A Story of Units®

Eureka Math™

Grade 2, Module 7

Teacher Edition

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OVERVIEW

Module 7 presents an opportunity for students to practice addition and subtraction strategies within 100 and problem-solving skills as they learn to work with various types of units within the contexts of length, money, and data. Students represent categorical and measurement data using picture graphs, bar graphs, and line plots. They revisit measuring and estimating length from Module 2 but now use both metric and customary units.

Module 7 opens with students representing and interpreting categorical data. In Grade 1, students learned to organize and represent data with up to three categories. Now, in Grade 2, students build upon this understanding by drawing both picture and bar graphs (**2.MD.10**). First, they record category counts in a table, solving problems based on the information in the table. Next, they draw picture graphs in which each picture represents one object. Finally, they represent the same data set in the form of a bar graph, where one axis names the categories and the other shows a single-unit count scale. Students use the information to solve *put together, take apart,* and *compare* problems (**2.MD.10**), making connections to finding sums and differences on a number line diagram. In the final lesson of Topic A, students display money data in the form of a bar graph, thus establishing a connection to word problems with coins in Topic B.

In Topic B, students work with the most popular units of all: bills and coins. Students apply their knowledge of coin values, place value strategies, and the properties of operations to solve addition and subtraction word problems (**2.NBT.5**, **2.MD.8**) to find the total value of a group of coins or bills. Next, they use coins to find multiple ways to represent the same quantity, sometimes using the fewest number of coins. Students then focus on the decomposition of a dollar, where they see that this unit behaves like all others they have seen before (e.g., 100 ones = 1 hundred, 100 cm = 1 m). Students learn how to make change from one dollar using counting on, simplifying strategies (e.g., number bonds), and the relationship between addition and subtraction. As students use coins or bills to solve addition and subtraction word problems within 100,[1] they use drawings and equations to represent the unknown in various situations. The Application Problems throughout this module include solving two-step word problems involving two-digit money amounts (e.g., $28 + $47 or 28¢ + 47¢), as students use this new context to increase fluency with addition and subtraction within 100 (**2.NBT.5**).

After the Mid-Module Assessment, Topic C reviews the measurement concepts and skills presented in Module 2, now with a focus on customary units. Students deepen their understanding of a *length unit* as they lay one-inch square tiles end-to-end to create simple inch rulers, just as they created centimeter rulers in Module 2. They see again that the smaller the unit, the more iterations are necessary to cover a given distance. Students measure the length of various objects with their new unit rulers (**2.MD.1**), applying

[1]Totals are limited to within 100 cents, or 1 dollar, when working with coins, and 100 dollars when working with bills.

important concepts such as the understanding that the zero point on a ruler is the beginning of the total length and the number on a ruler means the distance covered by that number of length units.

In Topic D, students apply their measurement skills and knowledge of the ruler to measure a variety of objects using the appropriate measurement tools, such as inch rulers and yardsticks, just as they measured with centimeter rulers, meter sticks, and meter tapes in Module 2 (**2.MD.1**). Students thereby add to their bank of benchmark lengths, such as an inch being the distance across a quarter. By doing so, students develop mental images of an inch, a foot, or a yard, which empowers them to estimate a given length (**2.MD.3**).

In addition, in Topic D, students measure objects using both metric and customary length units, thereby developing an understanding of how the number of units needed depends upon the size of the unit chosen (**2.MD.2**). As in Topic C, students recognize, for example, that the smaller the length unit, the more iterations are necessary to cover a given distance. Topic D concludes with students measuring to determine how much longer one object is than another (**2.MD.4**). Students use addition and subtraction to compare two lengths, subtracting the length of the shorter object from the length of the longer object to determine the difference (e.g., 40 in – 35 in = 5 in, or 35 in + _____ = 40 in).

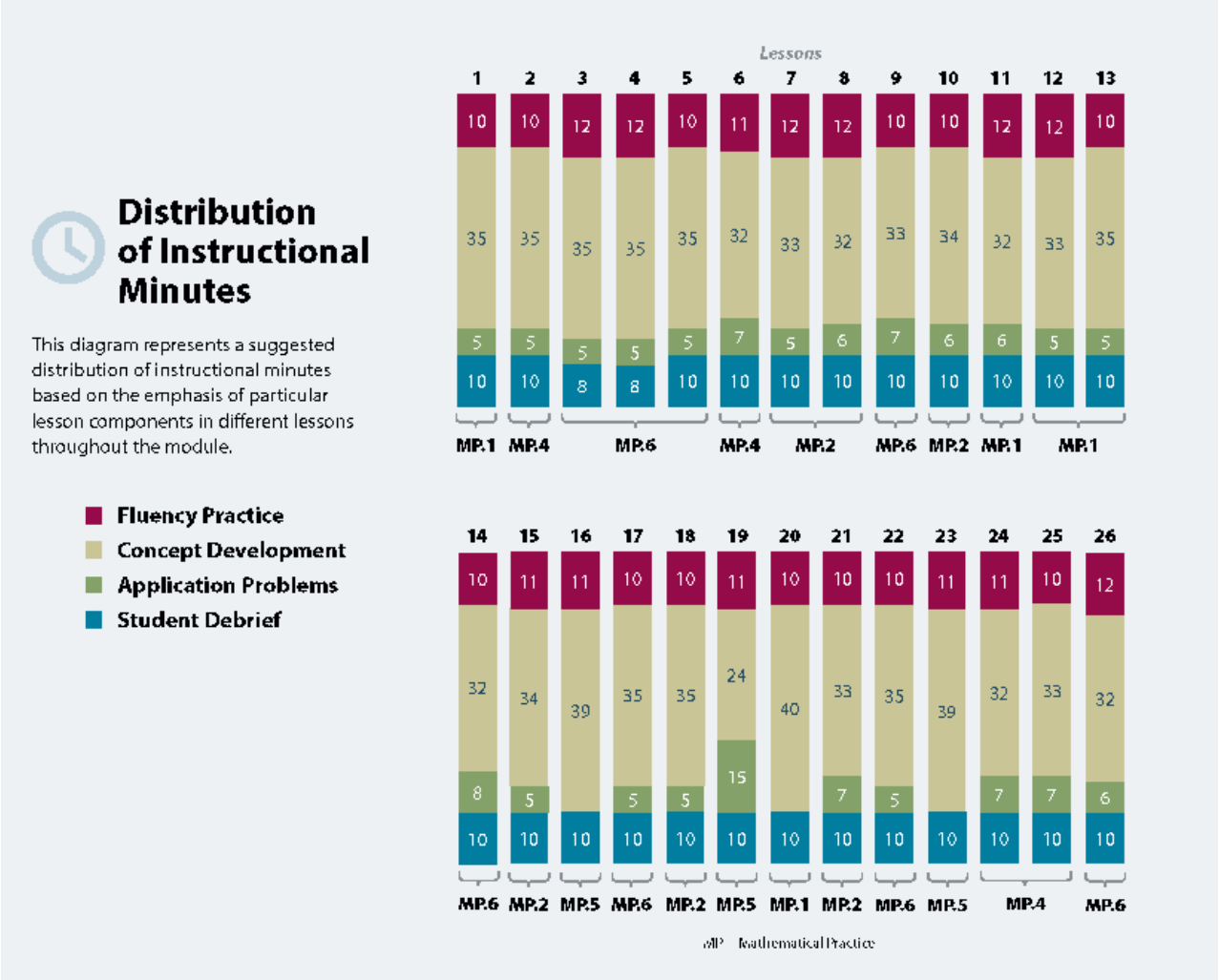
Whereas in Topic D students used rulers to compare lengths, in Topic E, students use drawings (e.g., tape diagrams and number bonds) and equations with an unknown to represent addition and subtraction word problems (**2.MD.5**). Once they have a solid conceptual understanding of length, students are ready to represent whole numbers as lengths on a number line (**2.MD.6**) and apply their knowledge of the ruler to a number line diagram. In Topic E, they are asked to identify unknown numbers on a number line by using place value, reference points (e.g., 5, 10, 25, and 50), and the distance between points. Students are also asked to represent two-digit sums and differences using the number line as a measurement model for combining and comparing lengths.

Topic F follows naturally, with students generating measurement data and representing it with a line plot (**2.MD.9**). Students position data along a horizontal scale with whole number markings, drawn as a number line diagram (**2.MD.6**). Since students are working with length, the scale on their line plots corresponds to the scale on their rulers. After generating measurement data, students create line plots from different data sets, and then they discuss and interpret the results.

The Mid-Module Assessment follows Topic B, and the End-of-Module Assessment follows Topic F.

Notes on Pacing for Differentiation

If pacing is a challenge, consider consolidating Lessons 1 and 2, Lessons 3 and 4, Lessons 11 and 12, and Lessons 14 and 15. Omit Lesson 26, or consolidate it with Lesson 25.



Focus Grade Level Standards

Use place value understanding and properties of operations to add and subtract.

2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Measure and estimate lengths in standard units.

2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

2.MD.3 Estimate lengths using inches, feet, centimeters, and meters.

2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.

Work with time and money.[2]

2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

Represent and interpret data.

2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Foundational Standards

1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps*.

1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (See CCSS-M Glossary, Table 1.)

[2]Focus on money. Time is taught in Module 8.

2.NBT.2 Count within 1000; skip-count by 5s[3], 10s, and 100s.

2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

Focus Standards for Mathematical Practice

MP.1 **Make sense of problems and persevere in solving them.** Students draw to determine the part–whole relationships embedded within various word problem types, and based on their analysis, they persevere to use various addition and subtraction strategies to solve problems. They then persist in making a statement of the solution to answer the question in the original context. In this module, the problem-solving contexts involve length, money, and data.

MP.2 **Reason abstractly and quantitatively.** Students compare measurements using rulers, tape diagrams, and graphs. After they abstract the number of units or length measurements to calculate differences, they reinterpret the difference using the given units within a problem. Students also abstract the value from a set of coins to find the total value and then express that value once again in terms of dollars or cents.

MP.4 **Model with mathematics.** Students create drawings (e.g., tape diagrams) and write equations to model and solve word problems involving units of length, money, and data. Students use appropriate representations (e.g., line plot, bar graph, and picture graph) to visually display data. Students also use the number line to understand numbers and their relationships and to represent sums and differences within 100. Students organize their thinking about money by modeling with dollars and coins to solve addition and subtraction word problems.

MP.5 **Use appropriate tools strategically.** Students apply their measurement skills and knowledge of the ruler to measure a variety of objects using the appropriate measurement tools, such as inch rulers and yardsticks. When conventional measurement tools are not available, students make decisions about which resources might be helpful, such as using iteration with a shoe, a book, or a lima bean, while recognizing the limitations of such tools.

MP.6 **Attend to precision.** Students attend to precision when they iterate a physical unit to create inch rulers. They align the zero point on a ruler as the beginning of the total length, and they use various measurement tools and precise language to describe their experience: "I used an inch as the length unit." Students learn estimation strategies for measurement and make closer and closer approximations to the actual length. They assign specific values to different coins and count up, starting with the largest value. Students generate and represent data in a bar graph, picture graph, or line plot, labeling axes appropriately and specifying the unit of measure.

[3]Use an analog clock to provide a context for skip-counting by fives.

Overview of Module Topics and Lesson Objectives

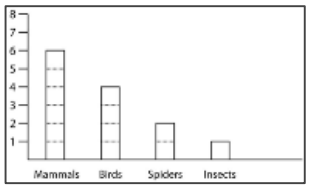
Standards		Topics and Objectives	Days
2.MD.10 2.MD.6	A	**Problem Solving with Categorical Data** Lesson 1: Sort and record data into a table using up to four categories; use category counts to solve word problems. Lesson 2: Draw and label a picture graph to represent data with up to four categories. Lesson 3: Draw and label a bar graph to represent data; relate the count scale to the number line. Lesson 4: Draw a bar graph to represent a given data set. Lesson 5: Solve word problems using data presented in a bar graph.	5
2.NBT.5 **2.MD.8** 2.NBT.2 2.NBT.6	B	**Problem Solving with Coins and Bills** Lesson 6: Recognize the value of coins and count up to find their total value. Lesson 7: Solve word problems involving the total value of a group of coins. Lesson 8: Solve word problems involving the total value of a group of bills. Lesson 9: Solve word problems involving different combinations of coins with the same total value. Lesson 10: Use the fewest number of coins to make a given value. Lesson 11: Use different strategies to make $1 or make change from $1. Lesson 12: Solve word problems involving different ways to make change from $1. Lesson 13: Solve two-step word problems involving dollars or cents with totals within $100 or $1.	8
		Mid-Module Assessment: Topics A–B (assessment ½ day, return ½ day, remediation or further applications 1 day)	2
2.MD.1	C	**Creating an Inch Ruler** Lesson 14: Connect measurement with physical units by using iteration with an inch tile to measure. Lesson 15: Apply concepts to create inch rulers; measure lengths using inch rulers.	2

Standards	Topics and Objectives		Days
2.MD.1 **2.MD.2** **2.MD.3** **2.MD.4**	D	**Measuring and Estimating Length Using Customary and Metric Units** Lesson 16: Measure various objects using inch rulers and yardsticks. Lesson 17: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks. Lesson 18: Measure an object twice using different length units and compare; relate measurement to unit size. Lesson 19: Measure to compare the differences in lengths using inches, feet, and yards.	4
2.MD.5 **2.MD.6** 2.NBT.2 2.NBT.4 2.NBT.5	E	**Problem Solving with Customary and Metric Units** Lesson 20: Solve two-digit addition and subtraction word problems involving length by using tape diagrams and writing equations to represent the problem. Lesson 21: Identify unknown numbers on a number line diagram by using the distance between numbers and reference points. Lesson 22: Represent two-digit sums and differences involving length by using the ruler as a number line.	3
2.MD.6 **2.MD.9** 2.MD.1 2.MD.5	F	**Displaying Measurement Data** Lesson 23: Collect and record measurement data in a table; answer questions and summarize the data set. Lesson 24: Draw a line plot to represent the measurement data; relate the measurement scale to the number line. Lessons 25–26: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.	4
		End-of-Module Assessment: Topics A–F (assessment ½ day, return ½ day, remediation or further applications 1 day)	2
Total Number of Instructional Days			**30**

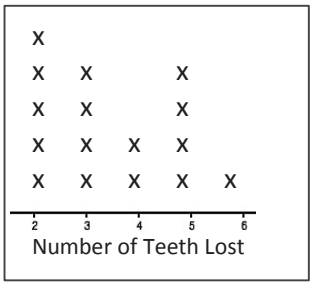
Terminology

New or Recently Introduced Terms

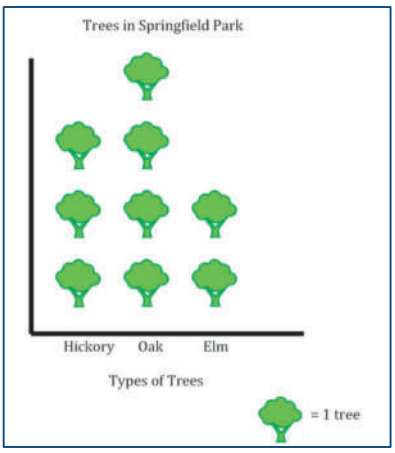
- Bar graph (pictured to the right)
- Category (a group of people or things sharing a common characteristic; e.g., bananas are in the fruit category)
- Data (a set of facts or pieces of information)
- Degree (unit used to measure temperature, e.g., degrees Fahrenheit)
- Foot (ft, a unit of length equal to 12 inches)
- Inch (in, a unit of length)
- Legend (the notation on a graph explaining what symbols represent)
- Line plot (a graphical representation of data—pictured to the right)
- Picture graph (a representation of data like a bar graph, using pictures instead of bars—pictured to the right)
- Scale (a number line used to indicate the various quantities represented in a bar graph—pictured below to the right)
- Survey (collecting data by asking a question and recording responses)
- Symbol (a picture that represents something else)
- Table (a representation of data using rows and columns)
- Thermometer (a tool used to measure temperature)
- Yard (yd, a unit of length equal to 36 inches or 3 feet)



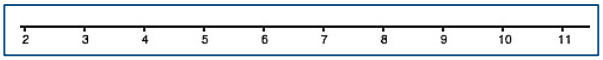
Bar Graph



Line Plot



Picture Graph



Scale

Familiar Terms and Symbols[4]

- Benchmark number (e.g., numbers like the multiples of 10)
- Centimeter (cm, a unit of length measure)
- Cents (e.g., 5¢)
- Coins (e.g., penny, nickel, dime, and quarter)
- Compare
- Compose
- Decompose
- Difference
- Dollars (e.g., $2)
- Endpoint

[4]These are terms and symbols students have seen previously.

- Equation
- Estimation (an approximation of the value of a quantity or number)
- Hash mark (the marks on a ruler or other measurement tool)
- Height
- Length
- Length unit
- Meter (m, a unit of length measure)
- Meter strip, meter stick
- Number bond
- Number line (a line marked at evenly spaced intervals)
- Overlap (to extend over or cover partly)
- Ruler
- Tally mark
- Tape diagram
- Unit
- Value

Suggested Tools and Representations

- Bar graph (representation of data)
- Centimeter cube
- Centimeter ruler
- Dice
- Grid paper
- Inch and centimeter ruler
- Inch tiles
- Line plot
- Measuring tape
- Meter stick
- Money (i.e., dollars, coins)
- Number bond
- Number line
- Personal white board
- Picture graph
- Table
- Tape diagram
- Yardstick

Scaffolds[5]

The scaffolds integrated into *A Story of Units* give alternatives for how students access information as well as express and demonstrate their learning. Strategically placed margin notes are provided within each lesson elaborating on the use of specific scaffolds at applicable times. They address many needs presented by English language learners, students with disabilities, students performing above grade level, and students performing below grade level. Many of the suggestions are organized by Universal Design for Learning (UDL) principles and are applicable to more than one population. To read more about the approach to differentiated instruction in *A Story of Units,* please refer to "How to Implement *A Story of Units*."

Assessment Summary

Type	Administered	Format	Standards Addressed
Mid-Module Assessment Task	After Topic B	Constructed response with rubric	2.NBT.5 2.MD.8 2.MD.10
End-of-Module Assessment Task	After Topic F	Constructed response with rubric	2.NBT.5 2.MD.1 2.MD.2 2.MD.3 2.MD.4 2.MD.5 2.MD.6 2.MD.8 2.MD.9 2.MD.10

[5]Students with disabilities may require Braille, large print, audio, or special digital files. Please visit the website www.p12.nysed.gov/specialed/aim for specific information on how to obtain student materials that satisfy the National Instructional Materials Accessibility Standard (NIMAS) format.

Topic A

Problem Solving with Categorical Data

2.MD.10, 2.MD.6

Focus Standard:	2.MD.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
Instructional Days:	5	
Coherence -Links from:	G1–M3	Ordering and Comparing Length Measurements as Numbers
-Links to:	G3–M6	Collecting and Displaying Data

In Topic A, student work revolves around categorical data, which is produced by sorting objects or information into categories. For example, students learn about categories of animal classes and habitats and then record that data in a table. Students also learn to use picture graphs and bar graphs to organize and represent the data in as many as four categories (**2.MD.10**). They learn that this organizing of information makes it easier to compare data and can help them solve problems.

In Lesson 1, working within a science context, students categorize animals into classes (mammals, birds, fish, and reptiles), organize them in the form of a table, and then use the category counts to solve simple *put together, take apart,* and *compare* word problems (**2.MD.10**). Students then repeat the process, sorting animals by habitat to create a second data set. They record category counts in the tables with both numerals and tally marks (see the images below).

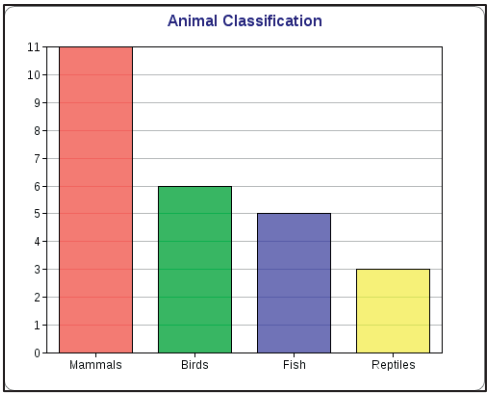
Animal Habitats		
Arctic	**Ocean**	**Woodland**
𝍸 |	𝍸	𝍸 𝍸 ||||

Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
6	5	11	3

In Lesson 2, students learn to draw and label a picture graph using the data from Lesson 1. Grid paper provides support as students construct these graphs. They learn that a graph can be oriented horizontally or vertically and that each picture represents one object.[1] Students ask and answer questions based on the information displayed in the graphs.

Following the same procedure and using the same data as in Lesson 2, students learn to draw and label a bar graph in Lesson 3. They learn that one axis names the category, while the other shows a single-unit count scale. As students ask and answer questions based on the data in the graphs, they relate the count scale to finding sums and differences on a number line diagram. In Lesson 4, students continue working with bar graphs to represent new data sets and solve simple word problems.

Topic A culminates in Lesson 5 as students display money data in a bar graph and use the data to solve word problems. This leads into problem solving with coins in Topic B.



A Teaching Sequence Toward Mastery of Problem Solving with Categorical Data

Objective 1: Sort and record data into a table using up to four categories; use category counts to solve word problems. (Lesson 1)

Objective 2: Draw and label a picture graph to represent data with up to four categories. (Lesson 2)

Objective 3: Draw and label a bar graph to represent data; relate the count scale to the number line. (Lesson 3)

Objective 4: Draw a bar graph to represent a given data set. (Lesson 4)

Objective 5: Solve word problems using data presented in a bar graph. (Lesson 5)

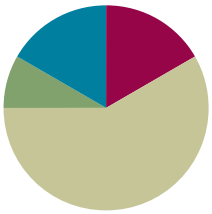
[1]Note that pictures can represent more than one object beginning in Grade 3.

Lesson 1

Objective: Sort and record data into a table using up to four categories; use category counts to solve word problems.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Count by 10 or 5 with Dimes and Nickels **2.NBT.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Count by 10 or 5 with Dimes and Nickels (5 minutes)

Materials: (T) 20 dimes, 20 nickels

Note: This activity uses dimes and nickels as representations of tens and fives to help students become familiar with coins while providing practice with counting forward and back by 10 or 5.

- Arrange 10 nickels in a ten-frame formation, and count up by 5 from 50 to 100. Ask how many nickels make 100 cents, how many fives are in 100 cents, and how many ones are in 100 cents. Add and subtract by 5 as you place and take away nickels.
- Arrange 9 dimes in a ten-frame formation, and count up by 10 from 90 to 150. Ask how many dimes make 150 cents, how many tens are in 150 cents, how many fives are in 150 cents, and how many ones are in 150 cents. Continue counting to 200. Ask how many dimes make 200 cents, how many tens are in 200 cents, and how many ones are in 200 cents. Add and subtract by 10 as you place and take away dimes.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets

Note: During Topic A and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. Five options are provided in this lesson for the Core Fluency Practice Set, with Sheet A being the most simple to Sheet E being the most complex. Start all students on Sheet A.

Students complete as many problems as they can in 120 seconds. The recommended goal is 100% accuracy and completion before moving to the next level. Collect any Practice Sets that have been completed within the 120 seconds, and check the answers. The next time Core Fluency Practice Sets are used, students who have successfully completed their sets can be provided with the next level. Keep a record of student progress.

Consider assigning early finishers a counting pattern and start number (e.g., count by fives from 195). Celebrate improvement as well as advancement. Students should be encouraged to compete with themselves rather than their peers. Discuss with students possible strategies to solve. Notify caring adults of each student's progress.

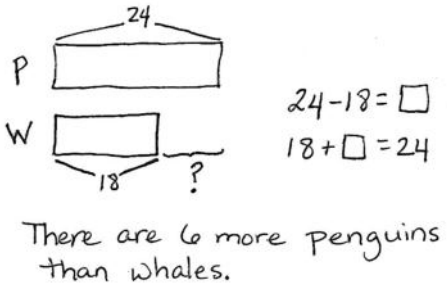
NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Scaffold the Application Problem for students who struggle by talking through it step-by-step and by asking questions, such as "How many penguins? How many whales? Are there more penguins or whales?" Watch students as they draw their tape diagrams to solve the problem, and insist that they represent the problem accurately.

Application Problem (5 minutes)

There are 24 penguins sliding on the ice. There are 18 whales splashing in the ocean. How many more penguins than whales are there?

Note: This problem's context leads into today's Concept Development, as students will be sorting animals by habitat. Also, it is a comparative problem type that lends itself to a tape diagram drawing. This sets the stage for students to notice the similarity between the bars of a tape diagram and the bars of a bar graph in Lesson 3.



Concept Development (35 minutes)

Materials: (T) 4 pieces of chart paper (see the chart list below) (S) Personal white board, 1 animal card from animal cards (Template) per pair

Note: Prior to this lesson, consider laminating the picture sheet to make reusable cards. Cut the sheet into individual pictures. Also, prepare the four charts listed below. Save these charts for work in this lesson and in Lessons 2 and 3.

Chart 1: Animal Characteristics with a tree map labeled *bird, mammal, reptile,* and *fish* (See the following page.)

Chart 2: Sentence frames to support language production

Chart 3: Animal Classification with a blank table labeled *bird, mammal, reptile,* and *fish*

Chart 4: Animal Habitats with a blank table labeled *arctic, woodland,* and *ocean*

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Support English language learners by introducing essential terms such as *characteristics*, *categories*, *data*, and *table* to them using visuals and multiple examples. Ask them to practice using the terms, pick out examples, and label pictures as examples of the different terms.

Have students sit on the carpet in a circle.

T: Let's play a guessing game!

T: I have two legs, wings, feathers, and I can fly. What am I? Whisper to your partner.

S: A bird!

T: Of course! I just described the characteristics of a bird. (Post Chart 1.) Where do you see the characteristics of a bird listed on this chart?

S: On the left! → Under the word *bird*.

T: (Show a picture of a fish. Point to Chart 2.) Use these sentence frames to tell your partner about this animal.

S: It is a fish. → A fish has scales and gills. → It can swim. → It can lay eggs.

T: What is this animal?

S: A fish!

T: So, what are the characteristics of a fish?

S: It has scales. → It has fins and gills. → It swims.

T: Yes! Let's sort animals into **categories**, or groups, based on their characteristics.

Chart 1

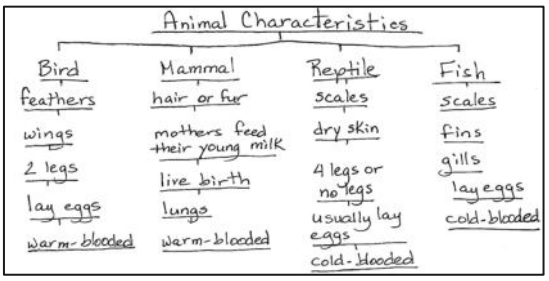


Chart 2

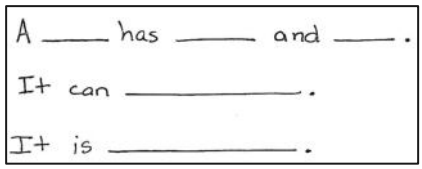
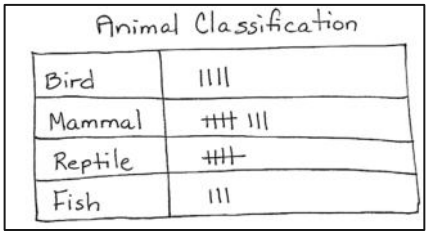


Chart 3



Pass out one picture card to each pair of students. Have partners take turns using the sentence frames and the Animal Characteristics chart to describe their animals to each other. Then, have students sort the pictures into piles by category in the middle of the circle.

T: (Display Chart 3.) Here is a **table**. How can we organize our information, or **data**, so it's easier to know how many animals are in each category?

S: We could tape the pictures down in the row where they belong. → We could count how many are in each group and write the number in that row. → We could use tally marks.

T: Those are all excellent ideas! Let's record our category counts on this table using tally marks.

T: Count with me, and make tally marks in the air as I record each amount.

T: How many birds do we have?

Call on volunteers to count each pile of pictures one by one. Make tally marks for each amount in the appropriate category as students make tally marks in the air and count aloud with the teacher.

T: Now that the data are organized in this table, is it easy to see and count how many animals belong to each category?

S: Yes!

T: Let's count the tally marks in each category while I record the totals as numbers directly on the table. (Record the numbers to the right of the tally marks.)

T: Now we can use the data to answer some questions.

Pose questions such as those below, and have students write their answers on their personal white boards. Then, invite students to pose questions to the class based on the data.

- How many categories does this table have?
- How many animals did we sort altogether?
- How many more birds and mammals are there than reptiles and fish?
- How many fewer birds and fish are there than mammals and reptiles?
- How would the table change if we counted four more birds?

T: What are some other ways we could organize these animals?

S: We could sort them by what they eat. → Or by where they live. → We could sort them by whether they are predators or prey!

T: I like your thinking! Let's sort them by their habitats, or where they live. (Display Chart 4.)

Chart 4

Animal Habitats		
Arctic	Woodland	Ocean
4	10	6

Repeat the process with animal habitats, but this time record numbers instead of tally marks.

Prompt students to discuss which recording is easier to read, tally marks or numbers. Some students may say numbers because the total is given so they do not have to count the tally marks. However, some students may reference the visual length of the tally marks as helpful, particularly with questions of most and least. This touches on the tally's resemblance to bars in a tape diagram, a relationship that is more pronounced when students create and use bar graphs in Lesson 3.

Make a quick drawing to show Chart 4 drawn vertically. Ask students whether the orientation of the table affects the data in any way.

After creating the table on Chart 4, have students write their answers to questions such as those below. Then, invite partners to ask and answer questions that they create.

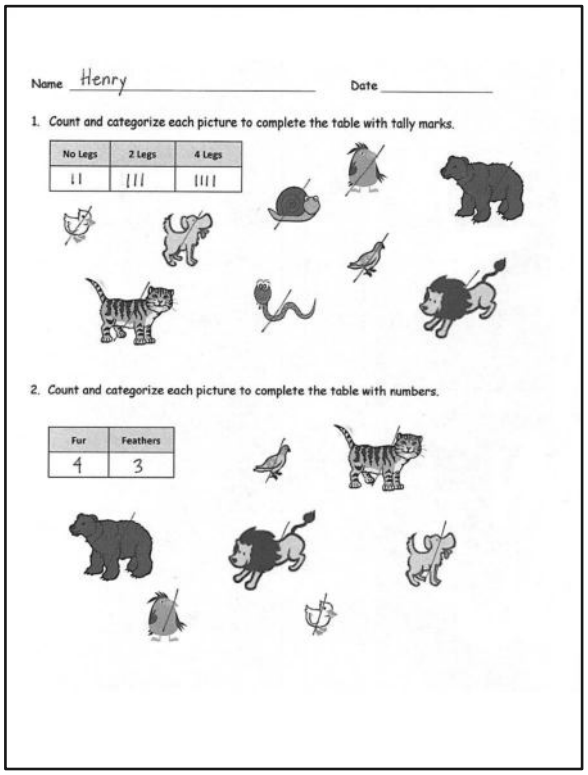
MP.1

- How many categories does this table have?
- Which category has the fewest animals? Which has the most?
- What is the total number of animals that live in the woodland and the ocean?
- How many fewer animals live in the arctic than in the ocean?
- How many more animals would need to be in the arctic category to have the same number as animals in the woodland category?
- How many more arctic and ocean animals are there than woodland animals? (Note that some students believe the wording *how many more* means there must be a difference. Have students who answer correctly explain their answers.)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the purposeful sequencing of the Problem Set guide your selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Consider assigning incomplete problems for homework or at another time during the day.



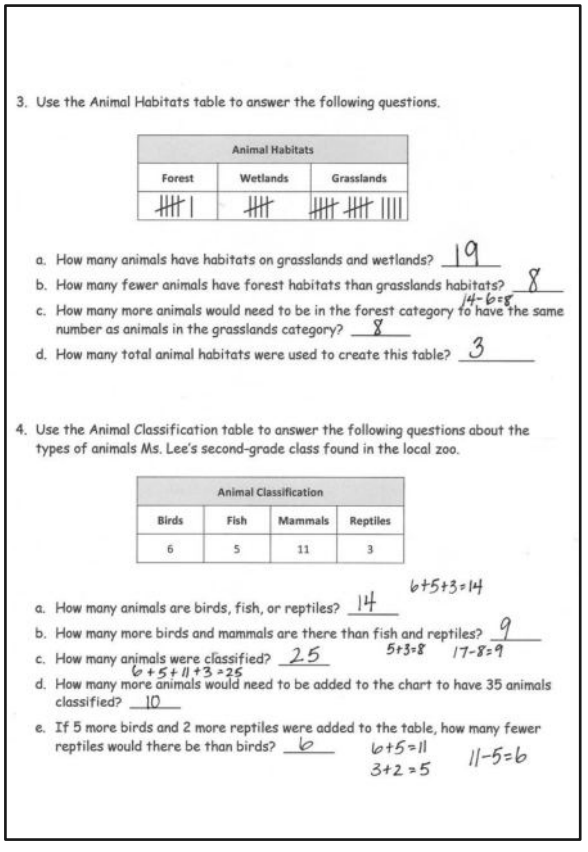
Name Henry Date

1. Count and categorize each picture to complete the table with tally marks.

No Legs	2 Legs	4 Legs
II	III	IIII

2. Count and categorize each picture to complete the table with numbers.

Fur	Feathers
4	3



3. Use the Animal Habitats table to answer the following questions.

Animal Habitats		
Forest	Wetlands	Grasslands
IIII I	IIII	IIII IIII IIII

a. How many animals have habitats on grasslands and wetlands? 19
b. How many fewer animals have forest habitats than grasslands habitats? 8 14-6=8
c. How many more animals would need to be in the forest category to have the same number as animals in the grasslands category? 8
d. How many total animal habitats were used to create this table? 3

4. Use the Animal Classification table to answer the following questions about the types of animals Ms. Lee's second-grade class found in the local zoo.

Animal Classification			
Birds	Fish	Mammals	Reptiles
6	5	11	3

a. How many animals are birds, fish, or reptiles? 14 6+5+3=14
b. How many more birds and mammals are there than fish and reptiles? 9 5+3=8 17-8=9
c. How many animals were classified? 25 6+5+11+3=25
d. How many more animals would need to be added to the chart to have 35 animals classified? 10
e. If 5 more birds and 2 more reptiles were added to the table, how many fewer reptiles would there be than birds? 6 6+5=11 3+2=5 11-5=6

Student Debrief (10 minutes)

Lesson Objective: Sort and record data into a table using up to four categories; use category counts to solve word problems.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at your Problem Set with a partner. Do you both have the same number of tallies in the **table** about animal legs? If you have a different number of tallies, talk to your partner about why that is. (A possible misstep is making a tally mark for each leg as opposed to one tally for the animal with four legs.)

- Look at the next table on your Problem Set. Could I have drawn the table like this? (Draw the table vertically, and write the categories in the left column.) If I make the table like this, does it change the **data** inside the table? Why or why not?
- Look at Problem 3(b) about animal habitats. Tell your neighbor what counting strategy you used to figure out how many fewer animals have forest habitats than grasslands habitats. (Strategies might include subtraction, matched marks and counted the extra, drew a picture, or crossed out objects.)
- Think about the two ways we recorded the value of our groups of animals in the tables we made today. Tell your neighbor which way you like to record information in a table. Can the same group of things be recorded in different ways? If yes, will the tallies or numbers be different in each table?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

1.	10 + 2 =	21.	7 + 9 =
2.	10 + 7 =	22.	5 + 8 =
3.	10 + 5 =	23.	3 + 9 =
4.	4 + 10 =	24.	8 + 6 =
5.	6 + 11 =	25.	7 + 4 =
6.	12 + 2 =	26.	9 + 5 =
7.	14 + 3 =	27.	6 + 6 =
8.	13 + 5 =	28.	8 + 3 =
9.	17 + 2 =	29.	7 + 6 =
10.	12 + 6 =	30.	6 + 9 =
11.	11 + 9 =	31.	8 + 7 =
12.	2 + 16 =	32.	9 + 9 =
13.	15 + 4 =	33.	5 + 7 =
14.	5 + 9 =	34.	8 + 4 =
15.	9 + 2 =	35.	6 + 5 =
16.	4 + 9 =	36.	9 + 7 =
17.	9 + 6 =	37.	6 + 8 =
18.	8 + 9 =	38.	2 + 9 =
19	7 + 8 =	39.	9 + 8 =
20.	8 + 8 =	40.	7 + 7 =

Name _____ Date _____

1.	10 + 6 =	21.	3 + 8 =
2.	10 + 9 =	22.	9 + 4 =
3.	7 + 10 =	23.	_____ + 6 = 11
4.	3 + 10 =	24.	_____ + 9 = 13
5.	5 + 11 =	25.	8 + _____ = 14
6.	12 + 8 =	26.	7 + _____ = 15
7.	14 + 3 =	27.	_____ = 4 + 8
8.	13 + _____ = 19	28.	_____ = 8 + 9
9.	15 + _____ = 18	29.	_____ = 6 + 4
10.	12 + 5 =	30.	3 + 9 =
11.	_____ = 2 + 17	31.	5 + 7 =
12.	_____ = 3 + 13	32.	8 + _____ = 14
13.	_____ = 16 + 2	33.	_____ = 5 + 9
14.	9 + 3 =	34.	8 + 8 =
15.	6 + 9 =	35.	_____ = 7 + 9
16.	_____ + 5 = 14	36.	_____ = 8 + 4
17.	_____ + 7 = 13	37.	17 = 8 + _____
18.	_____ + 8 = 12	38.	19 = _____ + 9
19	8 + 7 =	39.	12 = _____ + 7
20.	7 + 6 =	40.	15 = 8 + _____

Name _____ Date _____

1.	13 – 3 =	21.	16 – 8 =
2.	19 – 9 =	22.	14 – 5 =
3.	15 – 10 =	23.	16 – 7 =
4.	18 – 10 =	24.	15 – 7 =
5.	12 – 2 =	25.	17 – 8 =
6.	11 – 10 =	26.	18 – 9 =
7.	17 – 13 =	27.	15 – 6 =
8.	20 – 10 =	28.	13 – 8 =
9.	14 – 11 =	29.	14 – 6 =
10.	16 – 12 =	30.	12 – 5 =
11.	11 – 3 =	31.	11 – 7 =
12.	13 – 2 =	32.	13 – 8 =
13.	14 – 2 =	33.	16 – 9 =
14.	13 – 4 =	34.	12 – 8 =
15.	12 – 3 =	35.	16 – 12 =
16.	11 – 4 =	36.	18 – 15 =
17.	12 – 5 =	37.	15 – 14 =
18.	14 – 5 =	38.	17 – 11 =
19	11 – 2 =	39.	19 – 13 =
20.	12 – 4 =	40.	20 – 12 =

Name _____ Date _____

1.	17 – 7 =	21.	16 – 7 =
2.	14 – 10 =	22.	17 – 8 =
3.	19 – 11 =	23.	18 – 7 =
4.	16 – 10 =	24.	14 – 6 =
5.	17 – 12 =	25.	17 – 8 =
6.	15 – 13 =	26.	12 – 8 =
7.	12 – 3 =	27.	14 – 7 =
8.	20 – 11 =	28.	15 – 8 =
9.	18 – 11 =	29.	13 – 5 =
10.	13 – 5 =	30.	16 – 8 =
11.	_____ = 11 – 2	31.	14 – 9 =
12.	_____ = 12 – 4	32.	15 – 6 =
13.	_____ = 13 – 5	33.	13 – 6 =
14.	_____ = 12 – 3	34.	_____ = 13 – 8
15.	_____ = 11 – 4	35.	_____ = 15 – 7
16.	_____ = 13 – 2	36.	_____ = 18 – 9
17.	_____ = 11 – 3	37.	_____ = 20 – 14
18.	17 – 8 =	38.	_____ = 20 – 7
19	14 – 6 =	39.	_____ = 20 – 11
20.	16 – 9 =	40.	_____ = 20 – 8

Name _____ Date _____

1.	11 + 9 =	21.	13 – 7 =
2.	13 + 5 =	22.	11 – 8 =
3.	14 + 3 =	23.	15 – 6 =
4.	12 + 7 =	24.	12 + 7 =
5.	5 + 9 =	25.	14 + 3 =
6.	8 + 8 =	26.	8 + 12 =
7.	14 – 7 =	27.	5 + 7 =
8.	13 – 5 =	28.	8 + 9 =
9.	16 – 7 =	29.	7 + 5 =
10.	17 – 9 =	30.	13 – 6 =
11.	14 – 6 =	31.	14 – 8 =
12.	18 – 5 =	32.	12 – 9 =
13.	9 + 9 =	33.	11 – 3 =
14.	7 + 6 =	34.	14 – 5 =
15.	3 + 9 =	35.	13 – 8 =
16.	6 + 7 =	36.	8 + 5 =
17.	8 + 5 =	37.	4 + 7 =
18.	13 – 8 =	38.	7 + 8 =
19	16 – 9 =	39.	4 + 9 =
20.	14 – 8 =	40.	20 – 8 =

Name _____ Date _____

1. Count and categorize each picture to complete the table with tally marks.

No Legs	2 Legs	4 Legs









2. Count and categorize each picture to complete the table with numbers.

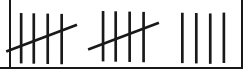
Fur	Feathers







3. Use the Animal Habitats table to answer the following questions.

Animal Habitats		
Forest	**Wetlands**	**Grasslands**
		

a. How many animals have habitats on grasslands and wetlands? ____

b. How many fewer animals have forest habitats than grasslands habitats? ____

c. How many more animals would need to be in the forest category to have the same number as animals in the grasslands category? ____

d. How many total animal habitats were used to create this table? ____

4. Use the Animal Classification table to answer the following questions about the types of animals Ms. Lee's second-grade class found in the local zoo.

Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
6	5	11	3

a. How many animals are birds, fish, or reptiles? ____

b. How many more birds and mammals are there than fish and reptiles? ____

c. How many animals were classified? ____

d. How many more animals would need to be added to the chart to have 35 animals classified? ____

e. If 5 more birds and 2 more reptiles were added to the table, how many fewer reptiles would there be than birds? ____

Name _____ Date _____

Use the Animal Classification table to answer the following questions about the types of animals at the local zoo.

Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
9	4	17	8

1. How many animals are birds, fish, or reptiles? ____

2. How many more mammals are there than fish? ____

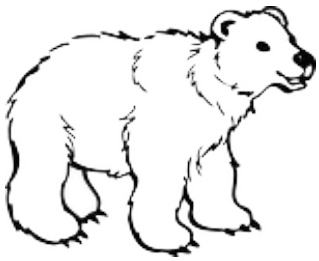
3. How many animals were classified? ____

4. How many more animals would need to be added to the chart to have 45 animals classified? ____

Name _____ Date _____

1. Count and categorize each picture to complete the table with tally marks.

No Legs	2 Legs	4 Legs







2. Count and categorize each picture to complete the table with numbers.

Fur	Feathers







3. Use the Animal Habitats table to answer the following questions.

Animal Habitats		
Arctic	**Forest**	**Grasslands**
6	11	9

a. How many animals live in the arctic? _____

b. How many animals have habitats in the forest and grasslands? _____

c. How many fewer animals have arctic habitats than forest habitats? _____

d. How many more animals would need to be in the grasslands category to have the same number as the arctic and forest categories combined? _____

e. How many total animal habitats were used to create this table? _____

4. Use the Animal Classification table to answer the following questions about the class pets in West Chester Elementary School.

Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
7	15	18	9

a. How many animals are birds, fish, or reptiles? ____

b. How many more birds and mammals are there than fish and reptiles? ____

c. How many animals were classified? ____

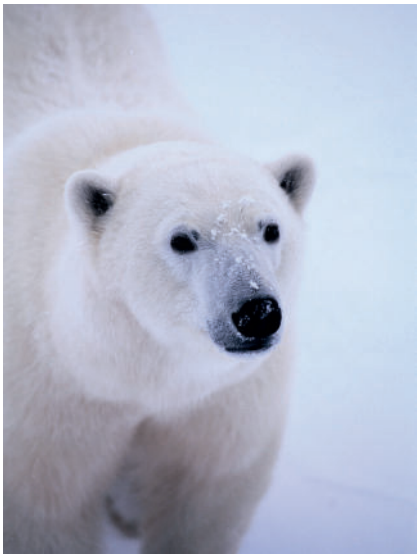
d. If 3 more birds and 4 more reptiles were added to the table, how many fewer birds would there be than reptiles? ____

African Penguin

The African penguin lays 2 eggs at a time.

Clown Anemonefish

The clown anemonefish has scales, fins, and gills.



Polar Bear

The polar bear's thick coat of insulated fur protects against the Arctic cold.

Barn Owl

The barn owl usually lays 4–7 eggs at a time.

Rough Green Snake

Rough green snakes lay 4–12 sticky eggs under a flat stone or log.

Seahorse

Male seahorses carry eggs in brood pouches. They swim using a small fin on their backs.

animal cards

Arctic Fox

The female Arctic fox can give birth to a litter of up to 14 pups.

Bottlenose Dolphin

Dolphins have lungs. They breathe air through a blowhole at the top of the head.

Brown Bear

Brown bear mothers give birth to cubs during hibernation. They don't even have to wake up!

Rabbit

Mother rabbits feed their babies milk once or twice a day.

Leopard Gecko

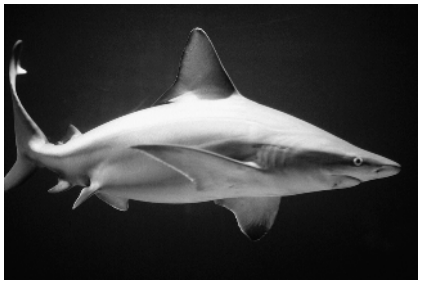
Leopard geckos are cold-blooded and absorb sunlight for warmth.

Green Iguana

Green iguanas often live in trees but come to the ground to lay eggs.

California Mountain King Snake

This snake is a cold-blooded animal with scales.



Bull Shark

Bull sharks' gills allow them to live in the shallow, warm waters of the ocean.

animal cards

Brown Field Mouse

Female field mice give birth to 4–7 babies at a time.

British Robin

Females lay 4–6 pale blue speckled eggs in a nest in the spring.

Rooster

These warm-blooded creatures are known for crowing at dawn.

Orca Whale

A baby orca, or calf, is born tailfirst and may weigh about 400 pounds.

Sea Turtle

Females lay eggs in a nesting hole in the sand.

Baby Harp Seal

Seal mothers give birth in the spring and can identify their babies by their smell.

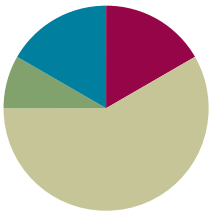
animal cards

Lesson 2

Objective: Draw and label a picture graph to represent data with up to four categories.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Coin Drop **2.OA.2, 2.NBT.2** (5 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic A and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Coin Drop (5 minutes)

Materials: (T) 10 dimes, 10 nickels, 10 pennies, can

Note: In this activity, students practice adding and subtracting ones, fives, and tens with coins.

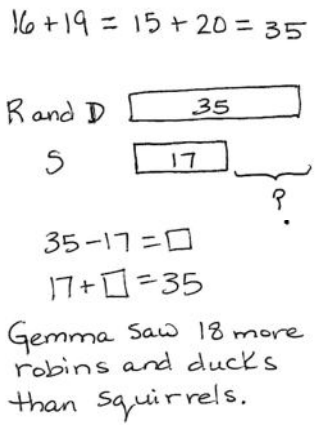
T: (Hold up a nickel.) Name my coin.
S: A nickel.
T: How much is it worth?
S: 5 cents.
T: Listen carefully as I drop coins in my can. Count along in your minds.

Drop in some nickels, and ask the value of the money in the can. Take out some of the nickels, and show them. Ask how much money is still in the can. Continue adding and subtracting nickels for a minute or so. Then, repeat the activity with dimes, then with nickels and pennies, and then dimes and pennies.

Application Problem (5 minutes)

Gemma is counting animals in the park. She counts 16 robins, 19 ducks, and 17 squirrels. How many more robins and ducks did Gemma count than squirrels?

Note: This comparative problem type invites the use of a tape diagram. It leads into today's lesson, in which students use data involving animals to solve simple *compare* word problems. It also prepares students to notice the relationship between the tape diagram and the bars on a bar graph in Lesson 3.



Concept Development (35 minutes)

Materials: (T) Animal Classification and Animal Habitats tables (Charts 3 and 4 from Lesson 1), 1 piece of chart paper (see below) (S) Vertical and horizontal picture graphs (Template 1), vertical picture graph (Template 2), crayons or colored pencils, personal white board, paper or math journal

Note: Prior to this lesson, prepare a chart for a new table: Favorite Class of Animal. At the end of the lesson, save this new table and the Template 1 and Template 2 graphs for work in Lesson 3.

Part 1: Use the vertical and horizontal picture graphs (Template 1).

T: (Display the Animal Classification table.) Yesterday, we organized information, or data, about animals into tables using tally marks and numbers.

T: A **picture graph** is another way we can show data. What do you think we use to show data on a picture graph?

S: Pictures!

T: Yes! Let's create a picture graph of the data in the Animal Classification table.

Pass out Template 1, and have students slide the sheet into their personal white boards. This way, the template can be used until students demonstrate proficiency in recording data.

Project or draw the first graph (vertical orientation on Template 1) on the board next to the Animal Classification table.

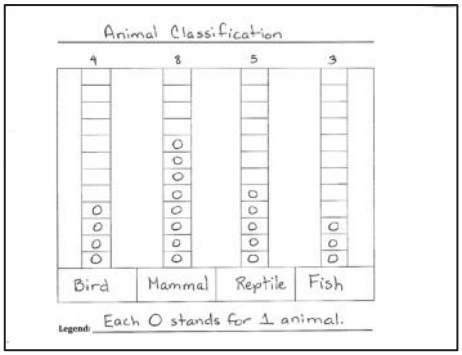
T: Since graphs help us understand information, we need to know what the graph is about. What is the title of our table?

S: Animal Classification.

T: Yes. Our picture graph is going to show the same information, so write this same title on the line above the first graph. (Model as students do the same.)

T: What are the four categories of animals we classified?

S: Bird. → Mammal. → Reptile. → Fish.



Template 1

T: Let's write these labels in the same order as they appear on the table. (Model as students do the same.)

T: Why do you think it matters that we write the categories in the same order as they appear on the table?

S: So we don't get confused. → So the information looks the same.

T: Yes. We want to be sure our data match up.

T: Now we're going to draw a picture in each box to represent each animal recorded by a tally mark on our table.

T: As always, it's math, not art, so we want to be quick and efficient. We don't have the time or enough space to draw a whale or a polar bear over and over in these little boxes, do we?

S: No!

T: What do we sometimes use in our math drawings that's quick and efficient?

S: A circle.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Do an Internet search of images to show visuals of unusual animals such as the Komodo dragon or the chameleon, and share interesting facts. Invite students from other countries to share any information about animals that may be specific to that geographic area.

T: Absolutely! A circle is a fast way to draw something, and it can stand for whatever we want it to stand for!

T: Today, our circles will be our picture, or **symbol**, for animals. Each circle will represent one animal, and we'll draw one circle in each box.

T: How many circles should we draw in the *bird* column?

S: Four circles!

T: Draw with me. (Model as students do the same. Continue this way to complete the picture graph.)

T: We need to add one more piece of information to our graph. We have to tell people what those circles stand for, so we need a **legend**, or key.

T: Does a circle stand for a box of crayons?

S: No!

T: What does each circle represent?

S: Each circle stands for one animal.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Support English language learners with sentence frames to guide them in posing and answering questions based on the data. For example, "We counted _____ birds, mammals, and reptiles," and, "The category with the fewest animals is _____."

T: Excellent! Add the legend on your graph. (Model as students do the same.)

T: It's also helpful to write the total for each category count right on the graph. Let's do that. (Model as students do the same.)

T: Now we're ready to use our graph to ask and answer questions about the data.

Pose questions such as those below, and have students write their answers on their personal white boards.

- How many birds, mammals, and reptiles did we count?
- Which category has the fewest animals? The most?
- How many fewer reptiles are there than mammals?

T: Now it is your turn to ask a comparison question. Use the sentence frame, "How many fewer ____ are there than ____?" to ask your partner a question about the graph.

S: How many fewer fish are there than reptiles? → How many fewer birds are there than mammals?

T: I like how you are careful with your questions. You made sure to put the class with fewer animals first in the sentence.

T: Let's ask another type of comparison question. This time use the sentence frame, "How many more ____ are there than ____?"

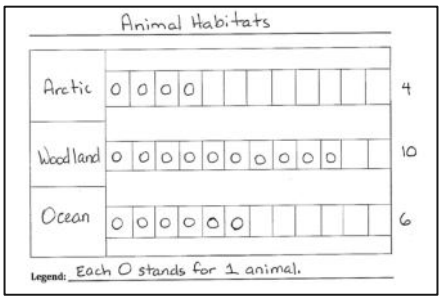
S: How many more mammals are there than reptiles? → How many more birds are there than fish?

T: Which class of animals did you say first in this question?

S: The one with more. → The one with a greater number of animals.

Repeat the process to create a picture graph of the data from the Animal Habitats table, using the second graph (horizontal orientation) on Template 1. As students demonstrate understanding, allow them to work with a partner or independently.

After creating the graph, invite partners to ask and answer questions based on the data.



Template 1

Part 2: Create picture graphs on graph paper.

Note: This next activity is designed to scaffold from the isolated columns and rows on Template 1 to the use of grid paper to create a vertical picture graph (Template 2).

T: Now that we've learned how to classify certain animals, let's gather some more data. I will **survey** the class to find out what your favorite class of animal is. (Display the Favorite Class of Animal table.)

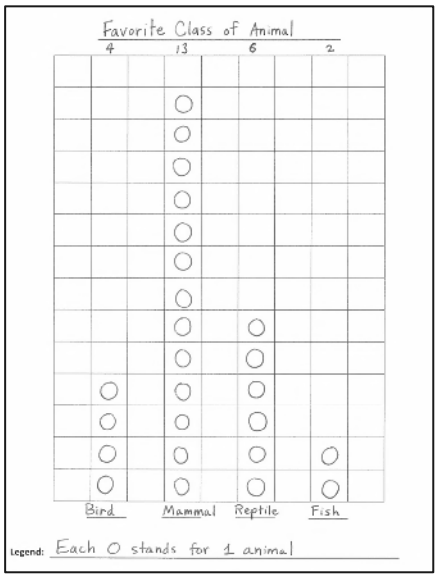
T: You each get one vote, and I will record your votes on this table. (Survey students and record votes, and then distribute Template 2.)

T: We're going to create a picture graph of the data, this time using grid paper.

MP.4 Guide students through the process of filling in the title, labels, and legend. Point out that they are only filling in the squares above the labels; the boxes to either side are left blank.

After completing the graph, ask partners to ask and answer comparison questions based on the data.

As students demonstrate proficiency creating and interpreting the graph, allow them to move on to the Problem Set. Continue working with any students who need support.



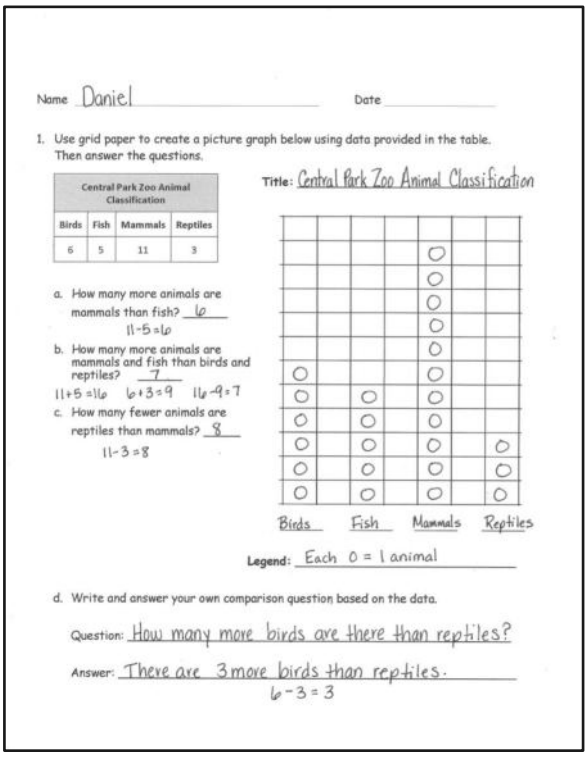
Template 2

Favorite Class of Animal

Bird	Mammal	Reptile	Fish
4	13	6	2

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Name Daniel Date

1. Use grid paper to create a picture graph below using data provided in the table. Then answer the questions.

Central Park Zoo Animal Classification			
Birds	Fish	Mammals	Reptiles
6	5	11	3

Title: Central Park Zoo Animal Classification

Birds Fish Mammals Reptiles

Legend: Each O = 1 animal

a. How many more animals are mammals than fish? 6
11-5=6

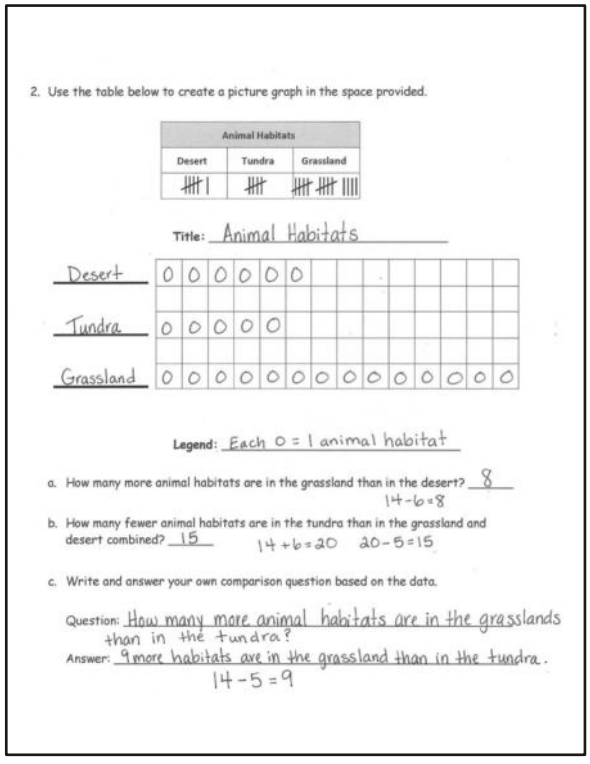
b. How many more animals are mammals and fish than birds and reptiles? 7
11+5=16 6+3=9 16-9=7

c. How many fewer animals are reptiles than mammals? 8
11-3=8

d. Write and answer your own comparison question based on the data.

Question: How many more birds are there than reptiles?

Answer: There are 3 more birds than reptiles.
6-3=3



2. Use the table below to create a picture graph in the space provided.

Animal Habitats		
Desert	Tundra	Grassland
6	5	14

Title: Animal Habitats

Desert Tundra Grassland

Legend: Each O = 1 animal habitat

a. How many more animal habitats are in the grassland than in the desert? 8
14-6=8

b. How many fewer animal habitats are in the tundra than in the grassland and desert combined? 15
14+6=20 20-5=15

c. Write and answer your own comparison question based on the data.

Question: How many more animal habitats are in the grasslands than in the tundra?

Answer: 9 more habitats are in the grassland than in the tundra.
14-5=9

Student Debrief (10 minutes)

Lesson Objective: Draw and label a picture graph to represent data with up to four categories.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Talk to your neighbor about why we call these graphs **picture graphs**. Are there pictures in the graph?
- Look at the first page of the Problem Set. Problem 1(a) asks how many more mammals than fish are in the table. Point to the pictures on your graph that tell the answer. Show your neighbor. (Guide students to see that in comparison problems, *more than* and *fewer than* refer to the extra circles of the two groups being compared.)
- Look at your Problem Set. Why does the grid paper make it easier to make a picture graph?
- Share the graph you created on the second page of the Problem Set with your neighbor. Do your graphs look the same? Can you understand your neighbor's graph? Is the information in the graph correct? Are there labels and **symbols**? Did they include a **legend**?

- Does it matter if we record our pictures or circles in rows or columns? Does it change the information in the graph?
- How does a picture graph help us organize information from a **survey**?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

1. Use grid paper to create a picture graph below using data provided in the table. Then, answer the questions.

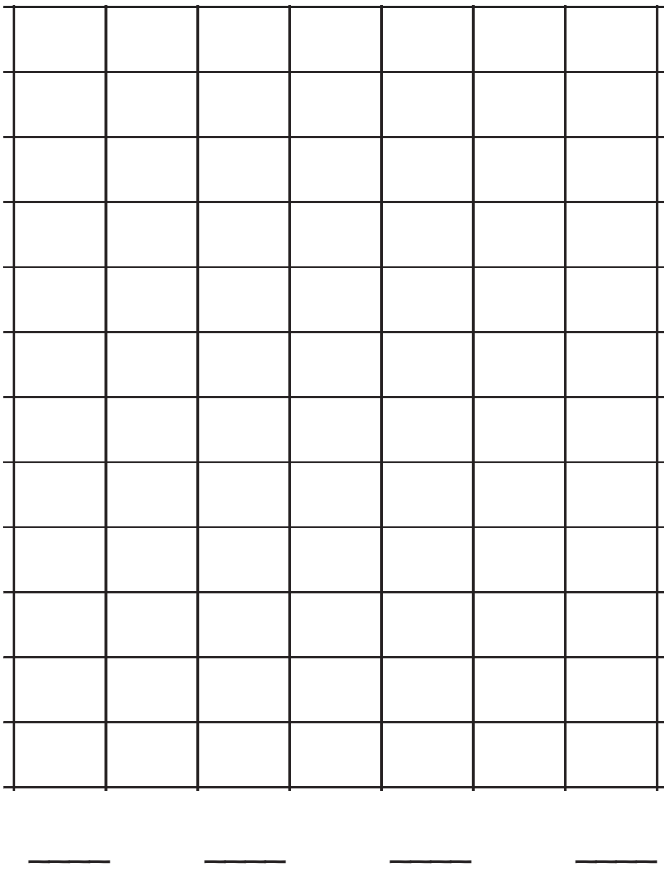
Central Park Zoo Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
6	5	11	3

a. How many more animals are mammals than fish? _____

b. How many more animals are mammals and fish than birds and reptiles? _____

c. How many fewer animals are reptiles than mammals? _____

Title: _____



_____ _____ _____ _____

Legend: _____

d. Write and answer your own comparison question based on the data.

Question: _____

Answer: _____

2. Use the table below to create a picture graph in the space provided.

Animal Habitats		
Desert	Tundra	Grasslands
𝍸 |	𝍸	𝍸 𝍸 |||

Title: _____

_____

_____

_____

Legend: _____

a. How many more animal habitats are in the grasslands than in the desert? ____

b. How many fewer animal habitats are in the tundra than in the grasslands and desert combined? ____

c. Write and answer your own comparison question based on the data.

Question: _____

Answer: _____

Name _____ Date _____

Use grid paper to create a picture graph below using data provided in the table. Then, answer the questions.

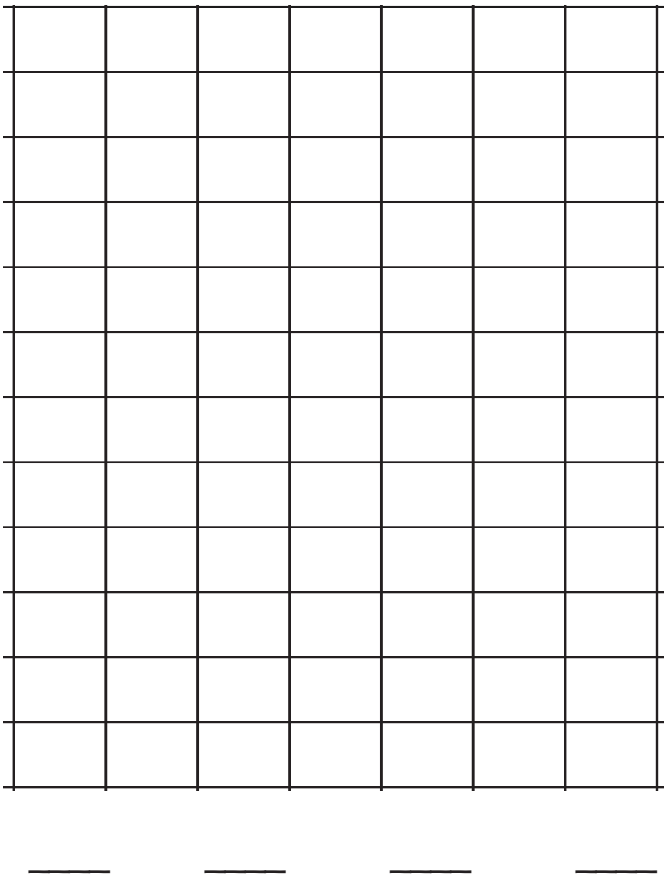
Fairview Park Zoo Animal Classification			
Birds	**Fish**	**Mammals**	**Reptiles**
8	4	12	5

a. How many more animals are mammals than birds? _____

b. How many more animals are mammals and reptiles than birds and fish? _____

c. How many fewer animals are fish than birds? _____

Title: _____



_____ _____ _____ _____

Legend: _____

Name _____ Date _____

1. Use grid paper to create a picture graph below using data provided in the table. Then, answer the questions.

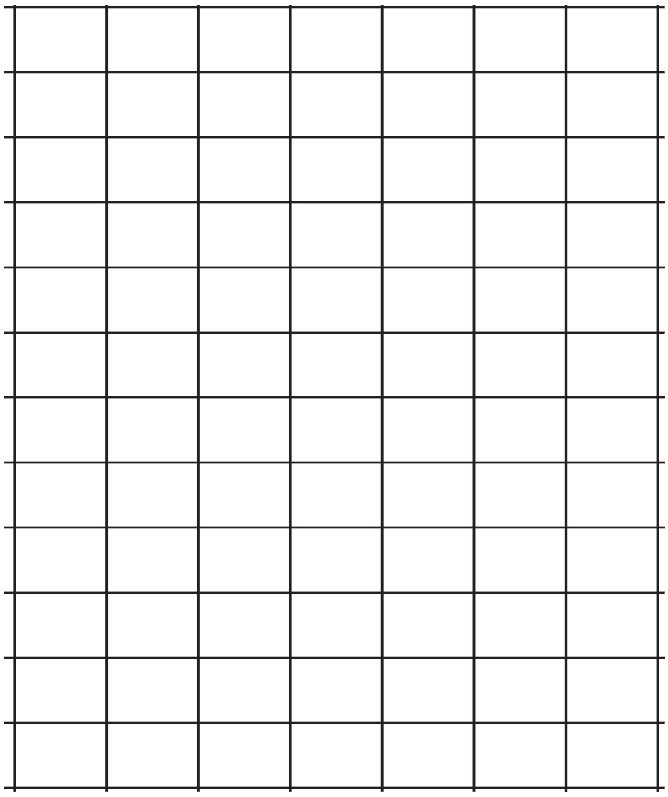
Favorite Mammals			
Tiger	Panda	Snow Leopard	Gorilla
8	11	7	12

a. How many more people chose gorilla as their favorite mammal than chose tiger? _____

b. How many more people chose tiger and gorilla as their favorite mammals than panda and snow leopard? _____

c. How many fewer people chose tiger as their favorite mammal than panda? _____

Title: _____



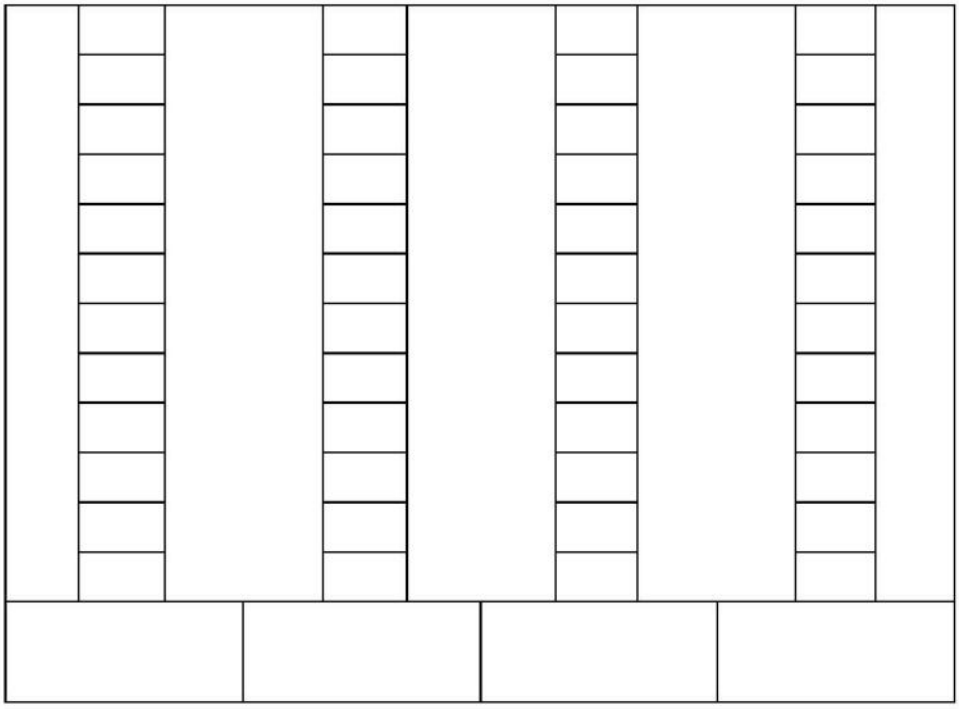
_____ _____ _____ _____

Legend: _____

d. Write and answer your own comparison question based on the data.

Question: _____

Answer: _____



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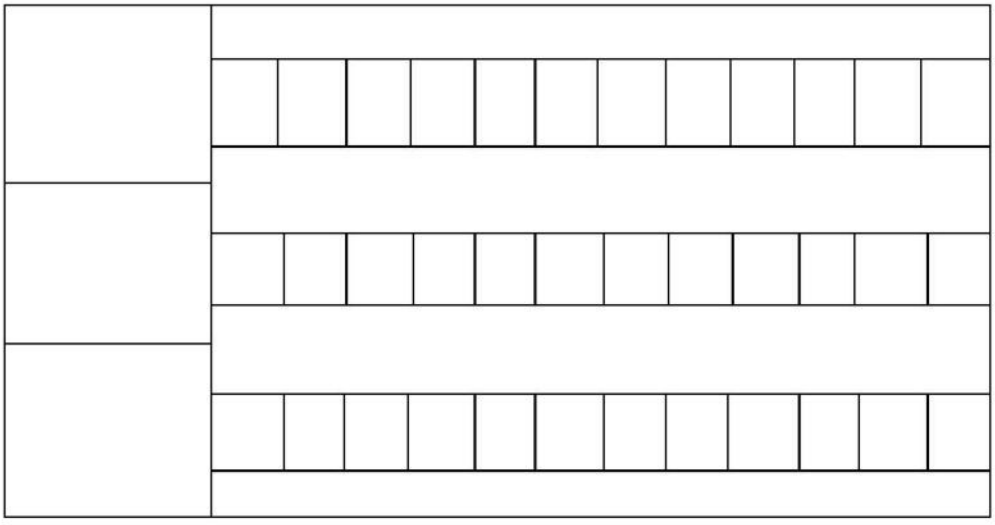

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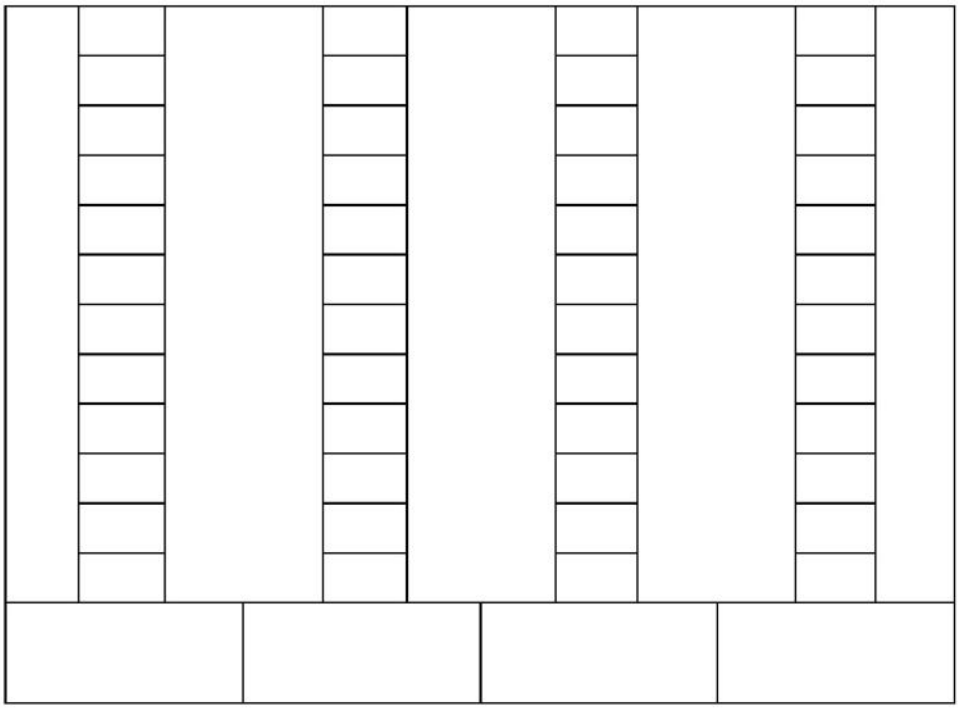

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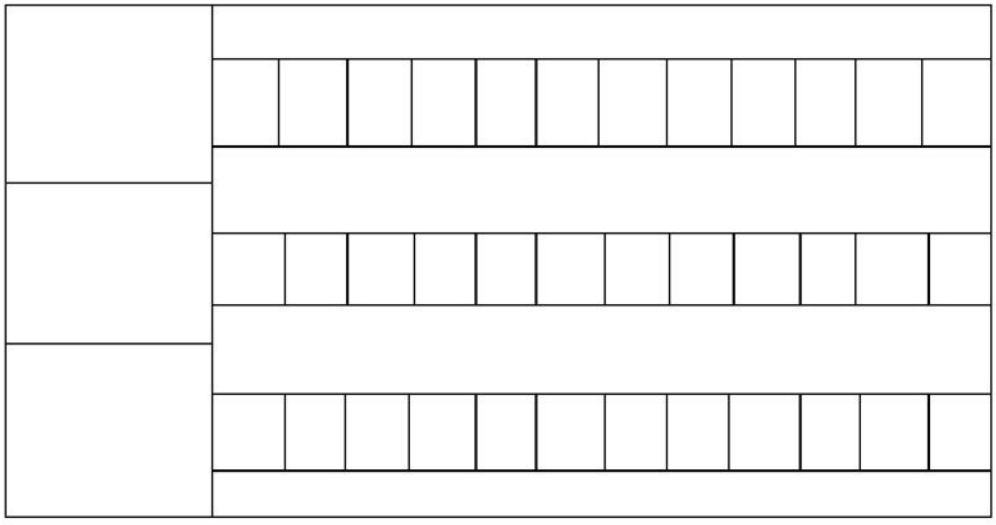
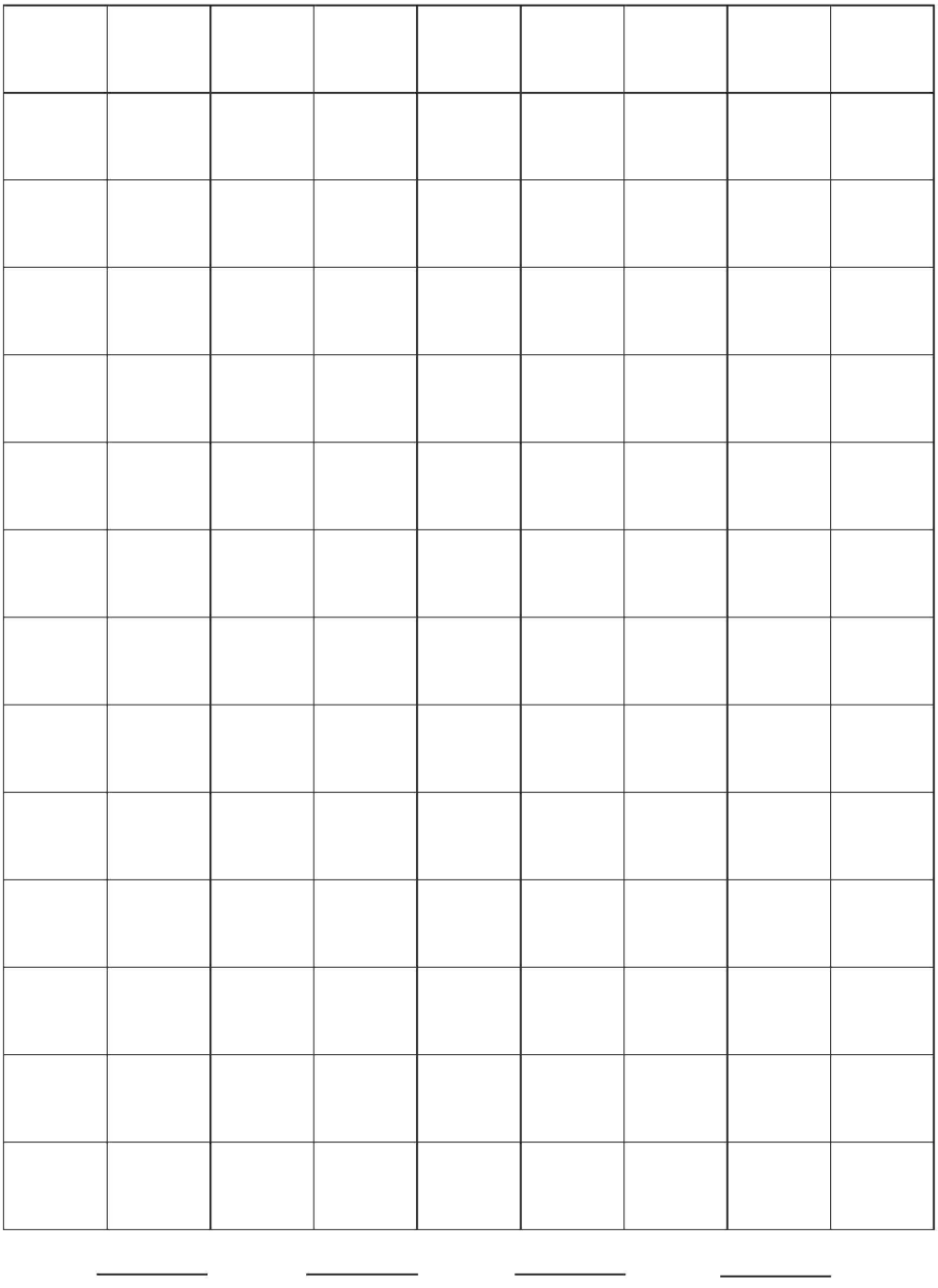


Legend: _____

vertical and horizontal picture graphs



Legend: _____

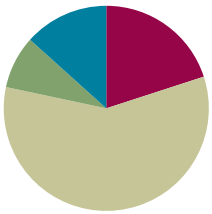
vertical picture graph

Lesson 3

Objective: Draw and label a bar graph to represent data; relate the count scale to the number line.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(8 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Addition and Subtraction by 5 **2.NBT.2** (9 minutes)
- Coin Drop **2.NBT.2, 2.OA.2** (3 minutes)

Sprint: Addition and Subtraction by 5 (9 minutes)

Materials: (S) Addition and Subtraction by 5 Sprint

Note: This Sprint gives practice adding and subtracting by 5 in preparation for counting nickels in Topic B.

Coin Drop (3 minutes)

Materials: (T) 10 dimes, 5 nickels, can

Note: In this activity, students practice adding and subtracting fives and tens.

T: (Hold up a nickel.) Name my coin.
S: A nickel.
T: How much is it worth?
S: 5 cents.
T: Listen carefully as I drop coins in my can. Count along in your minds.

Drop in some nickels, and ask how much money is in the can. Take out some of the nickels, and show them. Ask how much money is still in the can. Continue adding and subtracting nickels for a minute or so. Then, repeat the activity with dimes and nickels.

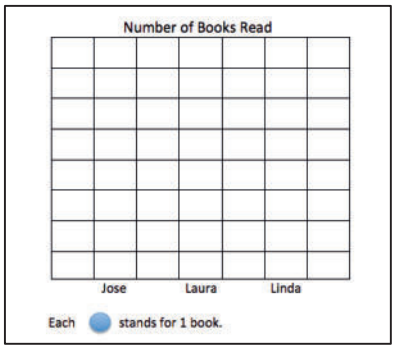
Application Problem (5 minutes)

Materials: (T) Tally chart (S) 1 Number of Books Read picture graphs (Template 1) per student

a. Use the tally chart to fill in the picture graph.

Number of Books Read

Jose	Laura	Linda
𝍸 III	𝍸	



b. Draw a tape diagram to show how many more books Jose read than Laura.

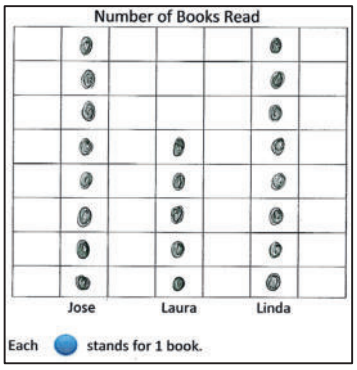
c. If Jose, Laura, and Linda read 21 books altogether, how many books did Linda read?

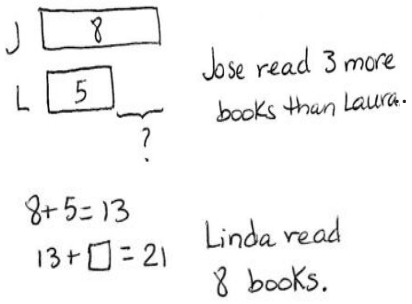
d. Complete the tally chart and the graph.

Note: This problem reviews creating and interpreting picture graphs. It also anticipates one element of the Concept Development in which students relate the bars of a graph to the bars of a tape diagram. Prior to the lesson, cut apart Template 1 so that each student receives one graph.

Number of Books Read

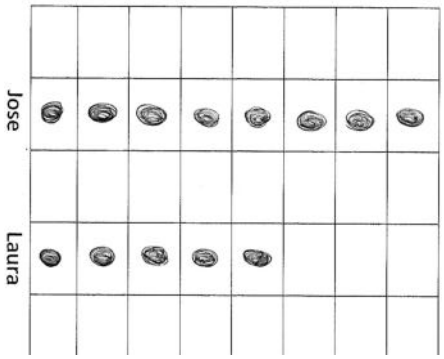
Jose	Laura	Linda
𝍸 III	𝍸	𝍸 𝍸 |





Concept Development (35 minutes)

Materials: (T) Horizontal and vertical bar graphs (Template 2), Chart 3: Animal Classification and Chart 4: Animal Habitats (from Lesson 1), completed Template 1 (from Lesson 2) (S) Tape diagrams from Application Problem, horizontal and vertical bar graphs (Template 2), personal white board, paper or math journal



T: Take your Application Problem, and turn it sideways like mine. (Model as students do the same.)

T: Talk with your partner: What do you notice about the picture graph when it's turned this way?

S: Hey! It looks just like a tape diagram! → The bars on the tape diagram show the same amount as the circles on the graph. → They both show that 8 is longer than 5. → They both show the difference between 8 and 5, but you can count the three empty spaces on the graph.

T: (Display the completed vertical picture graph [Lesson 2 Template 1], pictured below to the right.)

T: Talk with your partner: How can you tell by looking at the graph which category has more and which has less?

S: The category with the most is the tallest, and the category with the least is the shortest.

T: Do the data change if I turn the graph sideways? (Rotate the graph to the horizontal position.)

S: No!

T: True! So, we're learning some interesting things about graphs. We can change the position of the graph from vertical to horizontal, and the data stay the same.

T: (Display Chart 3: Animal Classification from Lesson 1.) And we learned we can show the same data in a table and in a picture graph.

T: Well, guess what? We can also show the information another way!

Project or draw the horizontal bar graph from Template 2. Then, pass out student copies of the template, and have students slide the sheet into their personal white boards.

T: We're going to create a **bar graph** to show the data from our Animal Classification table.

T: For our graph to make sense to someone who's reading it, it needs to have a title. What is the title of our chart?

S: Animal Classification!

T: We're showing the same information, just in a different way, so the title stays the same. Fill in the title while I do the same. (Record the title as students do the same.)

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

The language of comparison can be challenging for English language learners. Allow them to choose the language they prefer for discourse. Also, accompany comparative language such as *more, less, taller,* and *shorter,* with illustrative gestures.

Template 1 from Lesson 2

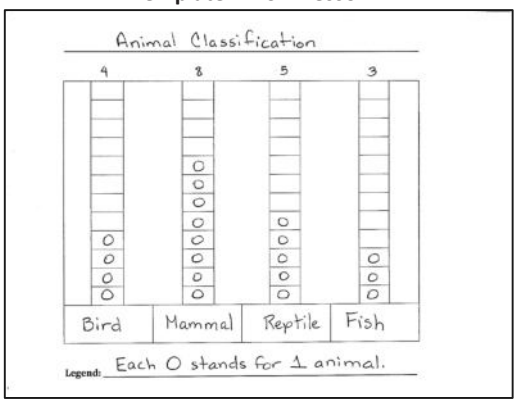
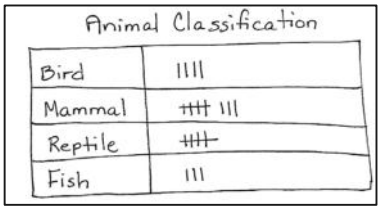
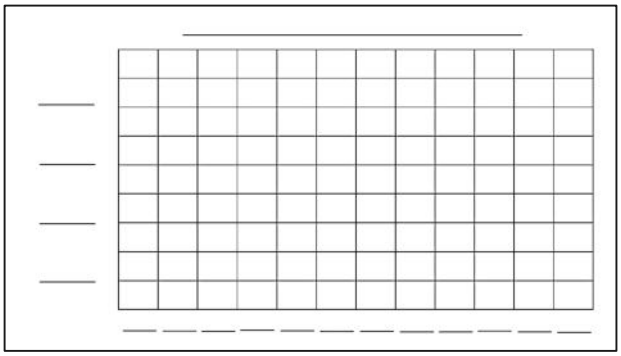


Chart 3 from Lesson 1





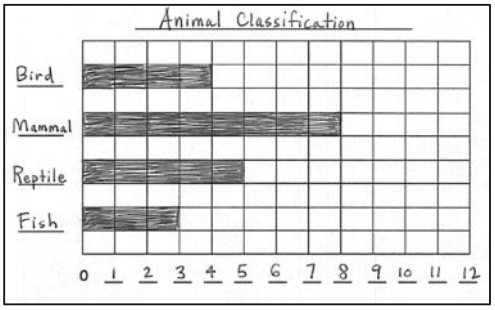
Template 2

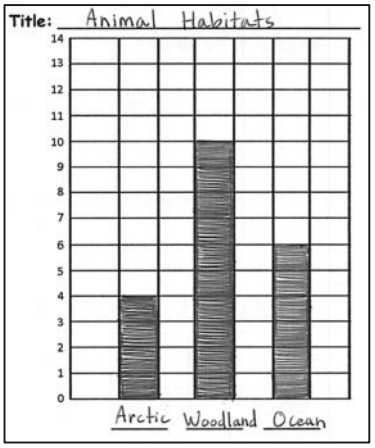
T: How many categories of animals did we classify?
S: Four!
T: Let's label those same categories in the same order on the bar graph. (Record as students do the same.)
T: How did we record the number of animals on the table?
S: We used tally marks.
T: And how did we represent the number of each animal on the picture graph?
S: We drew a picture to represent each animal.
T: Watch how we represent data on a bar graph. (Fill in the scale.)
T: (Point to the numbers.) First, I fill in the **scale**. What are we counting by?
S: Ones!
T: Yes. Whisper to your partner what the scale reminds you of.
S: It's like a meter strip. → It's like the numbers on a ruler. → It's a number line!
T: The scale tells us that each box equals one, so how many boxes should we color in for the bird category?
S: Four boxes!
T: Color four boxes in the bird row. (Model as students do the same. Continue in this way to complete the graph.)
T: Now, just as with the picture graph, we can use the bar graph to ask and answer questions.

MP.6

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

When comparing categories, have students make the *hop* with their fingers to show how they add and subtract on the number line. Alternatively, call students up to make live bars to compare categories. For example, to compare birds and fish, have a row of four students face a row of three students. Three students from each *bar* can hold hands, making it easy to see the difference.





Template 2

Pose questions such as those below, and have students write their answers on paper or in a math journal. Then, invite students to pose questions to the class based on the picture graph. Invite students to utilize the *compare* question sentence frames from Lesson 2 as needed.

- How many more mammals than reptiles are there?
- How many fewer birds than reptiles are there?
- How would the graph change if we added four more birds to the bird category?

Repeat the process to create a bar graph of the data from the Animal Habitats table using the second graph (vertical orientation) on Template 2.

After creating the graph, invite partners to ask and answer questions based on the data.

As students demonstrate proficiency creating and interpreting the graph, allow them to move on to the Problem Set. Continue working with any students who need support.

Problem Set (8 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (8 minutes)

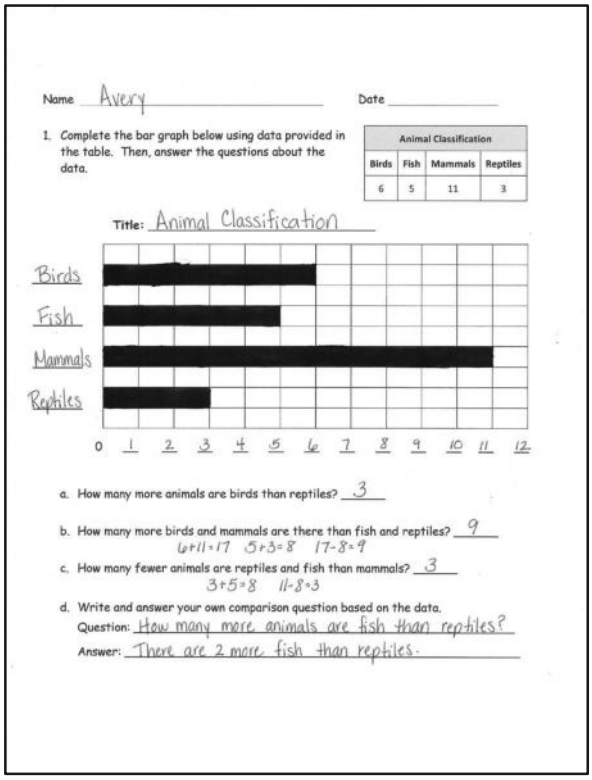
Lesson Objective: Draw and label a bar graph to represent data; relate the count scale to the number line.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the first graph in your Problem Set. What did you write on this graph that we didn't put on our graph yesterday? How do the numbers on the bottom help us to record data in a **bar graph**?
- Show your partner which part of your graph shows how many more birds than reptiles there are.
- Look at your neighbor's habitat graph. Are the numbers on the **scale** written horizontally or vertically?



Name Avery Date

1. Complete the bar graph below using data provided in the table. Then, answer the questions about the data.

Animal Classification			
Birds	Fish	Mammals	Reptiles
6	5	11	3

Title: Animal Classification

Birds
Fish
Mammals
Reptiles

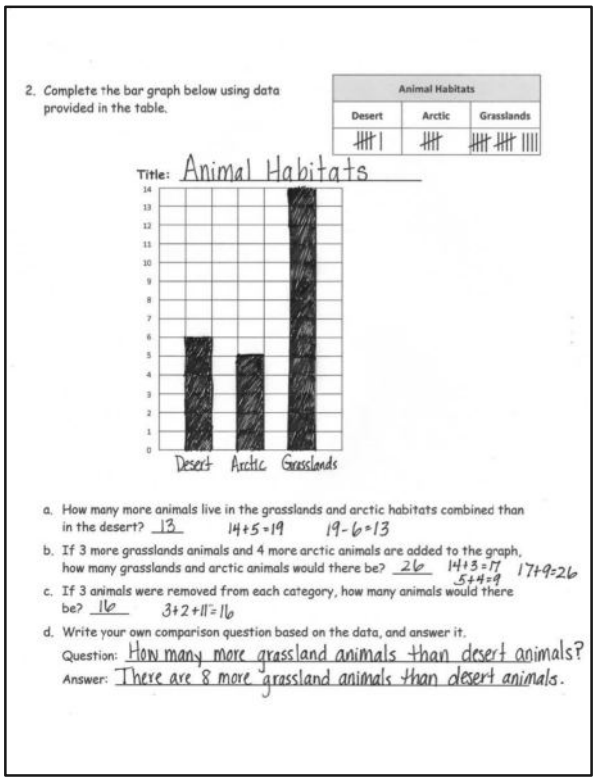
0 1 2 3 4 5 6 7 8 9 10 11 12

a. How many more animals are birds than reptiles? 3

b. How many more birds and mammals are there than fish and reptiles? 9
6+11=17 5+3=8 17-8=9

c. How many fewer animals are reptiles and fish than mammals? 3
3+5=8 11-8=3

d. Write and answer your own comparison question based on the data.
Question: How many more animals are fish than reptiles?
Answer: There are 2 more fish than reptiles.



2. Complete the bar graph below using data provided in the table.

Animal Habitats		
Desert	Arctic	Grasslands
6	5	14

Title: Animal Habitats

Desert Arctic Grasslands

a. How many more animals live in the grasslands and arctic habitats combined than in the desert? 13 14+5=19 19-6=13

b. If 3 more grasslands animals and 4 more arctic animals are added to the graph, how many grasslands and arctic animals would there be? 26 14+3=17 5+4=9 17+9=26

c. If 3 animals were removed from each category, how many animals would there be? 16 3+2+11=16

d. Write your own comparison question based on the data, and answer it.
Question: How many more grassland animals than desert animals?
Answer: There are 8 more grassland animals than desert animals.

- When you were coloring the boxes to record how many animal habitats are in the grasslands, did you count each box, or did you look at the numbers you wrote? Which strategy would be faster?
- Why are bar graphs good for making comparisons? Can you tell which category has more or less without using the scale? How does the scale help you make more precise comparisons?
- How does writing numbers on our graphs help us to use tape diagrams? How do bar and picture graphs help us to draw tape diagrams so that we can see the difference (more than or fewer than) between groups?
- Tell your partner the different types of graphs you know how to use. What are the differences and similarities between them? Do they all use numbers?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Addition and Subtraction by 5

1.	0 + 5 =	
2.	5 + 5 =	
3.	10 + 5 =	
4.	15 + 5 =	
5.	20 + 5 =	
6.	25 + 5 =	
7.	30 + 5 =	
8.	35 + 5 =	
9.	40 + 5 =	
10.	45 + 5 =	
11.	50 – 5 =	
12.	45 – 5 =	
13.	40 – 5 =	
14.	35 – 5 =	
15.	30 – 5 =	
16.	25 – 5 =	
17.	20 – 5 =	
18.	15 – 5 =	
19.	10 – 5 =	
20.	5 – 5 =	
21.	5 + 0 =	
22.	5 + 5 =	

23.	10 + 5 =	
24.	15 + 5 =	
25.	20 + 5 =	
26.	25 + 5 =	
27.	30 + 5 =	
28.	35 + 5 =	
29.	40 + 5 =	
30.	45 + 5 =	
31.	0 + 50 =	
32.	50 + 50 =	
33.	50 + 5 =	
34.	55 + 5 =	
35.	60 – 5 =	
36.	55 – 5 =	
37.	60 + 5 =	
38.	65 + 5 =	
39.	70 – 5 =	
40.	65 – 5 =	
41.	100 + 50 =	
42.	150 + 50 =	
43.	200 – 50 =	
44.	150 – 50 =	

B

Number Correct: _____

Improvement: _____

Addition and Subtraction by 5

1.	5 + 0 =	
2.	5 + 5 =	
3.	5 + 10 =	
4.	5 + 15 =	
5.	5 + 20 =	
6.	5 + 25 =	
7.	5 + 30 =	
8.	5 + 35 =	
9.	5 + 40 =	
10.	5 + 45 =	
11.	50 – 5 =	
12.	45 – 5 =	
13.	40 – 5 =	
14.	35 – 5 =	
15.	30 – 5 =	
16.	25 – 5 =	
17.	20 – 5 =	
18.	15 – 5 =	
19.	10 – 5 =	
20.	5 – 5 =	
21.	0 + 5 =	
22.	5 + 5 =	

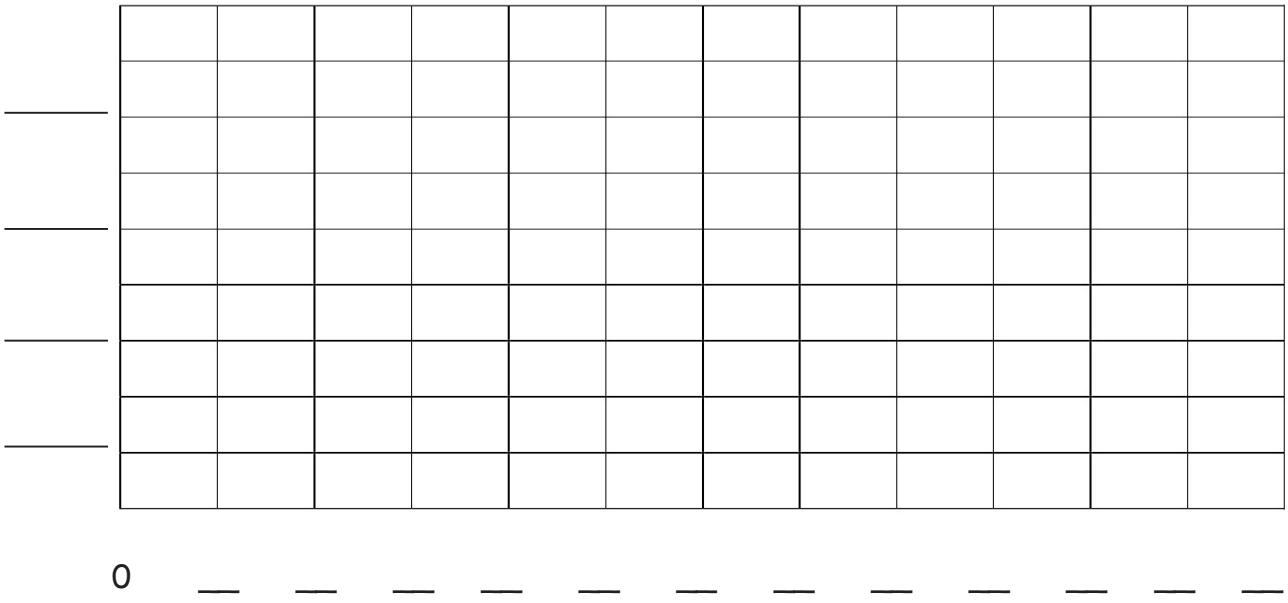
23.	10 + 5 =	
24.	15 + 5 =	
25.	20 + 5 =	
26.	25 + 5 =	
27.	30 + 5 =	
28.	35 + 5 =	
29.	40 + 5 =	
30.	45 + 5 =	
31.	50 + 0 =	
32.	50 + 50 =	
33.	5 + 50 =	
34.	5 + 55 =	
35.	60 – 5 =	
36.	55 – 5 =	
37.	5 + 60 =	
38.	5 + 65 =	
39.	70 – 5 =	
40.	65 – 5 =	
41.	50 + 100 =	
42.	50 + 150 =	
43.	200 – 50 =	
44.	150 – 50 =	

Name _____ Date _____

1. Complete the bar graph below using data provided in the table. Then, answer the questions about the data.

Animal Classification			
Birds	Fish	Mammals	Reptiles
6	5	11	3

Title: _____



a. How many more animals are birds than reptiles? _____

b. How many more birds and mammals are there than fish and reptiles? _____

c. How many fewer animals are reptiles and fish than mammals? _____

d. Write and answer your own comparison question based on the data.

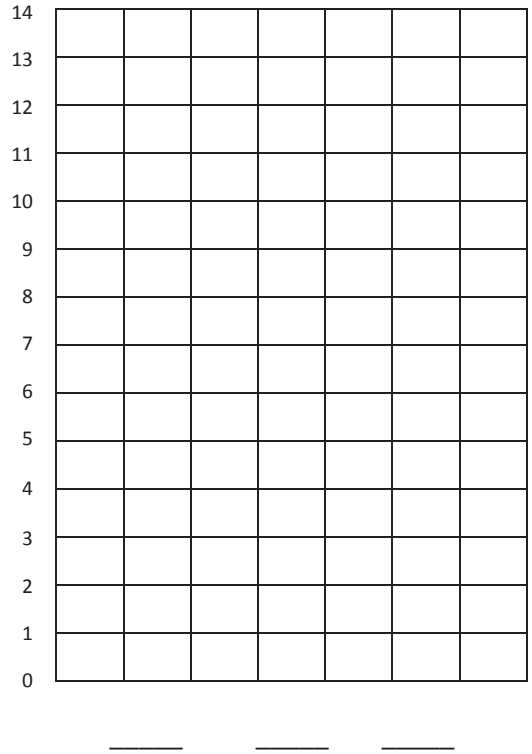
Question: _____

Answer: _____

2. Complete the bar graph below using data provided in the table.

Animal Habitats		
Desert	Arctic	Grasslands
𝍸 |	𝍸	𝍸 𝍸 ||||

Title: _____



_____ _____ _____

a. How many more animals live in the grasslands and arctic habitats combined than in the desert? _____

b. If 3 more grasslands animals and 4 more arctic animals are added to the graph, how many grasslands and arctic animals would there be? _____

c. If 3 animals were removed from each category, how many animals would there be? _____

d. Write your own comparison question based on the data, and answer it.

Question: _____

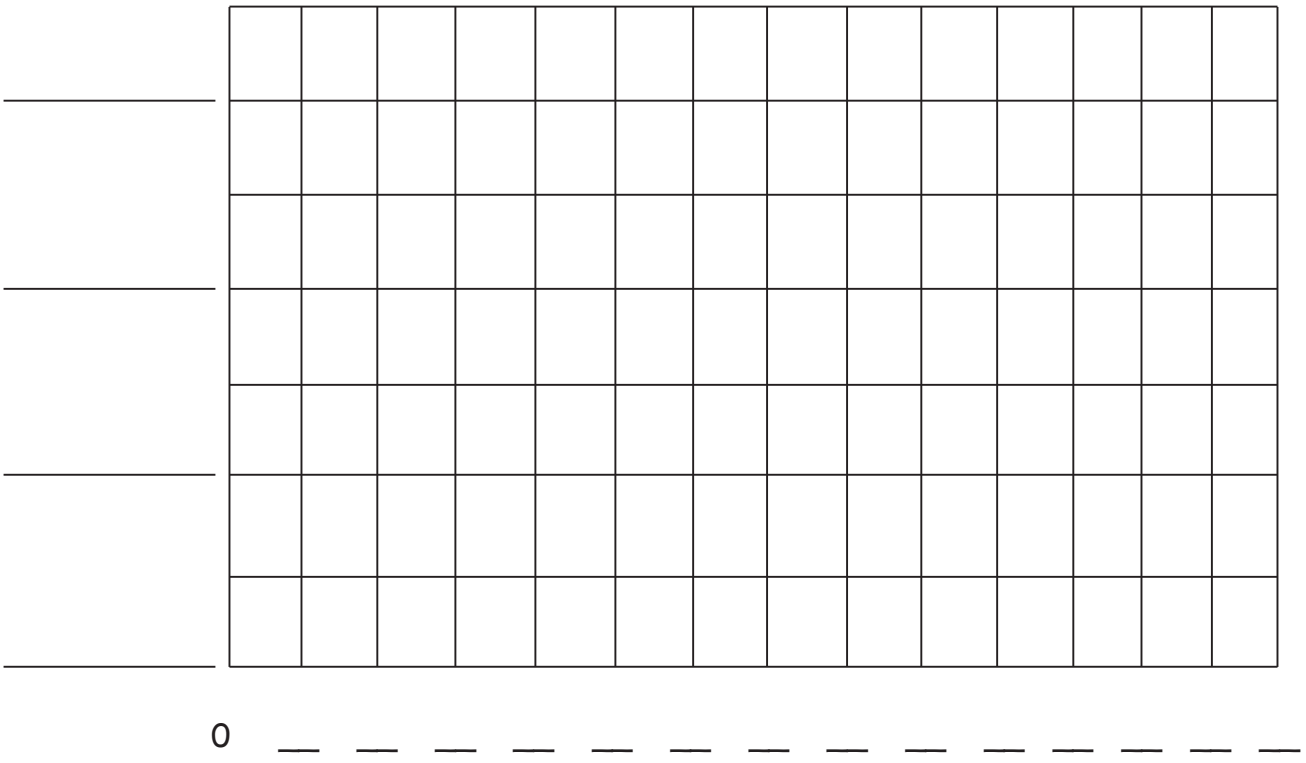
Answer: _____

Name _____ Date _____

Complete the bar graph below using data provided in the table. Then, answer the questions about the data.

Animal Classification			
Birds	Fish	Mammals	Reptiles
7	12	8	6

Title: _____



a. How many more animals are fish than reptiles? _____

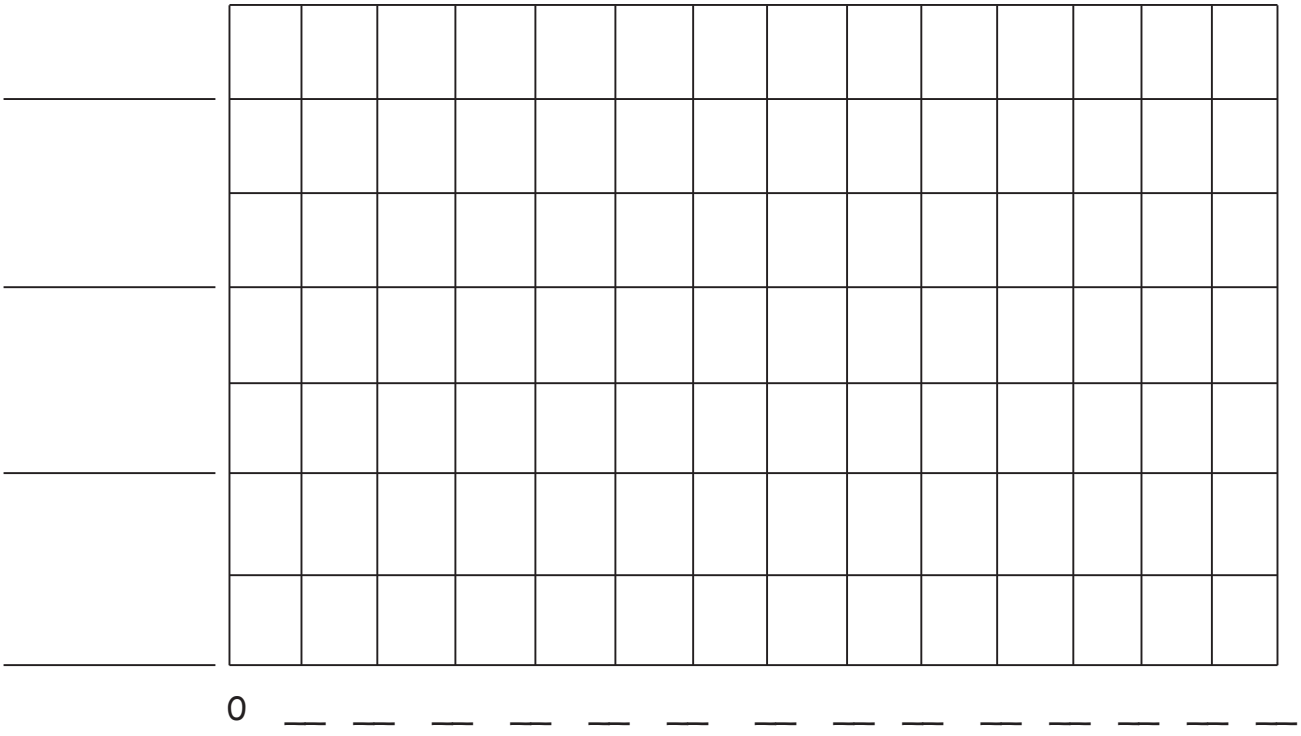
b. How many more fish and mammals are there than birds and reptiles? _____

Name _____ Date _____

1. Complete the bar graph below using data provided in the table. Then, answer the questions about the data.

Various Animal Coverings at Jake's Pet Shop			
Fur	Feathers	Shells	Scales
12	9	8	11

Title: _____



a. How many more animals have fur than shells? _____

b. Which pair of categories has more, fur and feathers or shells and scales? (Circle one.) How much more? ____

c. Write and answer your own comparison question based on the data.

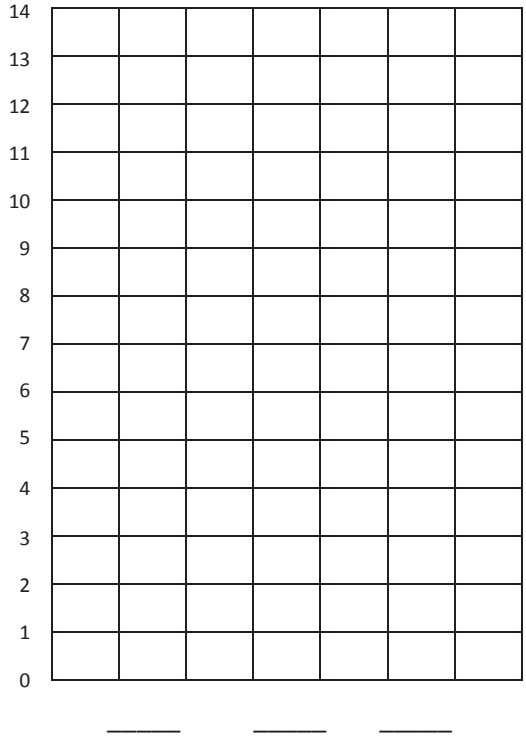
Question: _____

Answer: _____

2. Complete the bar graph below using data provided in the table.

City Shelter Animal Diets		
Meat Only	Plants Only	Meat and Plants
𝍸 | | |	𝍸 | | | |	𝍸 𝍸 | | | |

Title: _____



_____ _____ _____

a. How many total animals are in the city shelter? _____

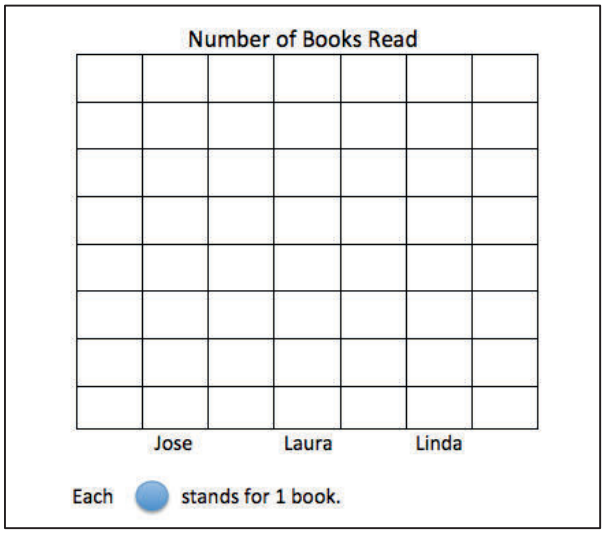
b. How many more meat- and plant-eating animals are there than meat only? _____

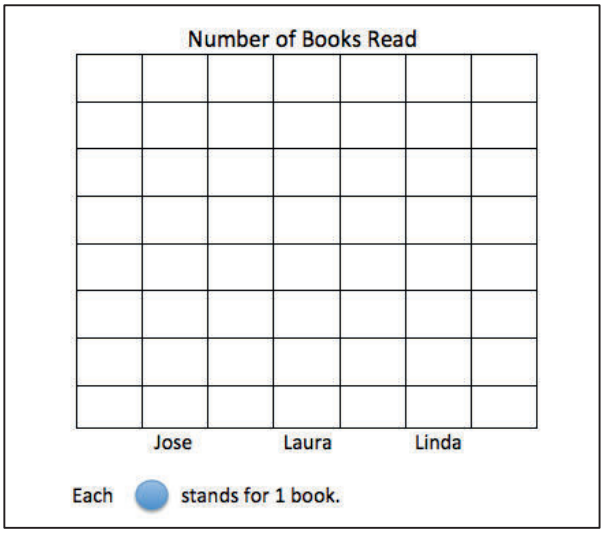
c. If 3 animals were removed from each category, how many animals would there be? ____

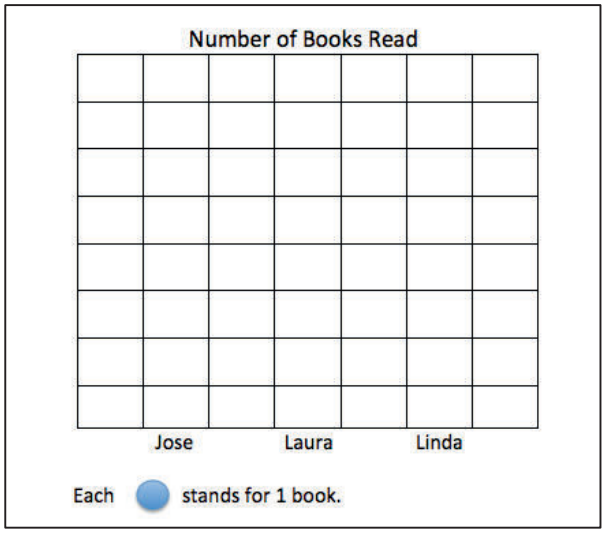
d. Write your own comparison question based on the data, and answer it.

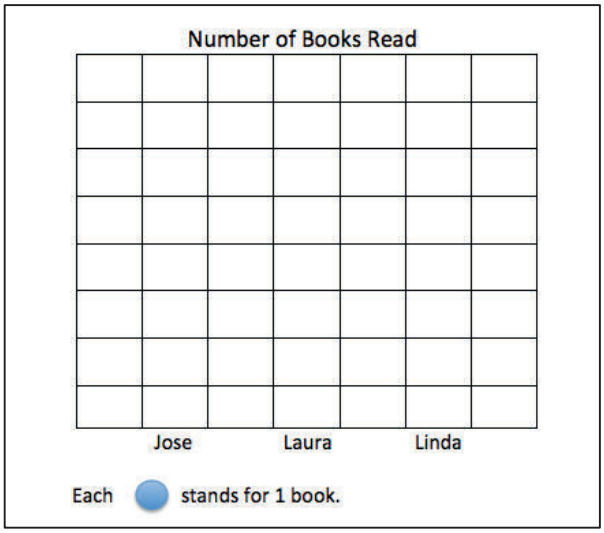
Question: _____

Answer: _____

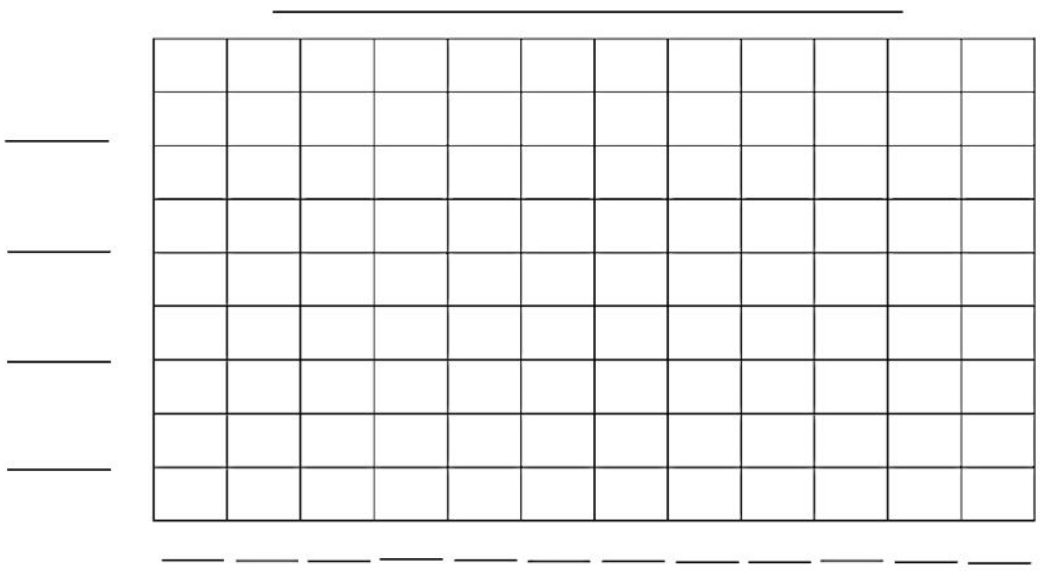




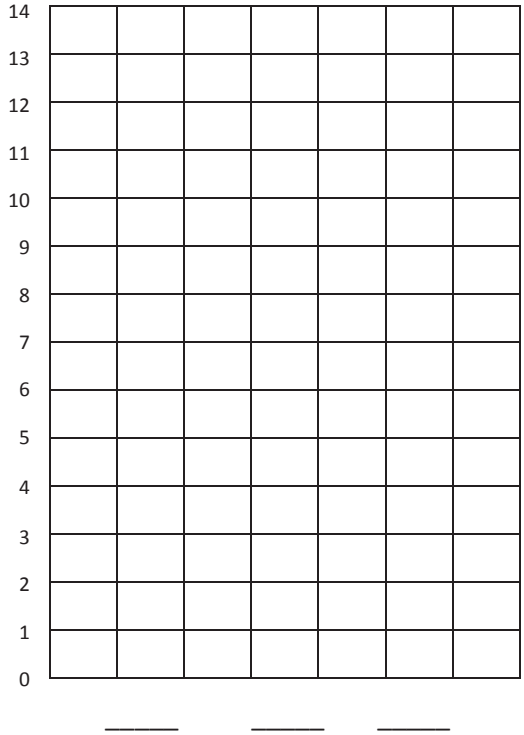




number of books read picture graphs



Title: _____



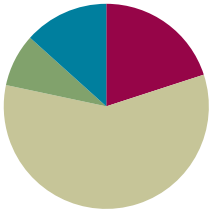
horizontal and vertical bar graphs

Lesson 4

Objective: Draw a bar graph to represent a given data set.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(8 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Coin Drop **2.NBT.2, 2.OA.2** (3 minutes)
- Sprint: Skip-Counting by 5 **2.NBT.2** (9 minutes)

Coin Drop (3 minutes)

Materials: (T) 2 quarters, 10 pennies, can

Note: In this activity, students practice adding and subtracting ones.

T: (Hold up a quarter.) Name my coin.
S: A quarter.
T: How much is it worth?
S: 25 cents.
T: Watch carefully as I drop the quarter and some pennies in my can. Count along in your minds.

Drop in a quarter and some pennies, and ask how much money is in the can. Take out some pennies, and show them. Ask how much money is still in the can. Continue adding and subtracting pennies for a minute or so. Then, repeat the activity with two quarters and some pennies.

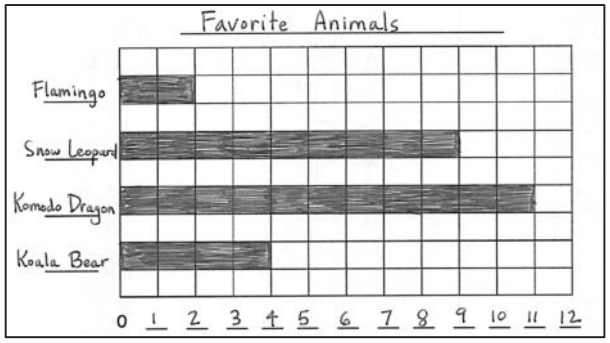
Sprint: Skip-Counting by 5 (9 minutes)

Materials: (S) Skip-Counting by 5 Sprint

Note: This Sprint gives practice skip-counting by 5 in preparation for counting with coins in Topic B.

Application Problem (5 minutes)

Materials: (T) Favorite animals bar graph (Template)



After a trip to the zoo, Ms. Anderson's students voted on their favorite animals. Use the bar graph to answer the following questions.

a. Which animal got the fewest votes?

b. Which animal got the most votes?

c. How many more students liked Komodo dragons than koala bears?

d. Later, two students changed their votes from koala bear to snow leopard. What was the difference between koala bears and snow leopards then?

a) Flamingo b) Komodo Dragon c) 7 students liked Komodo Dragons more than Koala Bears. d) The Koala Bear would be 2 and the Snow Leopard would be 11. The difference would be 9.

Note: Project or draw this graph on the board. This problem reviews yesterday's Concept Development, where students learned to read and interpret a bar graph. It leads into today's lesson, where students create bar graphs to represent new data sets.

Concept Development (35 minutes)

Materials: (T) Horizontal and vertical bar graphs (Lesson 3 Template 2), 2 pieces of chart paper (see the list below) (S) Horizontal and vertical bar graphs (Lesson 3 Template 2), colored pencils or crayons, personal white board

Note: Prior to the lesson, prepare two tables:

- Chart 1: Our Birthdays, labeled with the seasons of the year and the months that comprise each season
- Chart 2: Favorite Books, labeled with three titles

Part 1: Complete the bar graph using the table, Our Birthdays. Then, ask and answer questions using the data.

Post the table entitled *Our Birthdays*, conduct a class survey, and record the results. Note that some students may not know their birthdays, so have the information readily available. Then, distribute the horizontal and vertical bar graphs (Lesson 3 Template 2).

Our Birthdays

Spring	Summer	Fall	Winter
Mar., Apr., May	June, July, Aug.	Sept., Oct., Nov.	Dec., Jan., Feb.
8	6	2	9

Chart 1

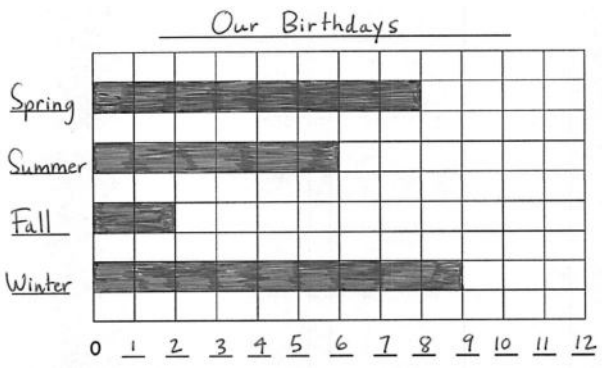
T: Now that we have new data, let's create a bar graph that represents the information.

T: We're going to use the horizontal graph at the top of your page. What information do we need to fill in first? Discuss with your partner.

S: We have to write the title. → We have to label the categories with the names of the seasons. → We need to put the number scale below the graph.

T: You are all correct! Let's fill in those elements. (Model as students do the same.)

T: Now, fill in the bars to match the table. (Pause.)



Lesson 3 Template 2

Pose questions such as those below, and have students write their answers on their personal white boards. Then, invite students to pose comparison questions to the class based on the bar graph.

- Do we know who has a birthday in the fall by reading this graph? What do we know about fall birthdays?
- How many fewer students have birthdays in the summer than in the winter?
- How many more students have a birthday in the spring and fall than in the winter?

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Use a ruler to provide visual support along with the explicit explanation of how the vertical scale mimics the ruler or number line. Provide a ruler to students who need the extra concrete support of turning the ruler.

Part 2: Complete the bar graph using the table, Favorite Books. Then, ask and answer questions using the data.

Repeat the above procedure to generate the new data set.

T: We're going to record our new data on the second graph. Talk with your partner about how these two graphs are similar and different.

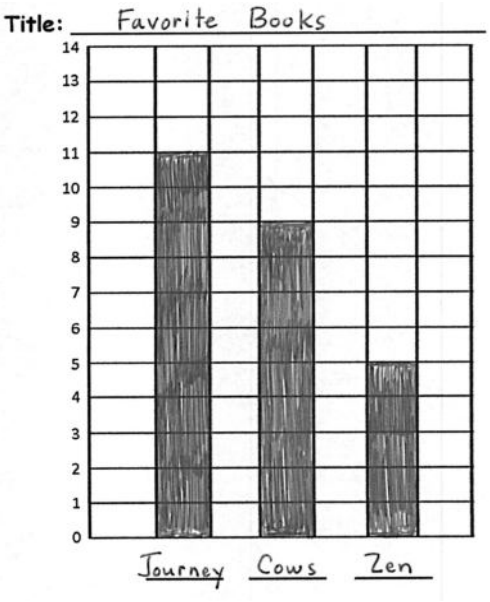
S: The first one goes across, and the second one goes up and down. → The one on top is horizontal, and the bottom one is vertical. → We'll compare how tall the bars are instead of how long they are. → The scale goes on the side instead of on the bottom.

MP.6

Favorite Books

The Miraculous Journey of Edward Tulane	Click, Clack, Moo: Cows That Type	Zen Shorts
11	9	5

Chart 2



Lesson 3 Template 2

T: Ah! Yesterday some of you said the numbers of the scale reminded you of a meter strip, a ruler, or a number line. Those are very good observations.

T: Just as on the ruler the space from 0 to 1 is one length unit, the space from the beginning of the bar to the first line represents a count of 1.

MP.6

T: We can also turn our scale vertically, just like we can turn a ruler vertically to measure height.

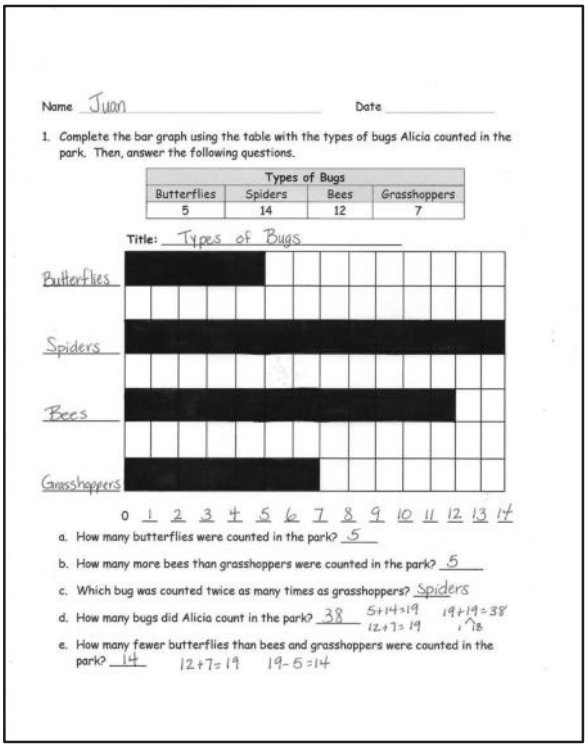
T: Let's fill in the scale together, starting at 0. (Model as students do the same.)

T: Now, fill in the rest of the graph. Then, ask and answer questions based on the data with a partner.

As students demonstrate proficiency interpreting the data, allow them to move on to the Problem Set. Continue working with any students who need support.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Name Juan Date

1. Complete the bar graph using the table with the types of bugs Alicia counted in the park. Then, answer the following questions.

Types of Bugs			
Butterflies	Spiders	Bees	Grasshoppers
5	14	12	7

Title: Types of Bugs

Butterflies
Spiders
Bees
Grasshoppers

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

a. How many butterflies were counted in the park? 5

b. How many more bees than grasshoppers were counted in the park? 5

c. Which bug was counted twice as many times as grasshoppers? Spiders

d. How many bugs did Alicia count in the park? 38 5+14=19 19+19=38 12+7=19

e. How many fewer butterflies than bees and grasshoppers were counted in the park? 14 12+7=19 19-5=14

Student Debrief (8 minutes)

Lesson Objective: Draw a bar graph to represent a given data set.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

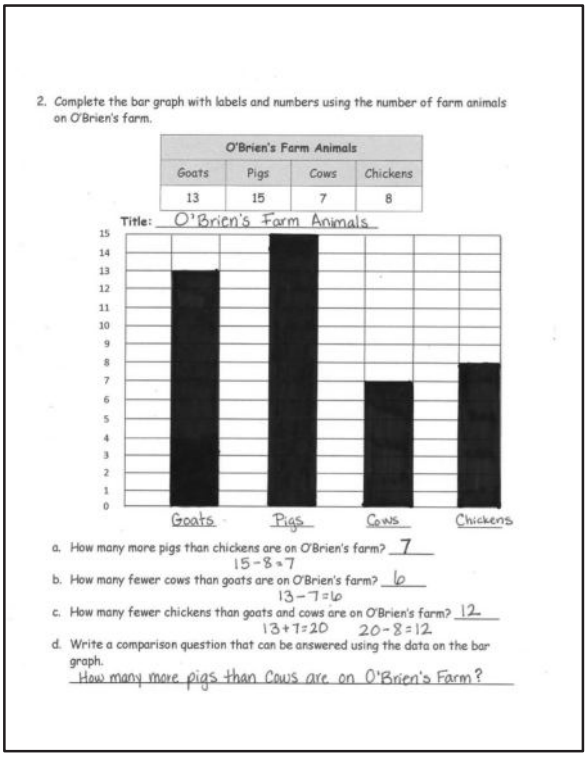
Any combination of the questions below may be used to lead the discussion.

- Explain to your partner the labels you wrote on your graph before you started to record the data. Is it important to label and write a number scale before you start graphing the data? Why or why not?
- In the bug graph, which problems asked a comparison question? (Problem 1 (b), (c), and (e).) If you used equations to figure out the answer to the comparison questions, what operation did you use? If you did not write an equation, tell your partner how you figured out the answer to Problem 1 (b) and (e).
- Look at O'Brien's farm bar graph. Did you write a number scale? Where did you put it? Does it matter if we write the number scale across the bottom or on the side?

- Talk to your partner about how picture and bar graphs help us organize and compare information. Can you think of a time in your life when making a graph would help you?
- So far, what has each box or picture represented in our graphs? (One thing. → One animal. → One unit.) Do you think each box always has to be one unit?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



2. Complete the bar graph with labels and numbers using the number of farm animals on O'Brien's farm.

O'Brien's Farm Animals			
Goats	Pigs	Cows	Chickens
13	15	7	8

Title: O'Brien's Farm Animals

a. How many more pigs than chickens are on O'Brien's farm? 7
15 - 8 = 7

b. How many fewer cows than goats are on O'Brien's farm? 6
13 - 7 = 6

c. How many fewer chickens than goats and cows are on O'Brien's farm? 12
13 + 7 = 20 20 - 8 = 12

d. Write a comparison question that can be answered using the data on the bar graph.
How many more pigs than cows are on O'Brien's Farm?

A

Number Correct: _____

Skip-Counting by 5

1.	0, 5, ___	
2.	5, 10, ___	
3.	10, 15, ___	
4.	15, 20, ___	
5.	20, 25, ___	
6.	25, 30, ___	
7.	30, 35, ___	
8.	35, 40, ___	
9.	40, 45, ___	
10.	50, 45, ___	
11.	45, 40, ___	
12.	40, 35, ___	
13.	35, 30, ___	
14.	30, 25, ___	
15.	25, 20, ___	
16.	20, 15, ___	
17.	15, 10, ___	
18.	0, ___, 10	
19.	25, ___, 35	
20.	5, ___, 15	
21.	30, ___, 40	
22.	10, ___, 20	

23.	35, ___, 45	
24.	15, ___, 25	
25.	40, ___, 50	
26.	25, ___, 15	
27.	50, ___, 40	
28.	20, ___, 10	
29.	45, ___, 35	
30.	15, ___, 5	
31.	40, ___, 30	
32.	10, ___, 0	
33.	35, ___, 25	
34.	___, 10, 5	
35.	___, 35, 30	
36.	___, 15, 10	
37.	___, 40, 35	
38.	___, 20, 15	
39.	___, 45, 40	
40.	50, 55, ___	
41.	45, 50, ___	
42.	65, ___, 55	
43.	55, 60, ___	
44.	60, 65, ___	

B

Number Correct: _____

Improvement: _____

Skip-Counting by 5

1.	5, 10, ___	
2.	10, 15, ___	
3.	15, 20, ___	
4.	20, 25, ___	
5.	25, 30, ___	
6.	30, 35, ___	
7.	35, 40, ___	
8.	40, 45, ___	
9.	50, 45, ___	
10.	45, 40, ___	
11.	40, 35, ___	
12.	35, 30, ___	
13.	30, 25, ___	
14.	25, 20, ___	
15.	20, 15, ___	
16.	15, 10, ___	
17.	0, ___, 10	
18.	25, ___, 35	
19.	5, ___, 15	
20.	30, ___, 40	
21.	10, ___, 20	
22.	35, ___, 45	

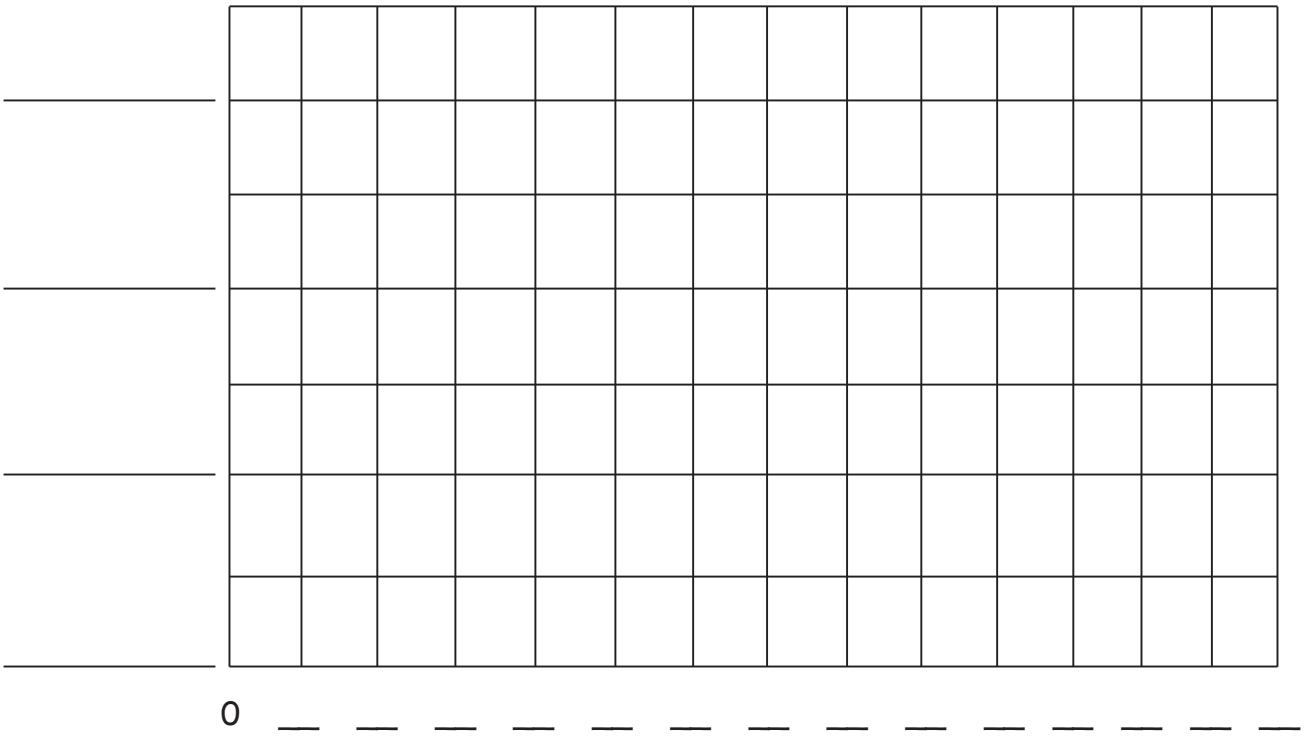
23.	15, ___, 25	
24.	35, ___, 45	
25.	30, ___, 20	
26.	25, ___, 15	
27.	50, ___, 40	
28.	20, ___, 10	
29.	45, ___, 35	
30.	15, ___, 5	
31.	35, ___, 25	
32.	10, ___, 0	
33.	35, ___, 25	
34.	___, 15, 10	
35.	___, 40, 35	
36.	___, 20, 15	
37.	___, 45, 40	
38.	___, 10, 5	
39.	___, 35, 30	
40.	45, 50, ___	
41.	50, 55, ___	
42.	55, 60, ___	
43.	65, ___, 55	
44.	___, 60, 55	

Name _____ Date _____

1. Complete the bar graph using the table with the types of bugs Alicia counted in the park. Then, answer the following questions.

Types of Bugs			
Butterflies	Spiders	Bees	Grasshoppers
5	14	12	7

Title: _____



a. How many butterflies were counted in the park? _____

b. How many more bees than grasshoppers were counted in the park? _____

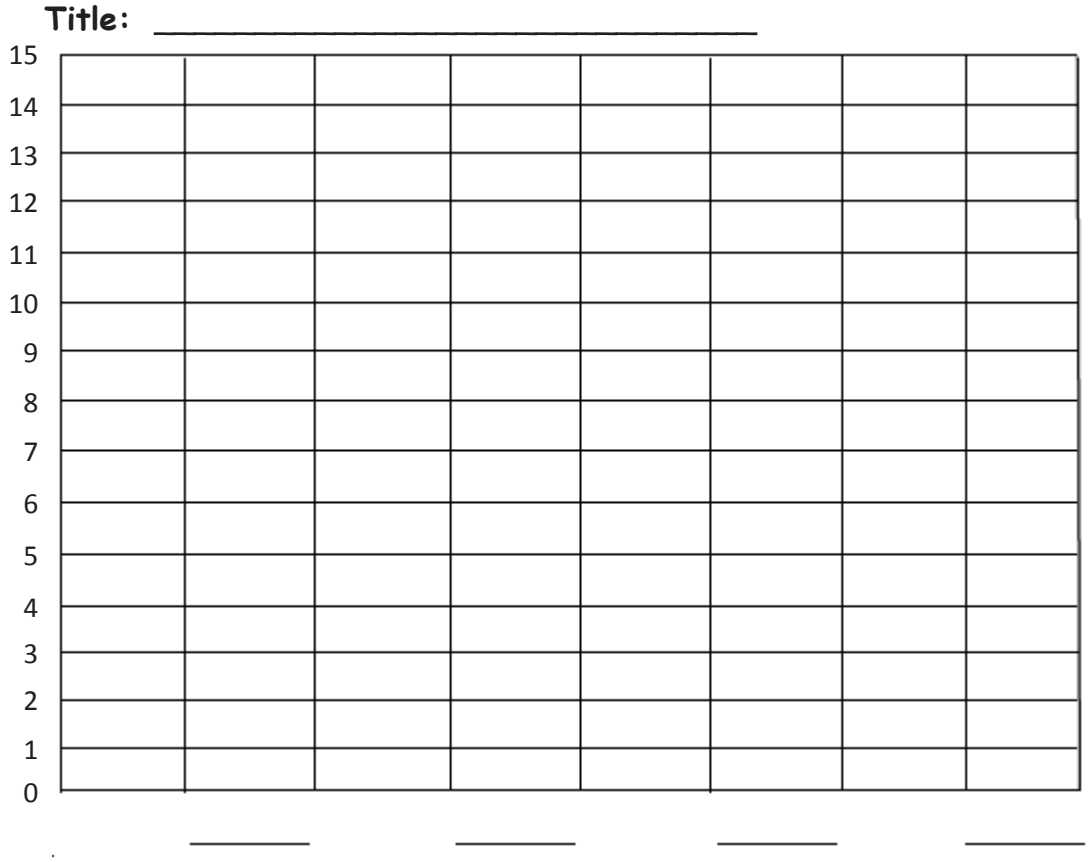
c. Which bug was counted twice as many times as grasshoppers? _____

d. How many bugs did Alicia count in the park? _____

e. How many fewer butterflies than bees and grasshoppers were counted in the park? _____

2. Complete the bar graph with labels and numbers using the number of farm animals on O'Brien's farm.

O'Brien's Farm Animals			
Goats	Pigs	Cows	Chickens
13	15	7	8



a. How many more pigs than chickens are on O'Brien's farm? _____

b. How many fewer cows than goats are on O'Brien's farm? _____

c. How many fewer chickens than goats and cows are on O'Brien's farm? _____

d. Write a comparison question that can be answered using the data on the bar graph.

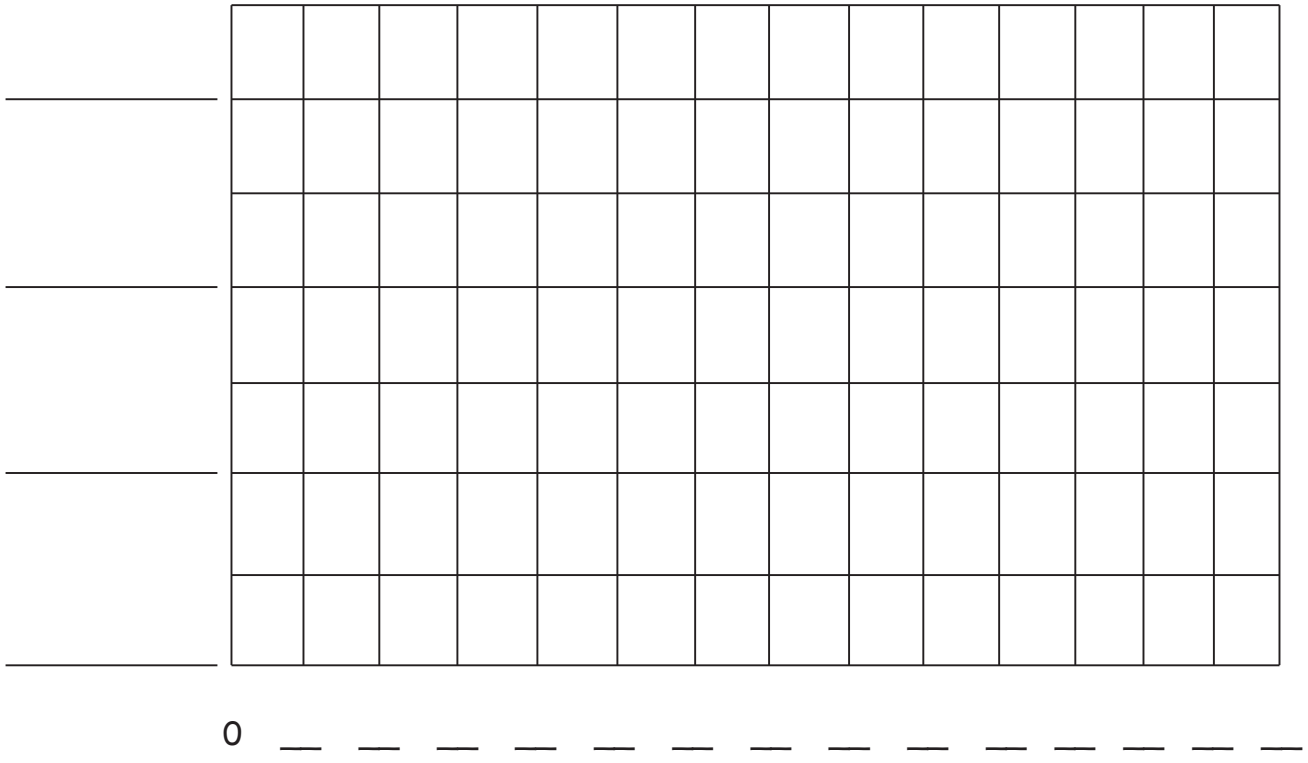
_____

Name _____ Date _____

Complete the bar graph using the table with the types of bugs Jeremy counted in his backyard. Then, answer the following questions.

Types of Bugs			
Butterflies	Spiders	Bees	Grasshoppers
4	8	10	9

Title: _____



a. How many more spiders and grasshoppers were counted than bees and butterflies?

_____

b. If 5 more butterflies were counted, how many bugs would have been counted?

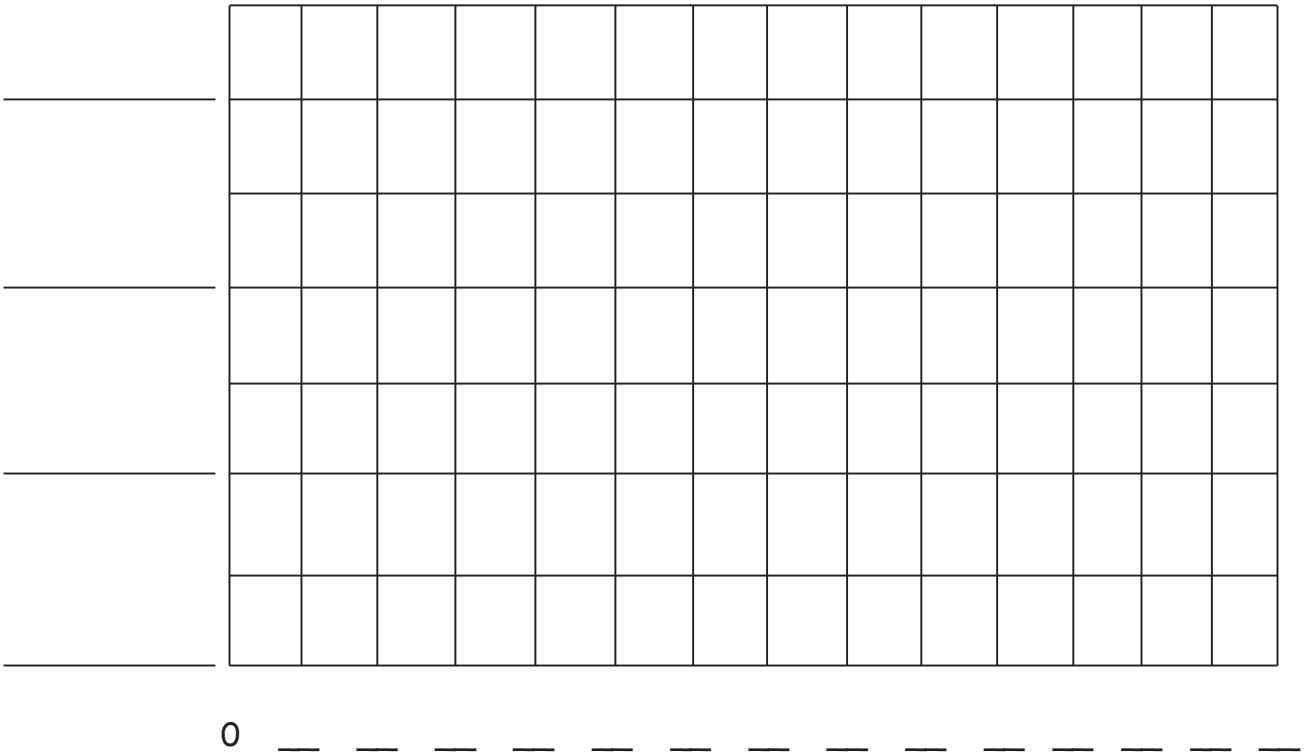
_____

Name _____ Date _____

1. Complete the bar graph using the table with the types of reptiles at the local zoo. Then, answer the following questions.

Types of Reptiles			
Snakes	Lizards	Turtles	Tortoises
13	11	7	8

Title: _____



a. How many reptiles are at the zoo? _____

b. How many more snakes and lizards than turtles are at the zoo? _____

c. How many fewer turtles and tortoises than snakes and lizards are at the zoo? _____

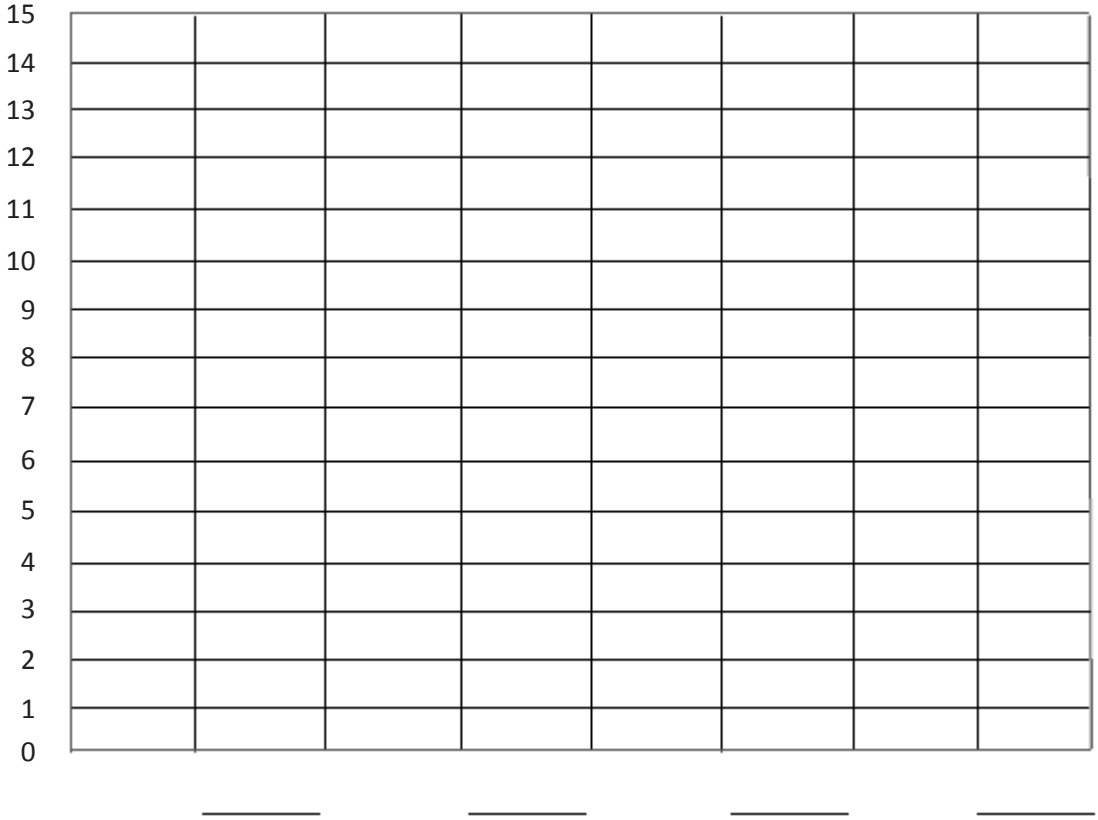
d. Write a comparison question that can be answered using the data on the bar graph.

_____

2. Complete the bar graph with labels and numbers using the number of underwater animals Emily saw while scuba diving.

Underwater Animals			
Sharks	Stingrays	Starfish	Seahorses
6	9	14	13

Title: _____



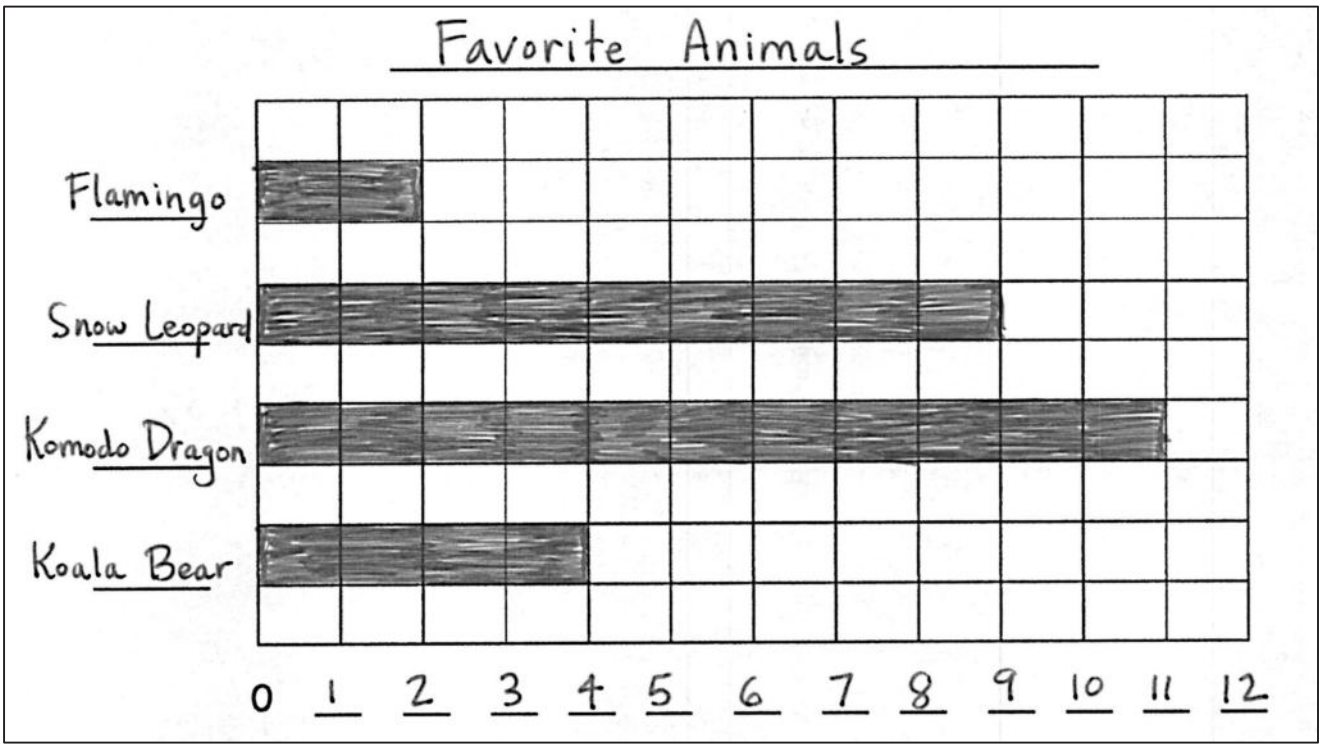
_____ _____ _____ _____

a. How many more starfish than sharks did Emily see? _____

b. How many fewer stingrays than seahorses did Emily see? _____

c. Write a comparison question that can be answered using the data on the bar graph.

_____



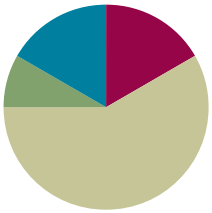
favorite animals bar graph

Lesson 5

Objective: Solve word problems using data presented in a bar graph.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Coin Drop **2.NBT.2, 2.OA.2** (5 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic A and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Coin Drop (5 minutes)

Materials: (T) 2 quarters, 10 dimes, 10 nickels, can

Note: In this activity, students practice adding and subtracting 25, 10, and 5.

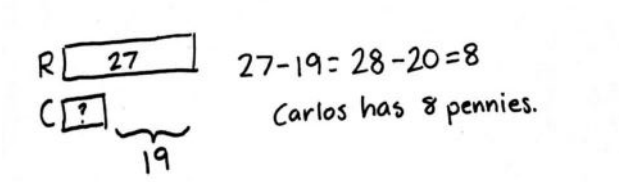
T: (Hold up a quarter.) Name my coin.
S: A quarter.
T: How much is it worth?
S: 25 cents.
T: Watch carefully as I drop the quarter and some nickels in my can. Count along in your minds.

Drop in a quarter and some nickels, and ask how much money is in the can. Take out some of the nickels, and show them. Ask how much money is still in the can. Continue adding and subtracting nickels for a minute or so. Then, repeat the activity with a quarter and dimes, a quarter with dimes and nickels, and then 2 quarters with dimes and nickels.

Application Problem (5 minutes)

Rita has 19 more pennies than Carlos. Rita has 27 pennies. How many pennies does Carlos have?

Note: In this problem, the context shifts to money. This leads into today's Concept Development, where students work with money data to solve word problems, and segues into problem solving with coins and bills in Topic B. The problem type is *compare with smaller unknown*, one of the more difficult problem types because *more* suggests the wrong operation. Guide students, as needed, to draw a tape diagram to solve.



Concept Development (35 minutes)

Materials: (T) Ruler (optional) (S) Activity Sheets 1, 2, and 3, colored pencils or crayons

Note: In this lesson, students use money data to solve word problems. Depending on the needs of students, choose to have them work independently, with a partner, or in groups.

T: Today, we're going to use activity sheets for our lesson. Use the information in the table to complete the graphs, and then use the data to answer the questions.

MP.6

Pass out Activity Sheets 1 and 2. Circulate to be sure students are labeling their graphs accurately, paying special attention to the count scale. Consider reminding them with the visual aid of a ruler that the beginning of the scale is 0 and not 1.

Provide support as students work. Invite students to share their solutions as they complete each problem. This is a good opportunity to work with a small group of students who are struggling with graphing or answering questions based on information presented in a graph. It is also a chance to provide extension for students working above grade level. For those students, a good alternative might be to use Activity Sheet 3 to design their own surveys and tables and then create graphs and questions to represent and interpret the data.

As students successfully complete their work, allow them to move on to the Problem Set.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Some students may find it visually challenging to fill in and read the graphs. Enlarge the activity sheet, or provide these students with Template 1 (Lesson 2), which leaves space between the bars. Also, have students use different colors to further distinguish the bars.

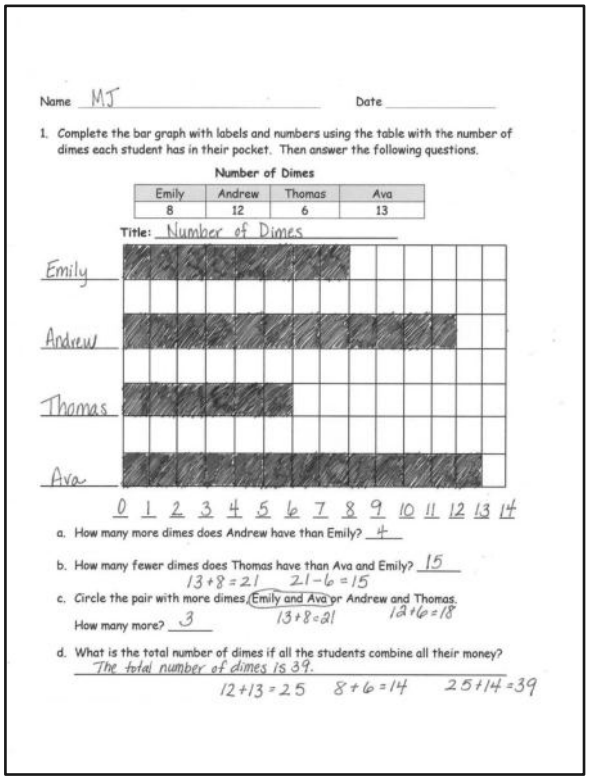
NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Activate multiple senses by playing music to create a soothing atmosphere.

Allow flexible grouping, and allow students to move around, check their work, and ask questions of those not in their pairs or groups.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Name MJ Date

1. Complete the bar graph with labels and numbers using the table with the number of dimes each student has in their pocket. Then answer the following questions.

Number of Dimes

Emily	Andrew	Thomas	Ava
8	12	6	13

Title: Number of Dimes

Emily
Andrew
Thomas
Ava

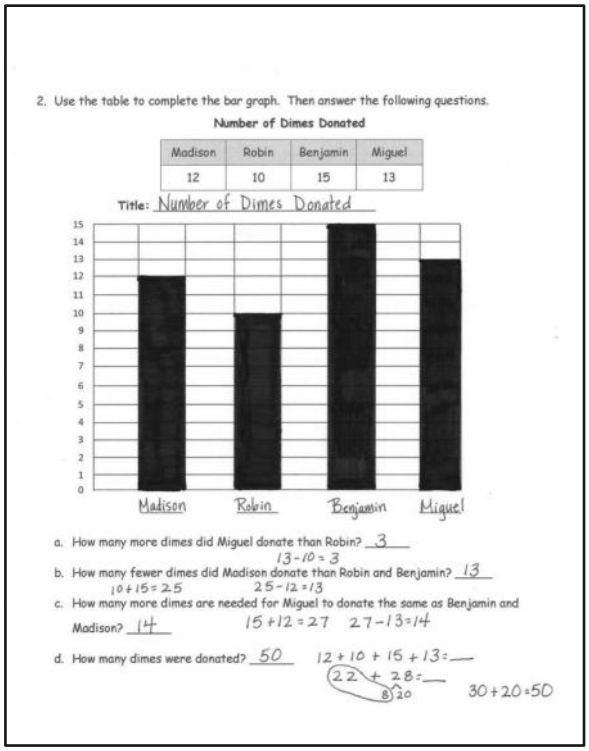
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

a. How many more dimes does Andrew have than Emily? 4

b. How many fewer dimes does Thomas have than Ava and Emily? 15
13+8=21 21−6=15

c. Circle the pair with more dimes. Emily and Ava or Andrew and Thomas.
How many more? 3 13+8=21 12+6=18

d. What is the total number of dimes if all the students combine all their money?
The total number of dimes is 39.
12+13=25 8+6=14 25+14=39



2. Use the table to complete the bar graph. Then answer the following questions.

Number of Dimes Donated

Madison	Robin	Benjamin	Miguel
12	10	15	13

Title: Number of Dimes Donated

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Madison Robin Benjamin Miguel

a. How many more dimes did Miguel donate than Robin? 3
13−10=3

b. How many fewer dimes did Madison donate than Robin and Benjamin? 13
10+15=25 25−12=13

c. How many more dimes are needed for Miguel to donate the same as Benjamin and Madison? 14
15+12=27 27−13=14

d. How many dimes were donated? 50
12+10+15+13=__
22+28=__
30+20=50

Student Debrief (10 minutes)

Lesson Objective: Solve word problems using data presented in a bar graph.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Emily's dimes in the Problem Set. How many dimes would Emily have if you doubled her dimes? (16.) How would we record 16 in the graph? (We would have to make more boxes. Or we could make each unit box's value 2 instead of 1.)
- In each graph you completed today, you were asked to find the total amount of coins recorded in the graph. Tell your partner if you figured out the answer in your head or with paper and pencil. Share the calculation strategy you used.
- Think about a question you could ask our class that you could turn into a bar graph. Tell your partner what question you would ask. What would you title your graph? What would the categories be labeled?

Exit Ticket (3 minutes)

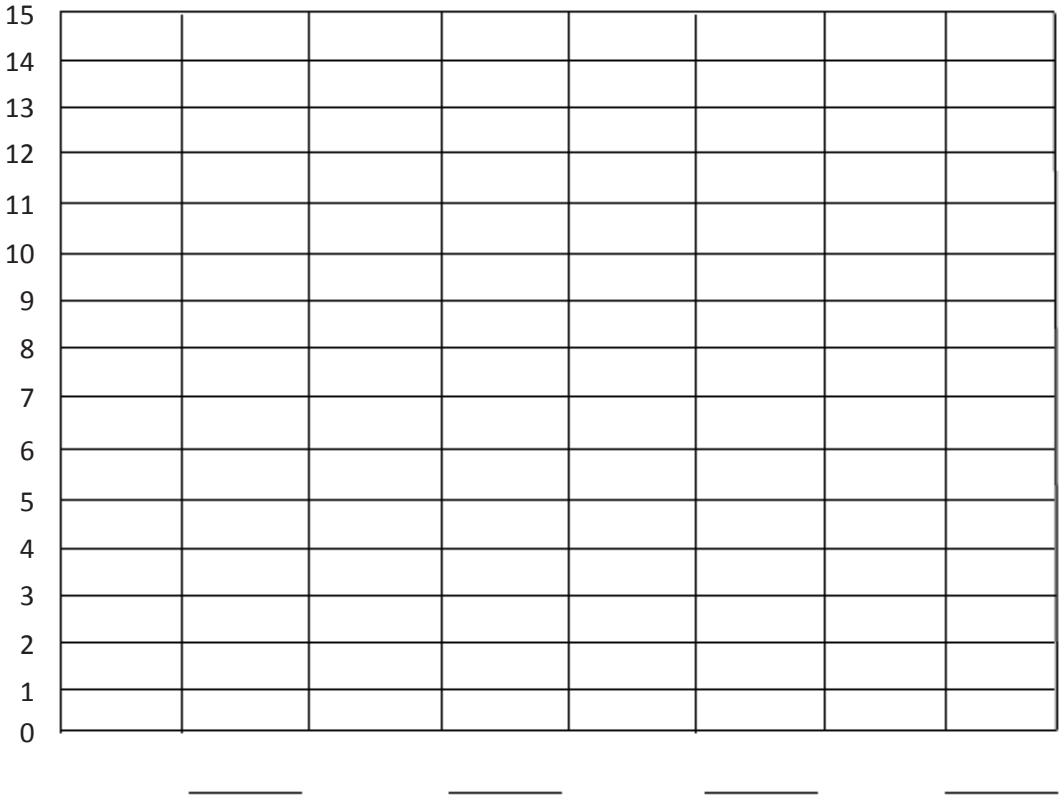
After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson today and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Callista saved pennies. Use the table to complete the bar graph. Then, answer the following questions.

Pennies Saved			
Saturday	Sunday	Monday	Tuesday
15	10	4	7

Title: _____



_____ _____ _____ _____

a. How many pennies did Callista save in all? _____

b. Her sister saved 18 fewer pennies. How many pennies did her sister save? _____

c. How much more money did Callista save on Saturday than on Monday and Tuesday? _____

d. How will the data change if Callista doubles the amount of money she saved on Sunday? _____

e. Write a comparison question that can be answered using the data on the bar graph.

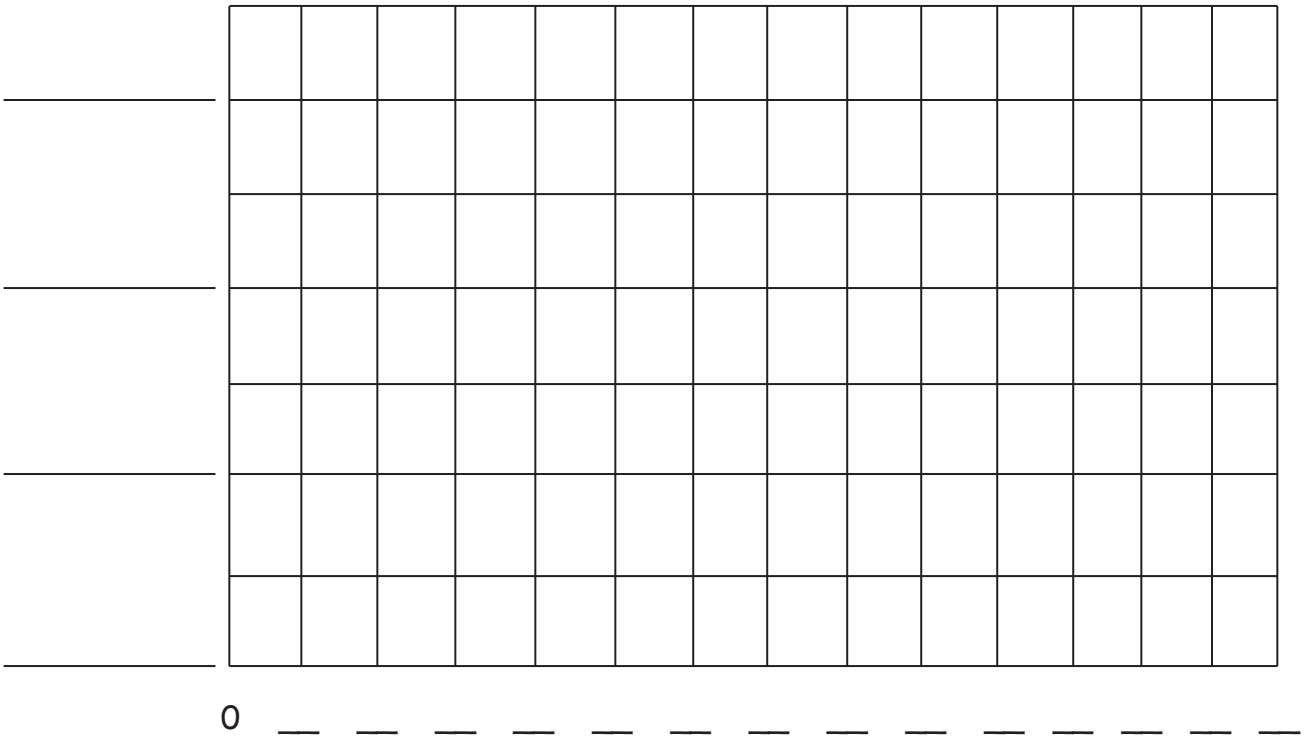
_____

Name _____ Date _____

A group of friends counted their nickels. Use the table to complete the bar graph. Then, answer the following questions.

Amount of Nickels			
Annie	Scarlett	Remy	LaShay
5	11	8	14

Title: _____



a. How many nickels do the children have in all? ___

b. What is the total value of Annie's and Remy's coins? ___

c. How many fewer nickels does Remy have than LaShay? ___

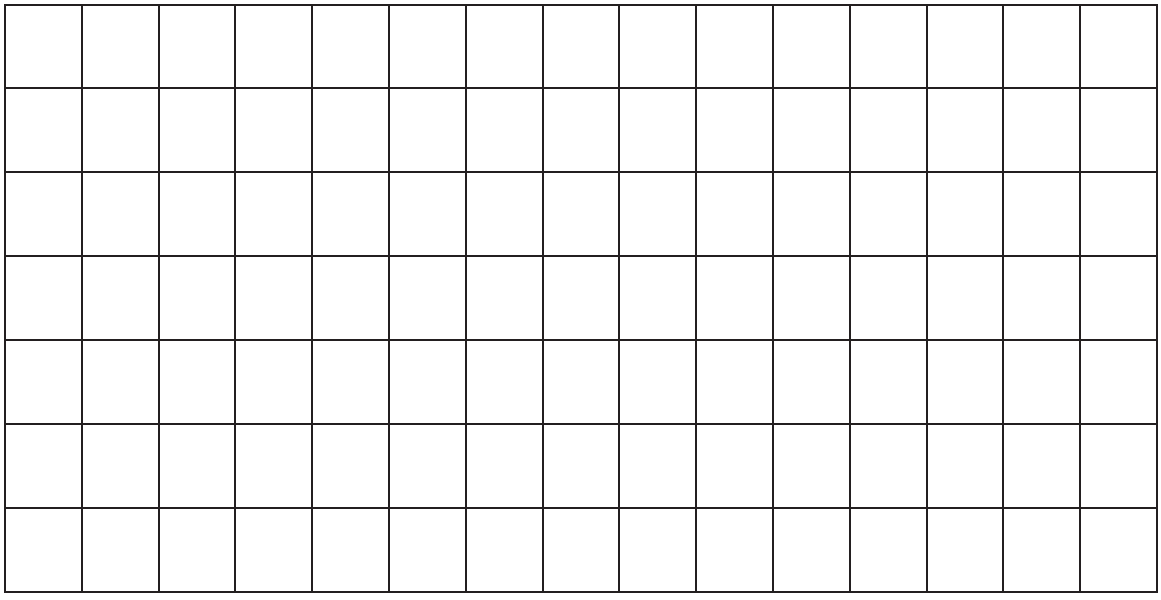
d. Who has less money, Annie and Scarlett or Remy and LaShay? _____

e. Write a comparison question that can be answered using the data on the bar graph.

_____

Name _____ Date _____

1. Design a survey, and collect the data.
2. Label and fill in the table.
3. Use the table to label and complete the bar graph.
4. Write questions based on the graph, and then let students use your graphs to answer them.
   a. _____
   b. _____
   c. _____
   d. _____



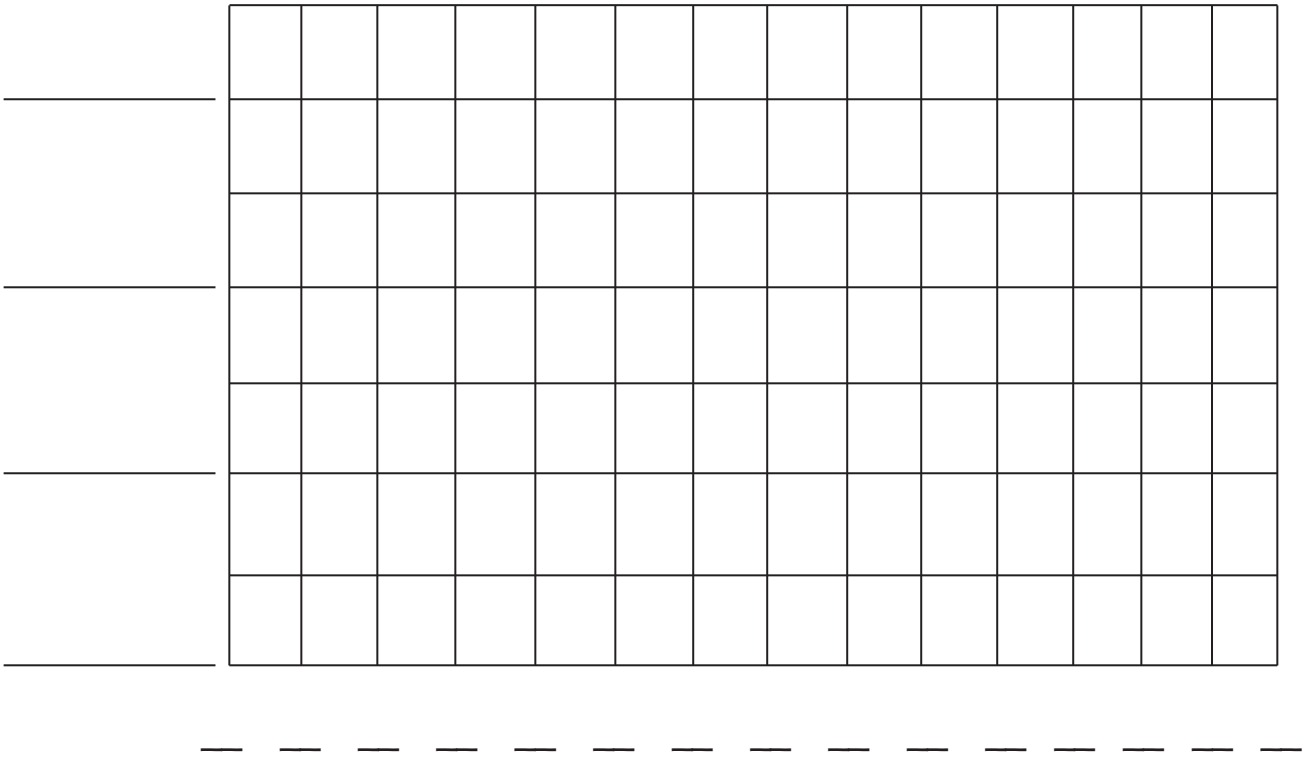
Name _____ Date _____

1. Use the table to complete the bar graph. Then, answer the following questions.

Number of Dimes

Emily	Andrew	Thomas	Ava
8	12	6	13

Title: _____



a. How many more dimes does Andrew have than Emily? _____

b. How many fewer dimes does Thomas have than Ava and Emily? _____

c. Circle the pair with more dimes, Emily and Ava or Andrew and Thomas. How many more? _____

d. What is the total number of dimes if all the students combine all their money?

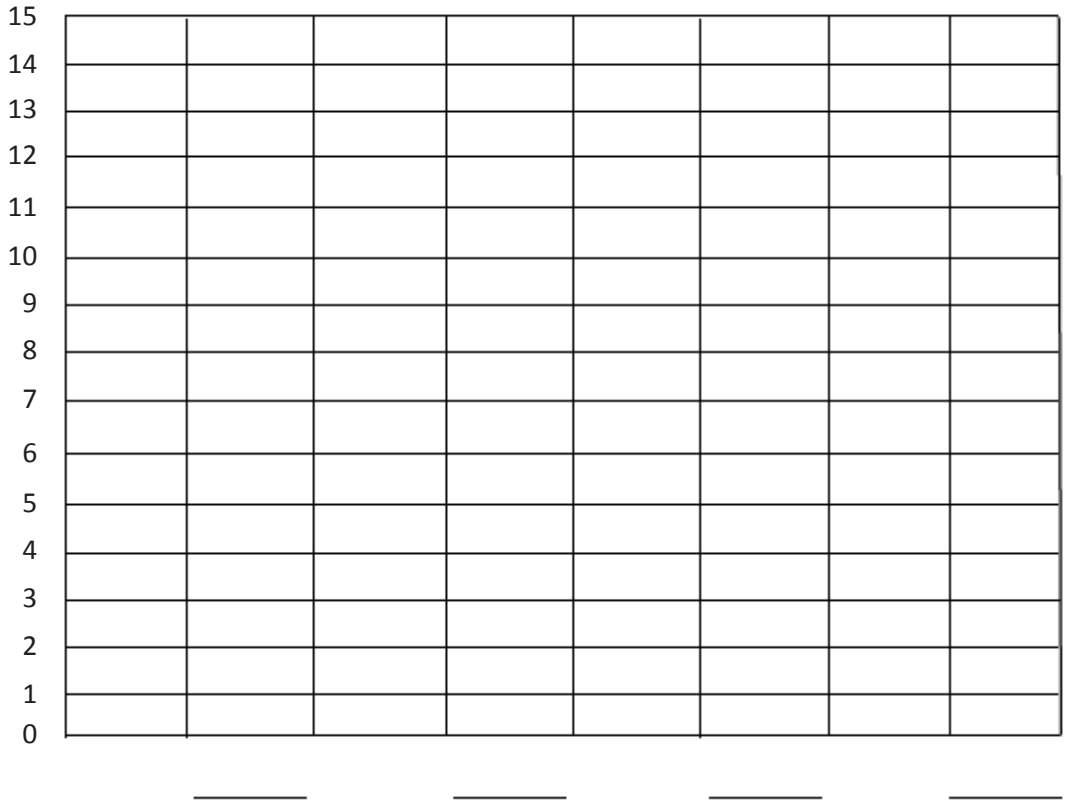
_____

2. Use the table to complete the bar graph. Then, answer the following questions.

Number of Dimes Donated

Madison	Robin	Benjamin	Miguel
12	10	15	13

Title: _____



_____ _____ _____ _____

a. How many more dimes did Miguel donate than Robin? _____

b. How many fewer dimes did Madison donate than Robin and Benjamin? _____

c. How many more dimes are needed for Miguel to donate the same as Benjamin and Madison? _____

d. How many dimes were donated? _____

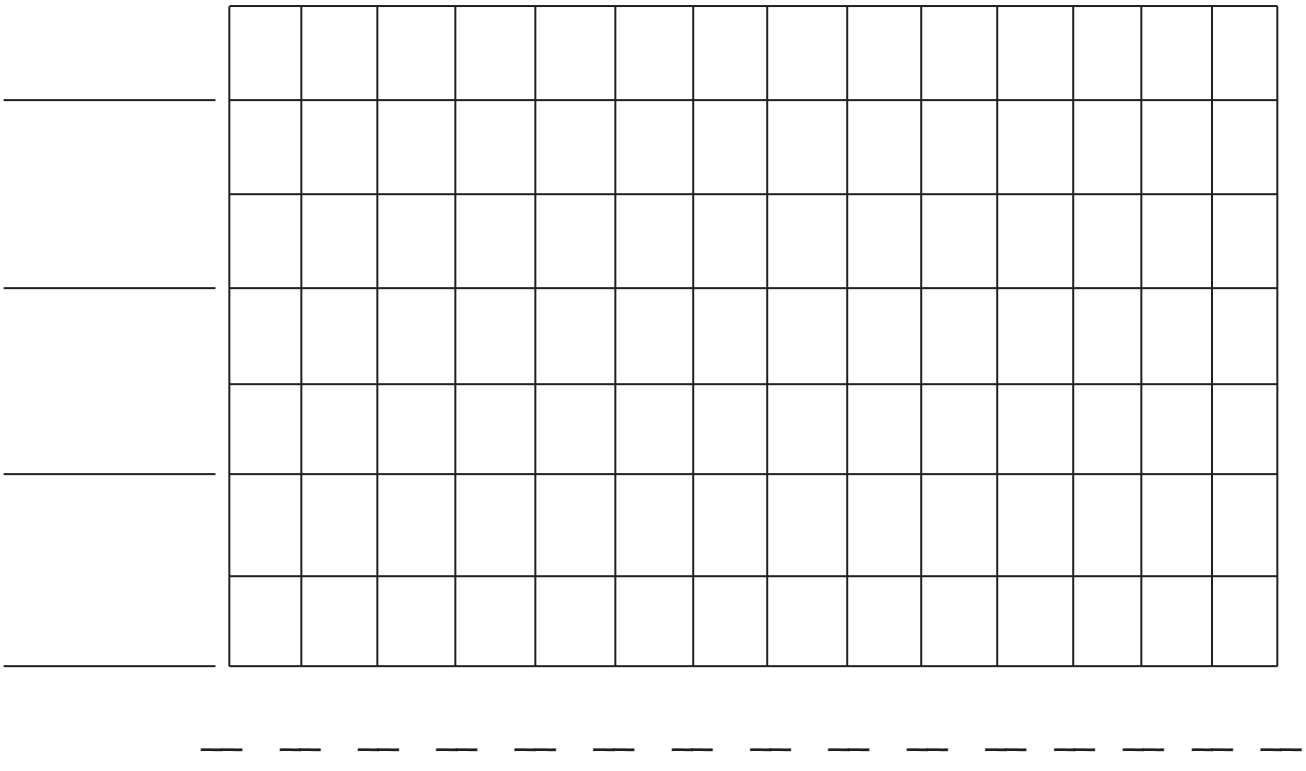
Name _____ Date _____

Use the table to complete the bar graph. Then, answer the following questions.

Number of Dimes

Lacy	Sam	Stefanie	Amber
6	11	9	14

Title: _____



a. How many more dimes does Amber have than Stefanie? _____

b. How many dimes will Sam and Lacy need to save to equal Stefanie and Amber?

_____

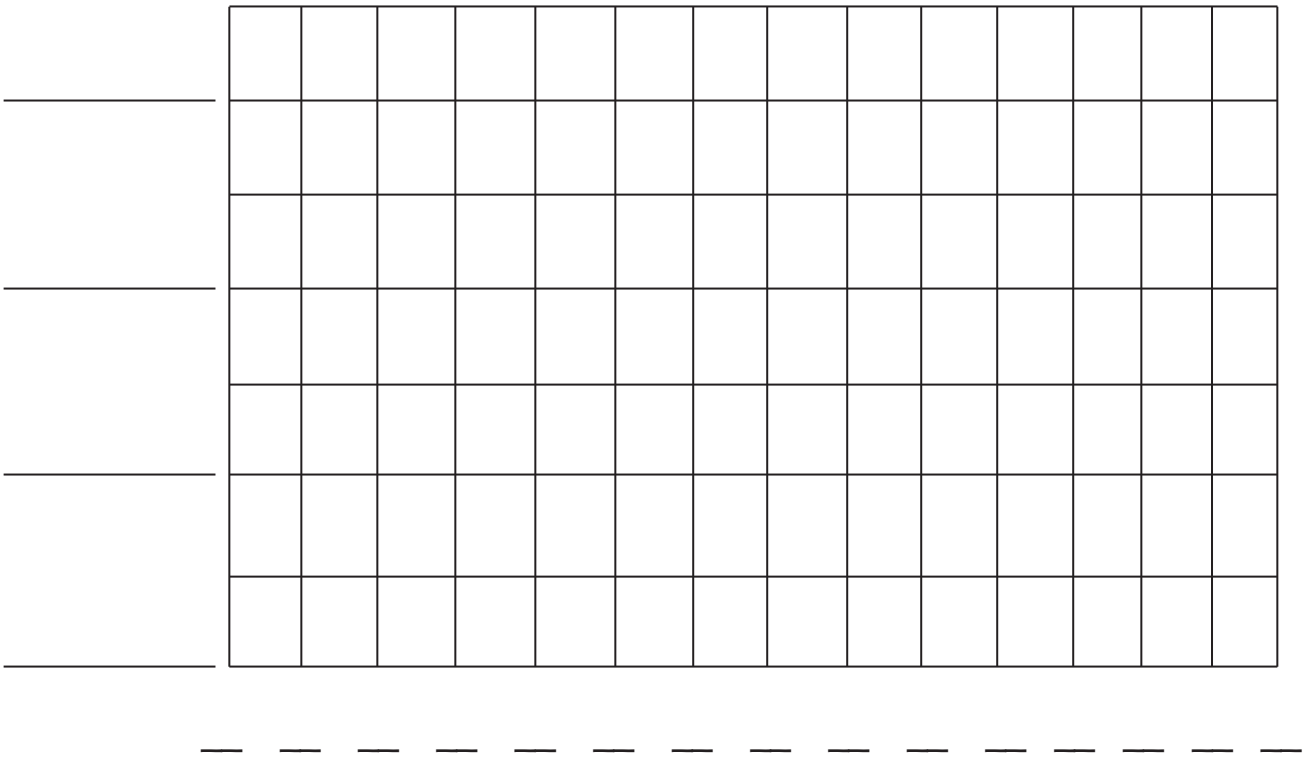
Name _____ Date _____

1. Use the table to complete the bar graph. Then, answer the following questions.

Number of Nickels

Justin	Melissa	Meghan	Douglas
13	9	12	7

Title: _____



a. How many more nickels does Meghan have than Melissa? _____

b. How many fewer nickels does Douglas have than Justin? _____

c. Circle the pair that has more nickels, Justin and Melissa or Douglas and Meghan. How many more? _____

d. What is the total number of nickels if all the students combine all their money?

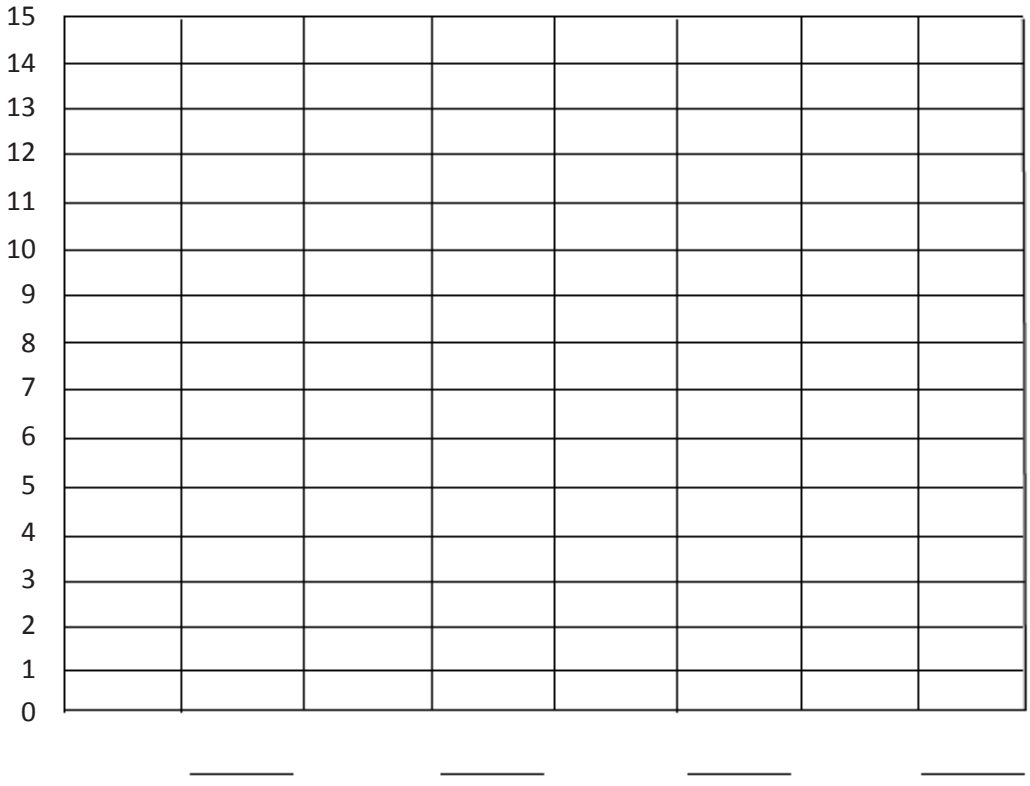
_____

2. Use the table to complete the bar graph. Then, answer the following questions.

Dimes Donated

Kylie	Tom	John	Shannon
12	10	15	13

Title: _____



_____ _____ _____ _____

a. How many dimes did Shannon donate? _____

b. How many fewer dimes did Kylie donate than John and Shannon? _____

c. How many more dimes are needed for Tom to donate the same as Shannon and Kylie? _____

d. How many dimes were donated in total? _____

Topic B

Problem Solving with Coins and Bills

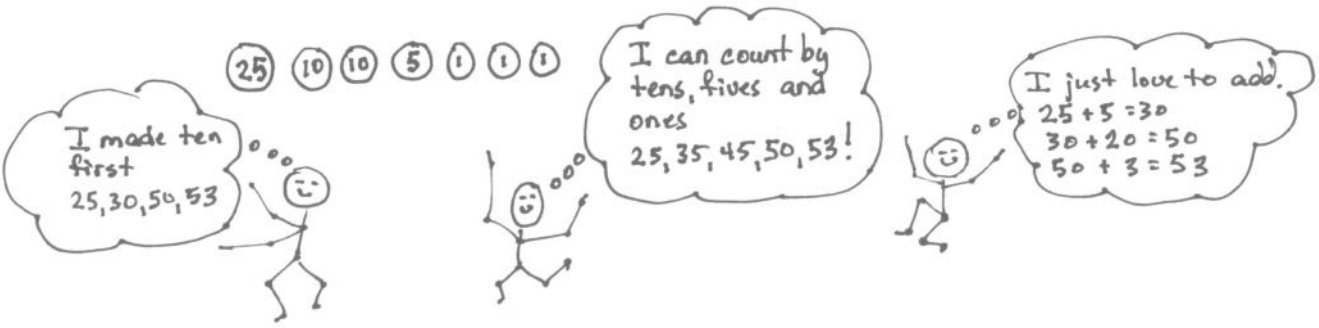
2.NBT.5, **2.MD.8**, 2.NBT.2, 2.NBT.6

Focus Standards:	2.NBT.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
	2.MD.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*
Instructional Days:	8	
Coherence -Links from:	G1–M6	Place Value, Comparison, Addition and Subtraction to 100
-Links to:	G3–M1	Properties of Multiplication and Division and Solving Problems with Units of 2–5 and 10
	G3–M2	Place Value and Problem Solving with Units of Measure

In Topic B, students solve problems involving coins and bills. They begin at the concrete level in Lesson 6, using play money to review the different coin values from Grade 1. Beginning with the largest coin value (often the quarter), students count the total value of a group of coins, applying their knowledge of addition strategies (**2.NBT.5**) and skip-counting by fives and tens when there are multiple nickels or dimes.

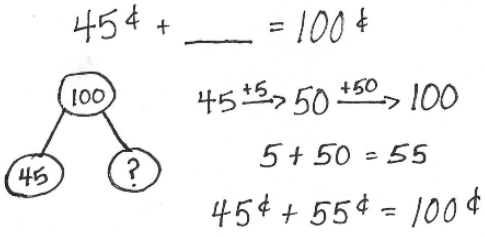
Lesson 7 builds upon this foundation as students find the total value of a group of coins in the context of simple addition and subtraction word problem types with the result unknown (**2.MD.8**). For example, "Carla has 2 dimes, 1 quarter, 1 nickel, and 3 pennies. How many cents does she have?" Likewise: "Carla has 53¢ and gives a dime to her friend. How many cents does she have left?" To solve the *add to* or *take from with result unknown* word problem types, students might use the RDW process to draw, write the corresponding number sentence, and write a statement with the solution, just as they have been doing throughout the year with word problems in varied contexts.

Similarly, in Lesson 8, students apply their understanding of place value strategies and skip-counting to find the total value of a group of bills within $100, again in the context of addition and subtraction word problems. As in Lesson 6, students arrange bills from greatest to least, count on to find the total, and write a number sentence to represent the total value of the bills, sometimes adding up to four two-digit numbers. They solve problems, such as "Raja has $85 in his pocket. Two $5 bills fall out. How many dollars are in his pocket now?" or "If Raja has 6 one-dollar bills, 4 ten-dollar bills, and 3 five-dollar bills, how many dollars does he have?" Students may write number sentences in any number of ways. One student might skip-count mentally and make a ten, thinking 4 tens make 40 and 3 fives make 15 and then write 40 + 15 + 6 = 40 + 20 + 1 = 61. Another might correctly write 10 + 10 + 10 +10 + 5 + 5 + 5 + 6 = 40 + 15 + 6 = 55 + 6 = 61. Students are encouraged to think flexibly and apply learned solution strategies.



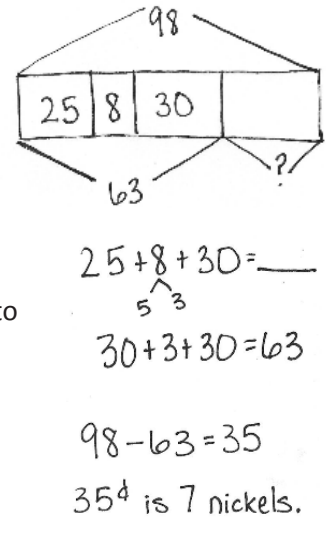
In Lessons 9 and 10, different combinations of coins are manipulated to make the same total value; for example, "Estella has 75¢ to buy a yo-yo. How many different ways could she pay for it?" Seventy-five cents might be recorded with 3 quarters or shown with 2 quarters, 2 dimes, and 5 pennies. Students work cooperatively to explain their reasoning and solution strategies. In Lesson 10, multiple ways are found to represent the same quantity, with the added complexity of using the fewest number of coins (e.g., 67¢ equals 2 quarters, 1 dime, 1 nickel, and 2 pennies). Students see that just as they changed 10 ones for 1 ten in Modules 4 and 5, they can also change coins of a lesser value for coins of a greater value (e.g., 2 nickels = 1 dime).

Students focus on making change from one dollar in Lessons 11 and 12, using the understanding that $1 has the same value as 100 pennies. In Lesson 11, students learn how to make change from one dollar using counting on, simplifying strategies (e.g., the arrow way), and the relationship between addition and subtraction. They represent the part–whole relationship using a number bond and by writing a number sentence, often using the related addition to solve (e.g., $1 – 45¢ = ____ or 45¢ + ____ = 100¢), as pictured to the right.



In Lesson 12, students solve one- and two-step word problems involving money. They use the RDW process, first reading the problem and then drawing a picture or model. With a partner, they discuss how their models match the story. Next, students apply a strategy to solve, and then they share their solution strategies with a partner.

In the final lesson of Topic B, students solve two-step addition and subtraction word problems with abstract drawings and equations with the unknown in various positions. For example, "Devon found 98¢ in her piggy bank. She counted 1 quarter, 8 pennies, 3 dimes, and some nickels. How many nickels did she find?" After making a tape diagram, one student's first step might involve adding the given coins from greatest to least and skip-counting, while another might bond the quarter with 5 pennies to make the next ten before counting on, as pictured on the right. Students synthesize their understanding of place value, making a ten, and skip-counting strategies to solve a variety of problem types embedded within the two-step problems.



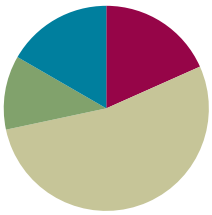
A Teaching Sequence Toward Mastery of Problem Solving with Coins and Bills	
Objective 1:	**Recognize the value of coins and count up to find their total value. (Lesson 6)**
Objective 2:	**Solve word problems involving the total value of a group of coins. (Lesson 7)**
Objective 3:	**Solve word problems involving the total value of a group of bills. (Lesson 8)**
Objective 4:	**Solve word problems involving different combinations of coins with the same total value. (Lesson 9)**
Objective 5:	**Use the fewest number of coins to make a given value. (Lesson 10)**
Objective 6:	**Use different strategies to make $1 or make change from $1. (Lesson 11)**
Objective 7:	**Solve word problems involving different ways to make change from $1. (Lesson 12)**
Objective 8:	**Solve two-step word problems involving dollars or cents with totals within $100 or $1. (Lesson 13)**

Lesson 6

Objective: Recognize the value of coins and count up to find their total value.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Concept Development	(32 minutes)
Application Problem	(7 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Decomposition Tree **2.NBT.5** (6 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic B and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

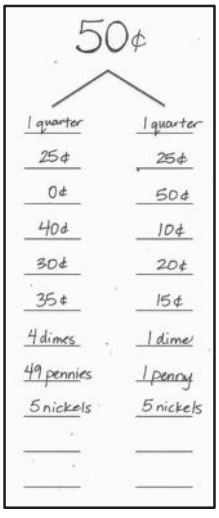
Decomposition Tree (6 minutes)

Materials: (S) Decomposition Tree (Fluency Template)

Note: Students are given 90 seconds to decompose a specified amount in as many ways as they can. This fluency activity allows students to work at their own skill levels and decompose amounts in a multitude of ways in a short amount of time.

T: (Post a blank decomposition tree.) I'm going to think of a way to break 50 cents into two parts. I know 2 quarters makes 50 cents, and each quarter is worth 25 cents.

T: Watch me as I track our thinking on this decomposition tree. It is called a decomposition tree because we are decomposing the number at the top. The tree is like a number bond because the sum of the two parts is equal to the whole.



T: Raise your hand when you have another way to break 50 cents into two parts.

S: 0¢ and 50¢. → 40¢ and 10¢. → 30¢ and 20¢. → 35¢ and 15¢. → 4 dimes and 1 dime. → 49 pennies and 1 penny. → 5 nickels and 5 nickels.

T: (Write each correct student response on the posted decomposition tree.)

T: Great! You are on a roll! Now, let's see what you can do on your own. (Distribute the decomposition tree template.)

T: You are going to break apart 60¢ on your own tree for 90 seconds. Make as many pairs as you can. Go!

S: (Work for 90 seconds.)

T: Now, exchange your tree with your partner, and check each other's work. (Allow students 30–45 seconds to check.)

T: Return each other's papers. Did you see another way to make 60¢ on your partner's paper? (Allow students to share for another 30 seconds.)

T: Turn your paper over. Let's break apart 60¢ for another minute.

Concept Development (32 minutes)

Materials: (T/S) Personal white board, bag with the following play money coins: 4 quarters, 20 nickels, 10 dimes, 10 pennies

Note: Call students to sit in a circle in the communal area. This Concept Development assumes that students know the names of coins and their values based on lessons taught in Grade 1. If this is not the case, add time in the beginning of the lesson to review the names and values of the coins, and omit the Application Problem.

Part 1: Count coins in isolation.

T: Let's count some money!

T: (Hold up a penny.) This coin is called a …?

S: Penny!

T: What is its value?

S: 1 cent!

T: (Hold up a nickel.) This coin is called a …?

S: Nickel!

T: What is its value?

S: 5 cents!

T: (Hold up a dime.) This coin is called a …?

S: Dime!

T: What is its value?

S: 10 cents!

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Support English language learners by highlighting the names and values of the coins. Post a chart with a picture, the name, and the value of the coins for reference. Practice saying the names and the values of the coins with them. Students who need more practice can use interactive technology such as the one found at http://www.ixl.com/math/grade-2/names-and-values-of-common-coins.

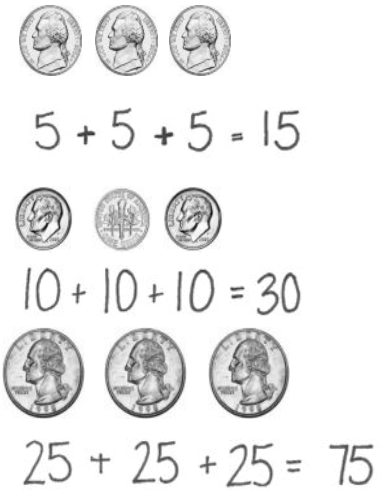
T: (Hold up a quarter.) This coin is called a …?

S: Quarter!

T: What is its value?

S: 25 cents!

T: Use your personal white board to write an addition sentence that shows the value of 3 nickels. (Pause.) Tell me the number sentence.



S: 5 + 5 + 5 = 15.

T: What coin do each of the fives represent in your number sentence?

S: A nickel!

T: Let's do the same with these 3 dimes.

T: Use your personal white board to write an addition sentence showing the value of 3 dimes. (Pause.) Tell me the number sentence.

S: 10 + 10 + 10 = 30.

T: What coin do each of the tens represent in your number sentence?

S: A dime.

T: (Show 3 quarters.) Use your personal white board to write an addition sentence showing the value of 3 quarters. (Pause.) Tell me the number sentence.

S: 25 + 25 + 25 = 75.

T: Let's look at our number sentences. (Point to 5 + 5 + 5 = 15, 10 + 10 + 10 = 30, and 25 + 25 + 25 = 75.) Each shows the value of 3 coins. Which coin is being counted for each number sentence? Review with your partner.

S: The 5s are counting nickels. → The 10s are counting dimes. → 25 + 25 + 25 is counting quarters.

T: Take out 10 nickels. Use skip-counting to find the value of the nickels.

S: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50.

T: Combine your nickels with your partner's. Together, skip-count to find the value of your nickels.

S: 5, 10, 15, …, 100.

Support students, and listen for misconceptions. Repeat the process with dimes.

T: Take out 1 nickel and 5 dimes. Skip-count starting with the value of the nickel.

S: 5, 15, 25, 35, 45, 55.

T: Exchange your nickel for a quarter. Skip-count starting with the value of the quarter.

S: 25, 35, 45, 55, 65, 75.

Listen carefully to students as they skip-count by 10 starting from a number other than zero. Provide additional examples as needed to solidify understanding.

Part 2: Count mixed groups of coins starting with the largest value coin.

T: (Take 2 dimes and 3 pennies out of the bag, and lay them down on a personal white board for students to see.)
T: Turn and talk: What is the total value of my coins?
S: 23 cents!
T: When we write the total value of coins, we use this symbol, which means cents. (Write 23¢ on the board.)
T: Let's count the money together. Start with the dimes.
S: 10, 20, 21, 22, 23.
T: Let's count again. This time, start with the pennies.
S: 1, 2, 3, 13, 23.
T: Which was easier? Why?
S: Counting the dimes first. → If we count the dimes first, we can count by tens. Then, we add the ones.
T: So, it was easier to start with the largest coin value. Let's try that with the next problem.
T: (Take out 1 quarter, 1 nickel, and 1 penny.) Turn and talk: What is the total value of my coins, and how do you know?
S: 25 cents plus 5 more is 30 cents, plus 1 more is 31. → The quarter and the nickel make 30, plus the penny is 31.
MP.4
T: Write a number sentence to show the value of 1 quarter, 1 nickel, and 1 penny.
S: (Write 25 + 5 + 1 = 31.)
T: It's so much easier to add 5 to 25 than to add 6 to 25. So when finding the total value of coins, I generally start counting with the coin that has the largest value.

Give students time to practice counting mixed groups with the following amounts:

- 1 quarter 1 dime 1 penny
- 1 quarter 2 nickels 1 dime
- 1 quarter 2 pennies 1 dime
- 1 quarter 2 dimes 1 nickel
- 2 quarters 2 dimes 1 nickel
- 2 quarters 3 dimes
- 2 quarters 5 dimes

Note: For the last amount in the sequence, explain to students that 100 cents can be written as 100¢ or $1. (Write 100¢ and $1 on the board.)

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge students working above grade level by asking them to assist by writing a few strings of different amounts using combinations of coins and to provide equations showing the values of those amounts.

Part 3: Count mixed groups of coins by making ten.

T: (Take out 1 quarter, 3 dimes, 1 nickel, and 2 pennies.) Turn and talk: How much money do we have here, and how do you know?

S: 25, 35, 45, 55, 60, 61, 62. → 25 cents plus 30 more is 55 cents, plus 5 more is 60, plus 2 more is 62. → 25, 30, 40, 50, 60, 61, 62. → The quarter and the nickel make 30. Then, I add 30 for the dimes to get 60. Then, add the pennies: 60 + 2 = 62.

T: Count the value of the coins for me, starting with the largest value coin to the smallest value coin.

S: 25, 35, 45, 55, 60, 61, 62.

T: Did anyone count a different way?

S: Yes! I added the quarter and nickel first. Then, I added the dimes. The pennies were last.

T: You made ten first. Try counting that way.

S: 25, 30, 40, 50, 60, 61, 62.

T: For me, it is easier to make ten first by adding the nickel to the quarter. See if you agree using the following sets of coins. Try finding the total value of the coins by making a ten first and then by not making a ten first.

Write the following amounts on the board:

- 1 quarter 2 pennies 1 nickel 2 dimes
- 1 quarter 1 penny 3 nickels 1 dime

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

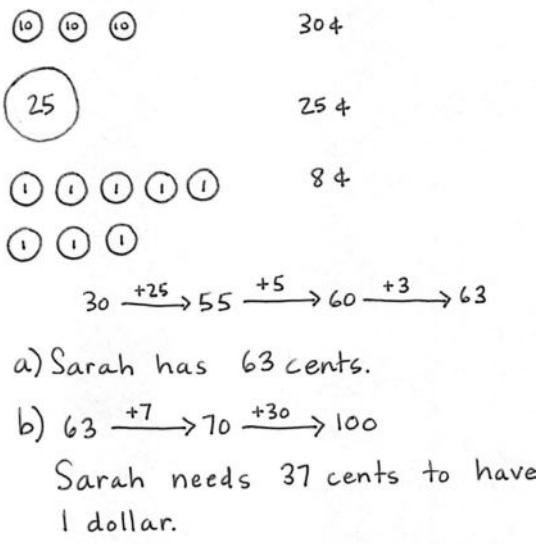
Application Problem (7 minutes)

Note: This Application Problem follows the Concept Development because it provides practice for material taught during the Concept Development.

Sarah is saving money in her piggy bank. So far, she has 3 dimes, 1 quarter, and 8 pennies.

a. How much money does Sarah have?

b. How much more does she need to have a dollar?



Student Debrief (10 minutes)

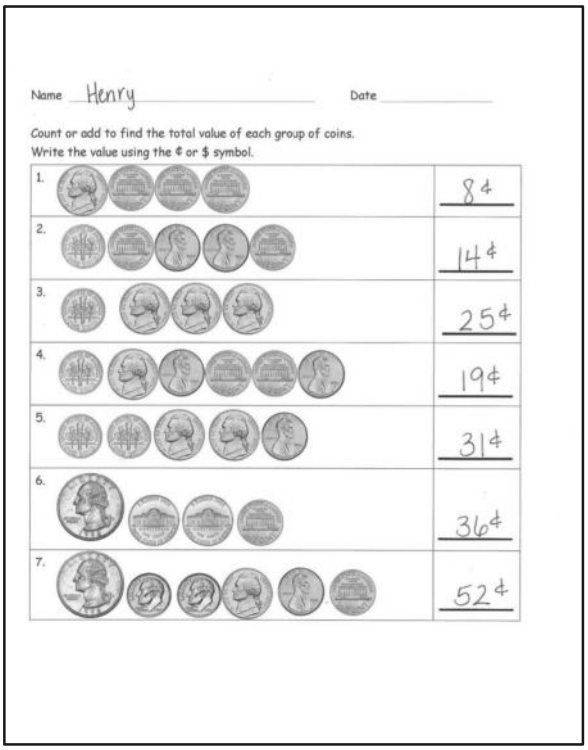
Lesson Objective: Recognize the value of coins and count up to find their total value.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

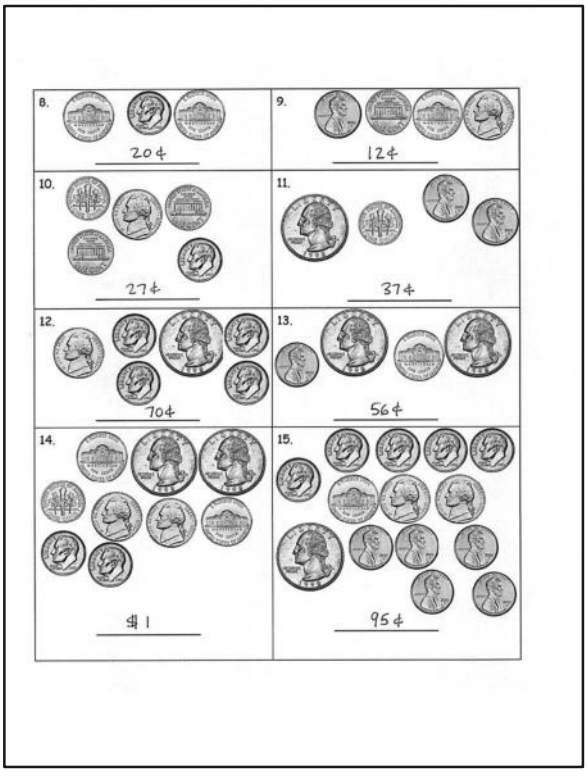
Any combination of the questions below may be used to lead the discussion.

- Look at the first page of your Problem Set. Tell your partner about how the coins are laid out in each row. Where did you start counting? Why did you start there? (Some students might count left to right or right to left, save the dimes for last, or count randomly.) Tell your partner your counting path and why it is a good way to find the total value of the coins.
- Look at the second page. Tell your partner about how the coins are laid out in each box. How is it different from the first page? Which one was the easiest to find the value for? Why?
- Did anyone use an addition equation to find the value of the coins? Did skip-counting help you to add faster?
- How can we use what we know about sorting to help us find the value of coins? Could we use a table to help us find the value of a group of coins?


Name Henry Date

Count or add to find the total value of each group of coins.
Write the value using the ¢ or $ symbol.

1. 8¢
2. 14¢
3. 25¢
4. 19¢
5. 31¢
6. 36¢
7. 52¢


8. 20¢
9. 12¢
10. 27¢
11. 37¢
12. 70¢
13. 56¢
14. $1
15. 95¢

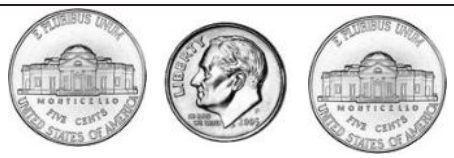
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Count or add to find the total value of each group of coins.
Write the value using the ¢ or $ symbol.

1. 	_____
2. 	_____
3. 	_____
4. 	_____
5. 	_____
6. 	_____
7. 	_____

8. 

9. 

10. 

11. 

12. 

13. 

14. 

15. 

Name _____ Date _____

Count or add to find the total value of each group of coins.

Write the value using the ¢ or $ symbol.

1. 

_____

2. 

_____

3. 

_____

4. 

_____

Name _____ Date _____

Count or add to find the total value of each group of coins.
Write the value using the ¢ or $ symbol.

1.		_____
2.		_____
3.		_____
4.		_____
5.		_____
6.		_____
7.		_____

8. 

9. 

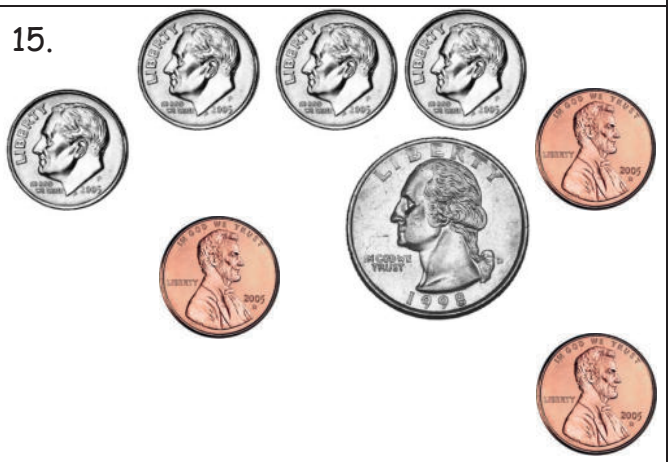
10. 

11. 

12. 

13. 

14. 

15. 

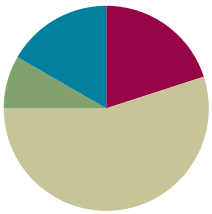
decomposition tree

Lesson 7

Objective: Solve word problems involving the total value of a group of coins.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Skip-Count by $5 and $10 Between 85 and 205 **2.NBT.2** (3 minutes)
- Sprint: Subtraction Across a Ten **2.OA.2** (9 minutes)

Skip-Count by $5 and $10 Between 85 and 205 (3 minutes)

Materials: (T) 20 ten-dollar bills, 10 five-dollar bills

Note: Bring students to an area where the bills can be laid on the carpet or central location. Students apply their knowledge of skip-counting by fives and tens to counting bills in preparation for solving word problems with bills in the next lesson.

T: (Lay out $85 in bills so that all students can see.) What is the total value of the bills?
S: $85.
T: Count in your head as I change the value. (Lay down ten-dollar bills to make 95, 105, 115.)
T: What is the total value of the bills now?
S: $115.
T: (Remove ten-dollar bills to make 105, 95.) What is the total value of the bills now?
S: $95.
T: (Add more ten-dollar bills to make 105, 115, 125, 135, 145, 155, 165, 175, 185.) What is the total value of the bills?
S: $185.
T: (Lay down five-dollar bills to make 190, 195, 200.) What is the total value of the bills?
S: $200.

Continue to count up and back by 5 and 10, crossing over the hundred and where students struggle.

Sprint: Subtraction Across a Ten (9 minutes)

Materials: (S) Subtraction Across a Ten Sprint

Note: This Sprint gives practice with the grade-level fluency of subtracting within 20.

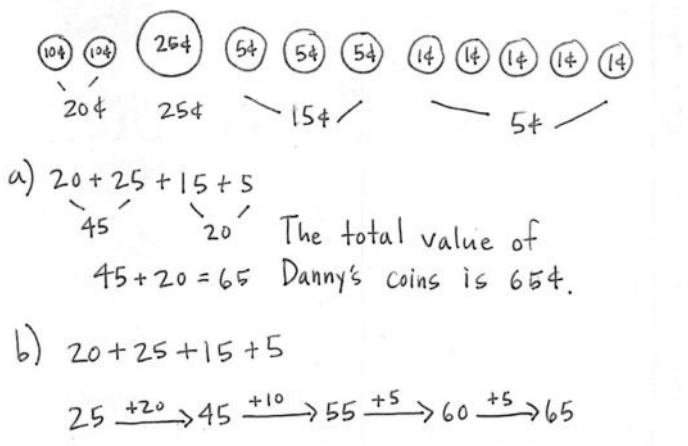
Application Problem (5 minutes)

Danny has 2 dimes, 1 quarter, 3 nickels, and 5 pennies.

a. What is the total value of Danny's coins?

b. Show two different ways that Danny might add to find the total.

Note: The problem is designed to encourage students to think flexibly when adding coins. While some may order coins from greatest to least and count on, others may skip-count, and still others may look to make a ten. These strategies are used to problem-solve during today's lesson.



Concept Development (33 minutes)

Materials: (T) Play money coins, personal white board
(S) Personal white board

Remind students to use the RDW process when solving word problems with money. Emphasize the importance of rereading and adjusting.

- Read the problem.
- Draw and label.
- Write number sentences.
- Write a statement.

Part 1: Solve a *put together with total unknown* problem.

Ignacio has 3 dimes and 2 nickels in one pocket and 1 quarter and 7 pennies in another pocket. How much money is in Ignacio's pockets?

T: What do we do first when we see a word problem?

S: Read it.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge students working above grade level by asking them to find other ways to show the same value (65 cents) as presented in the Application Problem. Students can use manipulatives to show their results or use paper and pencil to show how many different combinations of coins can make 65 cents.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

At the beginning of the lesson, support English language learners by pointing to visuals of the coins while reading Problem 1 out loud to the class. Pictures of quarters, dimes, nickels, and pennies should have the name of the coins printed clearly so that students can learn them more quickly. Post the visuals on the word wall so that students needing extra support can refer to them.

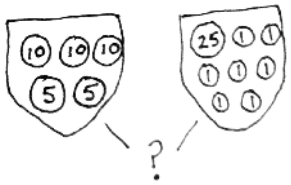
T: Yes. Let's read the problem together. (Read aloud.)

T: What can you draw?

S: Two pockets! → One pocket with 3 dimes and 2 nickels and another pocket with 1 quarter and 7 pennies.

T: Great! Get going. I'll give you a minute to draw quietly. When I give the signal, talk to your partner about how your drawing matches the story.

T: (Allow students time to draw. Signal.) Turn and talk: Look at your drawing. What are you trying to find? (See the example drawings to the right.)



S: We need to find out how much Ignacio has in both pockets. → We need to find the total value of the coins. → We need to find the total in Pocket 1 and the total in Pocket 2 and then add them.

T: Go ahead and do that. Write a number sentence and statement to match your work. (Pause to allow students time to work.) Explain to your partner how you solved the problem.

S: For the first pocket, I just skip-counted by tens and then fives: 10, 20, 30, 35, 40 cents. → For the first pocket, I added the 2 nickels first to make ten. And then I added on 3 more tens to get 40 cents. → A quarter is 25 cents, and then you can count on 7 cents, so 26, 27, 28, …, 32 cents in Pocket 2. → In the second pocket, I drew a number bond to make a ten, so 25 + 5 is 30, plus 2 is 32 cents.

T: What's your number sentence?

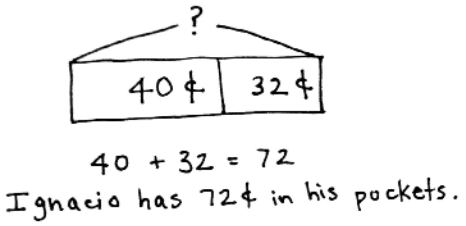
MP.2

S: 40 + 32 = 72.

T: And the statement of your solution?

S: Ignacio has 72 cents in his pockets.

T: Yes! Look how we can also represent this problem with a tape diagram. (See the image to the right.)



T: Turn and talk. Use part–whole language to describe how your drawing matches mine.

S: Your bar has two parts, and I drew two pockets. → We both added the two parts to find the total. → Our parts have the same amount of money in them.

T: Exactly! Let's try a more challenging problem. You're ready for it!

Repeat the process with the following *put together with result unknown* problem, adjusting the level of support as appropriate for students:

> Tamika has 12 pennies and 2 quarters in her new piggy bank. She puts in 4 nickels, 1 dime, and 4 more pennies. How much money does Tamika have in her piggy bank altogether?

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Provide students working below grade level with the chance to continue using coin manipulatives and part–whole templates for their personal white boards. This provides extra scaffolding to help them transition to drawing tape diagrams.

Circulate and support students as they use the RDW process to complete the problem independently. Encourage flexible thinking. Check student drawings and problem-solving strategies.

The following questions may be used to check for student understanding:

- What did you draw to show the story?
- What number sentence did you write to match your drawing?

Part 2: Solve a two-step *put together with total unknown* and *take from with result unknown* word problem.

On Monday, Reese gives 2 dimes and 3 nickels to her sister. On Tuesday, she gives her sister 1 quarter, 1 dime, and 4 pennies. If Reese started with 94 cents, how much money does she have now?

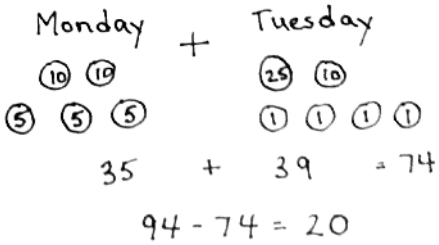
T: Let's read the problem together.

T/S: (Read aloud.)

T: What can you draw first?

S: Two groups of coins, one for Monday and one for Tuesday.

T: Great! Get to work. I'll give you a minute to draw quietly. When I give the signal, talk to your partner about how your drawing matches the story. (Allow students time to draw. See the examples to the right.)



T: Turn and talk: Look at your drawing. What are you trying to find?

S: We need to find the total value of all the coins Reese gave to her sister. Then, we need to subtract the total from 94 cents. → We need to add the two groups of coins first, but then we need to subtract to see how much she has left.

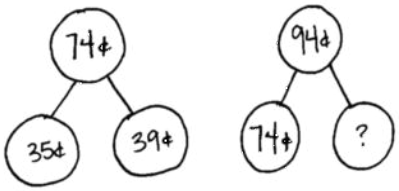
T: Go ahead and do that. Write a number sentence and statement to match your work. (Pause to allow students time to work.) Explain to your partner how you solved the problem.

S: First, I added the money from Monday and Tuesday. Then, I subtracted 74¢ from 94¢ to get 20¢. → I used the make a ten strategy to make it easy. 35 + 39 = 34 + 1 + 39 = 34 + 40 = 74.

T: (Circulate to provide support and check for understanding.)

T: What were your number sentences?

S: First, I added, so 20 + 15 + 25 + 10 + 4 = 74. → My second one was 94 – 74 = 20.



T: And the statement of your solution?

S: Reese has 20 cents now.

T: Watch how we can also represent this problem with a number bond.

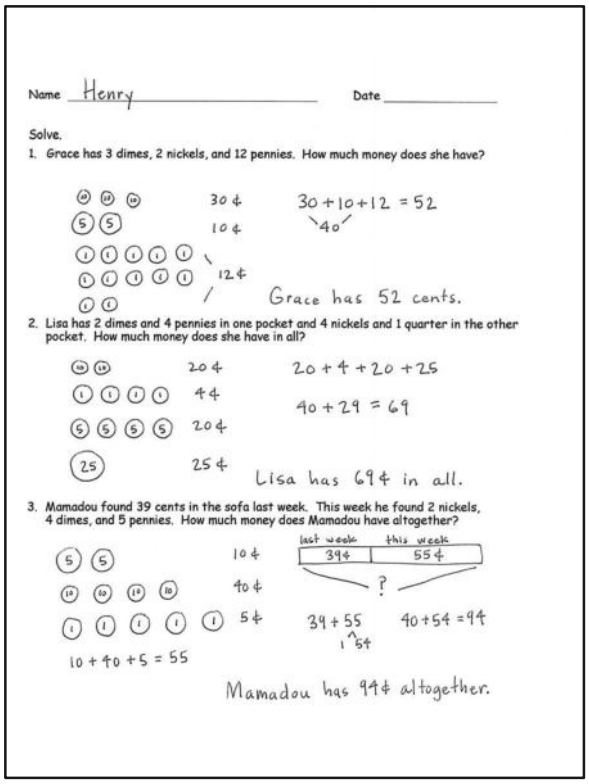
T: Turn and talk. Use part–whole language to describe how your drawing matches mine.

S: Since Reese started with 94 cents, that's the whole. → We know that she gave her sister a total of 74 cents; that's one part. → We know the whole and the part she gave her sister, and we found the part Reese has left.

T: You're on a roll! Now, it's your turn to solve.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Henry Date

Solve.

1. Grace has 3 dimes, 2 nickels, and 12 pennies. How much money does she have?

30 + 10 + 12 = 52
Grace has 52 cents.

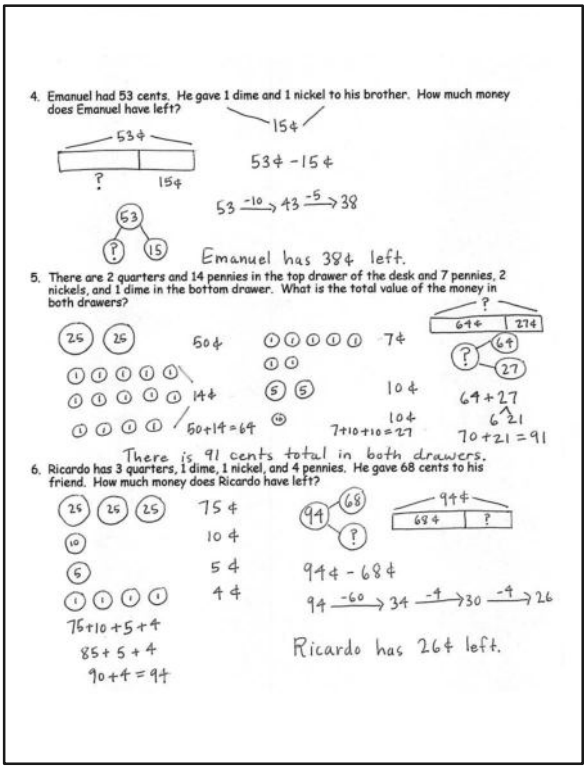
2. Lisa has 2 dimes and 4 pennies in one pocket and 4 nickels and 1 quarter in the other pocket. How much money does she have in all?

20 + 4 + 20 + 25
40 + 29 = 69
Lisa has 69¢ in all.

3. Mamadou found 39 cents in the sofa last week. This week he found 2 nickels, 4 dimes, and 5 pennies. How much money does Mamadou have altogether?

last week: 39¢ | this week: 55¢

39 + 55
40 + 54 = 94
10 + 40 + 5 = 55
Mamadou has 94¢ altogether.


4. Emanuel had 53 cents. He gave 1 dime and 1 nickel to his brother. How much money does Emanuel have left?

53¢ - 15¢
53 -10→ 43 -5→ 38
Emanuel has 38¢ left.

5. There are 2 quarters and 14 pennies in the top drawer of the desk and 7 pennies, 2 nickels, and 1 dime in the bottom drawer. What is the total value of the money in both drawers?

64 + 27
70 + 21 = 91
There is 91 cents total in both drawers.

6. Ricardo has 3 quarters, 1 dime, 1 nickel, and 4 pennies. He gave 68 cents to his friend. How much money does Ricardo have left?

94 - 68
94 -60→ 34 -4→ 30 -4→ 26
Ricardo has 26¢ left.

Student Debrief (10 minutes)

Lesson Objective: Solve word problems involving the total value of a group of coins.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the first problem in the Problem Set. Talk with your partner about how you thought about and counted the pennies. How could you think about the nickels to make it easier to find their value?
- How does understanding place value help you to find the value of coins?
- Turn and talk. What tool did you use to solve Problem 4: addition, subtraction, or something else?
- Explain to your partner using part–whole language how you figured out how much money Ricardo had left in Problem 6. If you used a model or an equation, show it to your partner.

- How are number bonds and the part–whole tape diagrams the same? How are they different? Are there certain math problems where it is better to use one instead of the other?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in todays' lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Subtraction Across a Ten

1.	10 – 3 =	
2.	11 – 3 =	
3.	12 – 3 =	
4.	10 – 2 =	
5.	11 – 2 =	
6.	10 – 5 =	
7.	11 – 5 =	
8.	12 – 5 =	
9.	14 – 5 =	
10.	10 – 4 =	
11.	11 – 4 =	
12.	12 – 4 =	
13.	13 – 4 =	
14.	10 – 7 =	
15.	11 – 7 =	
16.	12 – 7 =	
17.	15 – 7 =	
18.	10 – 6 =	
19.	11 – 6 =	
20.	12 – 6 =	
21.	14 – 6 =	
22.	10 – 9 =	

23.	11 – 9 =	
24.	12 – 9 =	
25.	17 – 9 =	
26.	10 – 8 =	
27.	11 – 8 =	
28.	12 – 8 =	
29.	16 – 8 =	
30.	10 – 6 =	
31.	13 – 6 =	
32.	15 – 6 =	
33.	10 – 7 =	
34.	13 – 7 =	
35.	14 – 7 =	
36.	16 – 7 =	
37.	10 – 8 =	
38.	13 – 8 =	
39.	14 – 8 =	
40.	17 – 8 =	
41.	10 – 9 =	
42.	13 – 9 =	
43.	14 – 9 =	
44.	18 – 9 =	

B

Number Correct: _____

Improvement: _____

Subtraction Across a Ten

1.	10 – 2 =	
2.	11 – 2 =	
3.	10 – 4 =	
4.	11 – 4 =	
5.	12 – 4 =	
6.	13 – 4 =	
7.	10 – 3 =	
8.	11 – 3 =	
9.	12 – 3 =	
10.	10 – 6 =	
11.	11 – 6 =	
12.	12 – 6 =	
13.	15 – 6 =	
14.	10 – 5 =	
15.	11 – 5 =	
16.	12 – 5 =	
17.	14 – 5 =	
18.	10 – 8 =	
19.	11 – 8 =	
20.	12 – 8 =	
21.	17 – 8 =	
22.	10 – 7 =	

23.	11 – 7 =	
24.	12 – 7 =	
25.	16 – 7 =	
26.	10 – 9 =	
27.	11 – 9 =	
28.	12 – 9 =	
29.	18 – 9 =	
30.	10 – 5 =	
31.	13 – 5 =	
32.	10 – 6 =	
33.	13 – 6 =	
34.	14 – 6 =	
35.	10 – 7 =	
36.	13 – 7 =	
37.	15 – 7 =	
38.	10 – 8 =	
39.	13 – 8 =	
40.	14 – 8 =	
41.	16 – 8 =	
42.	10 – 9 =	
43.	16 – 9 =	
44.	17 – 9 =	

Name _____ Date _____

Solve.

1. Grace has 3 dimes, 2 nickels, and 12 pennies. How much money does she have?

2. Lisa has 2 dimes and 4 pennies in one pocket and 4 nickels and 1 quarter in the other pocket. How much money does she have in all?

3. Mamadou found 39 cents in the sofa last week. This week, he found 2 nickels, 4 dimes, and 5 pennies. How much money does Mamadou have altogether?

4. Emanuel had 53 cents. He gave 1 dime and 1 nickel to his brother. How much money does Emanuel have left?

5. There are 2 quarters and 14 pennies in the top drawer of the desk and 7 pennies, 2 nickels, and 1 dime in the bottom drawer. What is the total value of the money in both drawers?

6. Ricardo has 3 quarters, 1 dime, 1 nickel, and 4 pennies. He gave 68 cents to his friend. How much money does Ricardo have left?

Name _____ Date _____

Solve.

1. Greg had 1 quarter, 1 dime, and 3 nickels in his pocket. He found 3 nickels on the sidewalk. How much money does Greg have?

2. Robert gave Sandra 1 quarter, 5 nickels, and 2 pennies. Sandra already had 3 pennies and 2 dimes. How much money does Sandra have now?

Name _____ Date _____

Solve.

1. Owen has 4 dimes, 3 nickels, and 16 pennies. How much money does he have?

2. Eli found 1 quarter, 1 dime, and 2 pennies in his desk and 16 pennies and 2 dimes in his backpack. How much money does he have in all?

3. Carrie had 2 dimes, 1 quarter, and 11 pennies in her pocket. Then, she bought a soft pretzel for 35 cents. How much money does Carrie have left?

4. Ethan had 67 cents. He gave 1 quarter and 6 pennies to his sister. How much money does Ethan have left?

5. There are 4 dimes and 3 nickels in Susan's piggy bank. Nevaeh has 17 pennies and 3 nickels in her piggy bank. What is the total value of the money in both piggy banks?

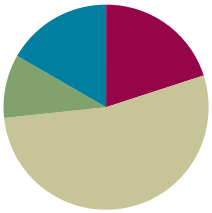
6. Tison had 1 quarter, 4 dimes, 4 nickels, and 5 pennies. He gave 57 cents to his cousin. How much money does Tison have left?

Lesson 8

Objective: Solve word problems involving the total value of a group of bills.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Adding Across a Ten **2.OA.2** (9 minutes)
- More and Less **2.NBT.5** (3 minutes)

Sprint: Adding Across a Ten (9 minutes)

Materials: (S) Adding Across a Ten Sprint

Note: This Sprint gives practice with the grade level fluency of adding within 20.

More and Less (3 minutes)

Note: In this activity, students practice adding and subtracting coins. Because the addition of the value of a quarter may still be challenging for some, the use of a signal to invite a choral response is suggested.

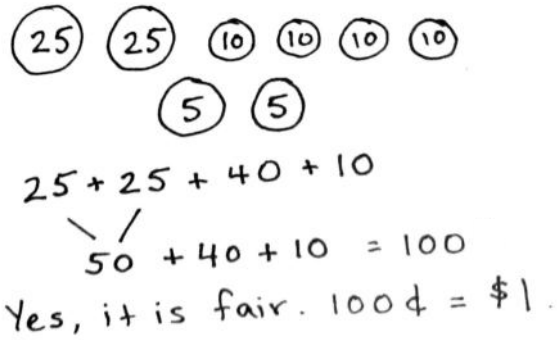
T: The value of one dime more than a quarter is …?
S: 35 cents.
T: Give the number sentence using cents as the unit.
S: 25 cents + 10 cents = 35 cents.
T: Wait for the signal. The value of 1 quarter more than 35 cents is …? (Signal when students are ready.)
S: 60 cents!
T: Give the number sentence.
S: 35 cents + 25 cents = 60 cents.
T: The value of 1 quarter more than 60 cents is …?
S: 85 cents.

T: Give the number sentence.
S: 60 cents + 25 cents = 85 cents.
T: The value of a dime and nickel more than 85 cents is …?
S: 100 cents. → 1 dollar!
T: Give the number sentence.
S: 85 cents + 15 cents = 100 cents.

Continue to repeat this line of questioning as time permits, restarting at zero after reaching 100 cents.

Application Problem (6 minutes)

Kiko's brother says that he will trade her 2 quarters, 4 dimes, and 2 nickels for a one-dollar bill. Is this a fair trade? How do you know?



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Scaffold the Application Problem for students who are working below grade level by providing them with coins to use. Work with students one step at a time while they add up the value of the coins: "What is the value of a quarter? 2 quarters? 1 dime, 2 dimes, 3 dimes, 4 dimes? Two nickels equals how much? Let's add them all up together."

Note: This problem affords students the chance to practice ordering coins from greatest to least and then finding the total. It also asks students to make a judgment call based on their solutions. The comparison to $1 serves as a bridge to today's lesson with dollar bills.

Concept Development (32 minutes)

Materials: (T) Play money dollar bills (S) Personal white board

Part 1: Solve a *put together with total unknown* type problem.

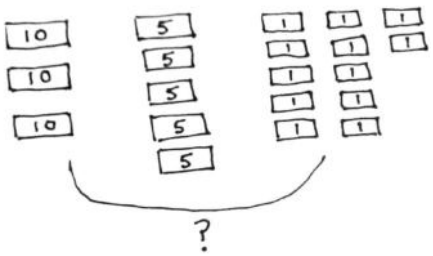
Alyssa has 5 five-dollar bills, 12 one-dollar bills, and 3 ten-dollar bills in her wallet. How much money is in her wallet?

T: What do we do first when we see a word problem?
S: Read the whole thing.
T: Yes. Let's read the problem together.
T/S: (Read aloud.)

T: What can you draw?

S: All the dollar bills. → 3 ten-dollar bills, 5 five-dollar bills, and 12 one-dollar bills.

T: Great! I'll give you about one minute to draw quietly. When I give the signal, talk to your partner about how your drawing (shown on the right) matches the story.



T: Turn and talk: Look at your drawing. What are you trying to find?

S: I need to find out how much money Alyssa has in her wallet. → I need to find the total value of the dollar bills. → I need to find the total value of the tens, then fives, then ones. Then, add.

T: Go ahead and do that. Write a number sentence and a statement to match your work. (Pause to allow students time to work.) Explain to your partner how you solved the problem and how your number sentence matches your drawing.

S: I put the money in order from greatest to least. Then, I skip-counted by tens first: 10, 20, 30. Then, I added on and skip-counted by fives: 35, 40, 45, 50, 55. Then, I added 12 ones, and I got 67. → I thought, 10 plus 10 is 20, and 20 plus 10 is 30. Then, I counted on each 5, so 35, 40, 45, 50, 55. Then, I added on 12 ones.

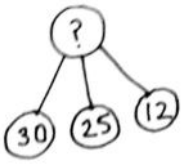
T: What's your number sentence?

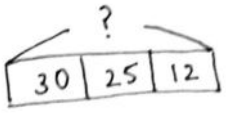
S: 30 + 25 + 12 = 67. → 10 + 10 + 10 + 5 + 5 + 5 + 5 + 5 + 12 = 67.

T: And the statement of your solution?

S: Alyssa has 67 dollars in her wallet.

T: Yes! Look how we can also represent this problem with a tape diagram or number bond (see the images on the right).





T: Turn and talk. Use part–whole language to describe how your drawing matches mine and how it is different from mine.

S: I combined three parts to find the whole thing. → We both have question marks for the whole, since we need to find it. → I added three parts, too: the ten-dollar bills, five-dollar bills, and one-dollar bills! → My drawing was a lot more work!

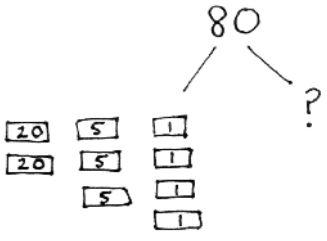
T: Do both drawings make sense?

S: Yes!

T: Whose might be more efficient?

S: Yours!

T: The important thing is that a drawing makes sense, but as we solve more problems, sometimes we do see more efficient ways to draw.



Part 2: Solve a *take from with result unknown* type problem.

Silas uses 2 twenty-dollar bills, 3 five-dollar bills, and 4 one-dollar bills on a gift for his aunt. He is going to save the rest. If Silas started with

$80, how much will he save?

T: Let's read the problem together.

T/S: (Read aloud.)

T: Can you draw something? Just answer yes or no.

S: Yes!

T: I'll give you a minute to draw quietly. (Circulate to support by rereading and repeating the simple questions, "Can you draw something? What can you draw?")

T: Talk to your partner. What did you draw?

S: I drew the money Silas spent on the gift and a question mark for the money he saved. → I drew 2 twenty-dollar bills, 3 five-dollar bills, and 4 one-dollar bills. → I started with 80 and made two arms like a number bond with all the money he spent in one part. (See the drawing on the previous page.)

T: Turn and talk: Look at your drawing. What are you trying to find?

S: First, I am trying to find out how much Silas spent altogether by adding. → I need to find the total value of all the bills. Then, I need to subtract from $80 to see how much he'll save.

T: Good analysis. Now, write a number sentence and a statement to match your work. (Pause while students work.) Explain to your partner how you solved.

MP.2

S: First, I added 20 plus 20, which is 40. Then, I skip-counted up by fives, so 45, 50, 55. Then, 4 more is 59 dollars. → I wrote 40 + 15 + 4 = ____. Since 15 + 4 is almost 20, I added 40 + 20 to make 60. Then, I subtracted 1 to get 59. → After I found the total, $59, I used compensation to subtract. I changed 80 – 59 to 81 – 60, which is $21. → To find how much Silas saved, I wrote 59 + ___ = 80. I counted up 21 more using the arrow way.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Facilitate English language learners' ability to talk to a partner by providing sentence starters throughout the lesson:

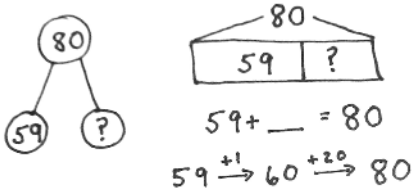
- Silas spent ____ dollars. I know because ___.
- I need to find ___.
- I drew ___ to match the story.
- I used the ____ strategy to find how much money Deste has.

T: I see many of you wrote two number sentences. First, you found the total Silas spent on the gift. From there, you found out how much he saved. Nice work!

T: How much did Silas save? Tell me in a statement.

S: Silas saved 21 dollars.

T: Some of you also represented this situation with a part–whole model (shown on the right).



T: Use part–whole language to describe how your drawing matches your friend's.

S: I added up the money in my drawing to get $59, which is one part in your number bond. → I drew $80 first, since that was the whole amount Silas started with. → I had a question mark for the part he saved.

T: You've got it!

Part 3: Solve a *compare with smaller unknown* type problem.

Deste has 4 ten-dollar bills and 6 five-dollar bills. She has $25 more than Kirsten. How much money does Kirsten have?

T: Let's read the problem together.

T/S: (Read aloud.)

T: What do we do after we have read?

S: Draw.

T: Great! Get going.

T: Look at your drawing. What are you trying to find? Turn and talk.

S: I'm trying to find out how much money Kirsten has. → I'm trying to find out Kirsten's total money. I know it is $25 less than Deste's.

T: Write a number sentence and a statement to match your work. (Pause to allow students time to work.) Explain to your partner how you solved and how your number sentence matches the story.

S: First, I skip-counted in my head by tens and fives to get Deste's total: 10, 20, 30, 40, 45, 50, …, 70. → I knew that if Deste has $25 more, then Kirsten has $25 less. To find 25 less than 70, I added 5 to both numbers and made it an easier problem. (See the image below.) → I drew a tape diagram, but I wrote ? + 25 = 70. I counted up 5 to 30 and then added on 40 more, so 45 dollars.

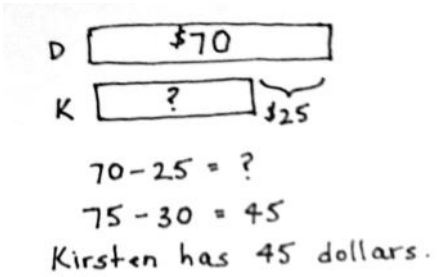
T: How much money does Kirsten have? Tell me in a statement.

S: Kirsten has 45 dollars.

T: The words *more* and *less* in a word problem can be tricky. Let's look back at the problem to be sure our drawing matches the story. (Point while working through the problem.)

T: How much money does Deste have?

S: 70 dollars.



T: Does our drawing show that?

S: Yes.

T: Who has more money?

S: Deste!

T: Does our drawing show that?

S: Yes!

T: How much more money does Deste have than Kirsten?

S: $25.

T: Does our drawing show that?

S: Yes!

T: Explain to your partner how you know Deste has more than Kirsten.

S: Deste has $70, and that's $25 more than $45. → Kirsten's total should be $25 less than Deste's total. $45 is $25 less than $70.

T: The tricky thing for me is that the problem says Deste has more, but we subtract to find the amount of money Kirsten has!

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

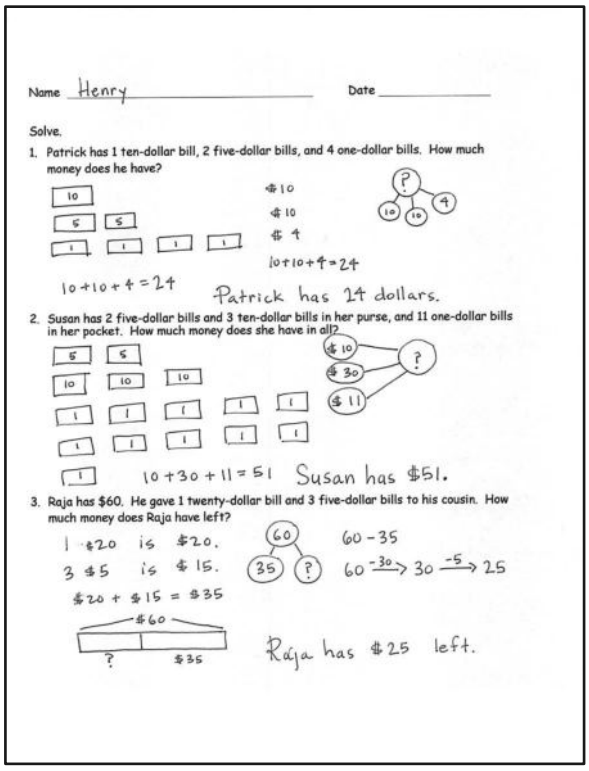
Lesson Objective: Solve word problems involving the total value of a group of bills.

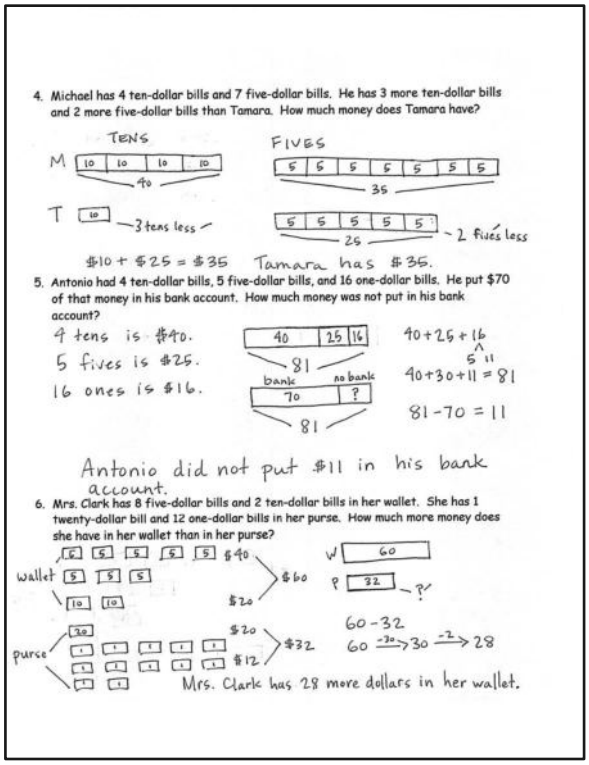
The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Problem 2 on your Problem Set. Talk to your partner about how you thought about the one-dollar bills when figuring out how much money Susan had. Did you use what you know about place value to help you?
- What strategy did you use in Problem 4 to compare Michael's and Tamara's money? (Number bond, tape diagram, pictures, or equations.)
- Let's read Problem 6 together. When it asked how much more money is in her wallet than in her purse, did you think add or subtract? Talk to your partner. (Discuss comparison problems and how not to be tricked by the word *more*.)





- Let's read Problem 5 together. Talk to your partner. How did your drawing help you know what you were trying to find? (Without a drawing labeled with a question mark for the unknown, students might miss that they are finding what Antonio did *not* put in his bank account.)
- Explain to your partner a good way to think about dollars when the problem asks you to count many different bills. How do your organize them so they are easier to count?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Adding Across a Ten

1.	9 + 2 =	
2.	9 + 3 =	
3.	9 + 4 =	
4.	9 + 7 =	
5.	7 + 9 =	
6.	10 + 1 =	
7.	10 + 2 =	
8.	10 + 3 =	
9.	10 + 8 =	
10.	8 + 10 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 9 =	
15.	9 + 8 =	
16.	7 + 4 =	
17.	10 + 5 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 6 =	

23.	4 + 7 =	
24.	4 + 8 =	
25.	5 + 6 =	
26.	5 + 7 =	
27.	3 + 8 =	
28.	3 + 9 =	
29.	2 + 9 =	
30.	5 + 10 =	
31.	5 + 8 =	
32.	9 + 6 =	
33.	6 + 9 =	
34.	7 + 6 =	
35.	6 + 7 =	
36.	8 + 6 =	
37.	6 + 8 =	
38.	8 + 7 =	
39.	7 + 8 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

Number Correct: _____

Improvement: _____

B

Adding Across a Ten

1.	10 + 1 =	
2.	10 + 2 =	
3.	10 + 3 =	
4.	10 + 9 =	
5.	9 + 10 =	
6.	9 + 2 =	
7.	9 + 3 =	
8.	9 + 4 =	
9.	9 + 8 =	
10.	8 + 9 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 7 =	
15.	7 + 8 =	
16.	7 + 4 =	
17.	10 + 4 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 8 =	

23.	5 + 6 =	
24.	5 + 7 =	
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26.	4 + 8 =	
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29.	3 + 9 =	
30.	2 + 9 =	
31.	5 + 8 =	
32.	7 + 6 =	
33.	6 + 7 =	
34.	8 + 6 =	
35.	6 + 8 =	
36.	9 + 6 =	
37.	6 + 9 =	
38.	9 + 7 =	
39.	7 + 9 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

Name _____ Date _____

Solve.

1. Patrick has 1 ten-dollar bill, 2 five-dollar bills, and 4 one-dollar bills. How much money does he have?

2. Susan has 2 five-dollar bills and 3 ten-dollar bills in her purse and 11 one-dollar bills in her pocket. How much money does she have in all?

3. Raja has $60. He gave 1 twenty-dollar bill and 3 five-dollar bills to his cousin. How much money does Raja have left?

4. Michael has 4 ten-dollar bills and 7 five-dollar bills. He has 3 more ten-dollar bills and 2 more five-dollar bills than Tamara. How much money does Tamara have?

5. Antonio had 4 ten-dollar bills, 5 five-dollar bills, and 16 one-dollar bills. He put $70 of that money in his bank account. How much money was not put in his bank account?

6. Mrs. Clark has 8 five-dollar bills and 2 ten-dollar bills in her wallet. She has 1 twenty-dollar bill and 12 one-dollar bills in her purse. How much more money does she have in her wallet than in her purse?

Name _____ Date _____

Solve.

1. Josh had 3 five-dollar bills, 2 ten-dollar bills, and 7 one-dollar bills. He gave Suzy 1 five-dollar bill and 2 one-dollar bills. How much money does Josh have left?

2. Jeremy has 3 one-dollar bills and 1 five-dollar bill. Jessica has 2 ten-dollar bills and 2 five-dollar bills. Sam has 2 ten-dollar bills and 4 five-dollar bills. How much money do they have together?

Name _____ Date _____

Solve.

1. Mr. Chang has 4 ten-dollar bills, 3 five-dollar bills, and 6 one-dollar bills. How much money does he have in all?

2. At her yard sale, Danielle got 1 twenty-dollar bill and 5 one-dollar bills last week. This week, she got 3 ten-dollar bills and 3 five-dollar bills. What is the total amount she got for both weeks?

3. Patrick has 2 fewer ten-dollar bills than Brenna. Patrick has $64. How much money does Brenna have?

4. On Saturday, Mary Jo received 5 ten-dollar bills, 4 five-dollar bills, and 17 one-dollar bills. On Sunday, she received 4 ten-dollar bills, 5 five-dollar bills, and 15 one-dollar bills. How much more money did Mary Jo receive on Saturday than on Sunday?

5. Alexis has $95. She has 2 more five-dollar bills, 5 more one-dollar bills, and 2 more ten-dollar bills than Kasai. How much money does Kasai have?

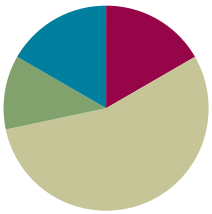
6. Kate had 2 ten-dollar bills, 6 five-dollar bills, and 21 one-dollar bills before she spent $45 on a new outfit. How much money was not spent?

Lesson 9

Objective: Solve word problems involving different combinations of coins with the same total value.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(7 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Decomposition Tree **2.NBT.5** (5 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic B and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Decomposition Tree (5 minutes)

Materials: (S) Decomposition Tree (Lesson 6 Fluency Template)

Note: Students are given 90 seconds to decompose a specified amount in as many ways as they can. This fluency activity allows students to work at their own skill levels and decompose amounts in a multitude of ways in a short amount of time. When decomposing the number a second time, students are more likely to try other representations that they saw on their partners' papers.

T: (Distribute the decomposition tree template.)

T: You are going to break apart 75¢ on your decomposition tree for 90 seconds. Make as many pairs as you can. Go!

S: (Work for 90 seconds.)

T: Now, exchange your tree with your partner, and check each other's work carefully.

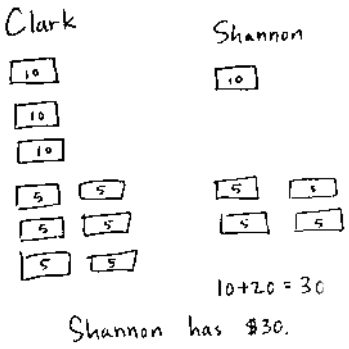
T: (Allow students 30–45 seconds to check.) Return each other's papers. Did you see another way to make 75¢ on your partner's paper?

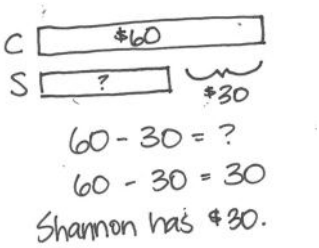
S: (Share for 30 seconds.)

T: Turn your paper over. Let's break apart 75¢ for another minute.

Application Problem (7 minutes)

Clark has 3 ten-dollar bills and 6 five-dollar bills. He has 2 more ten-dollar bills and 2 more five-dollar bills than Shannon. How much money does Shannon have?





NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Comparison problems present a comprehension challenge to some students, including English language learners. These students benefit from acting out the Application Problem first. They can then make connections through drawing and, finally, with a number sentence.

Note: Allow students who are able to work independently to do so. Offer guidance to students who need support.

Concept Development (33 minutes)

Materials: (T) 1 dime, 3 nickels, 5 pennies, 2 personal white boards (S) Personal white board, bag with the following coins: 4 quarters, 10 nickels, 10 dimes, 10 pennies

Assign partners before beginning instruction.

Part 1: Manipulate different combinations of coins to make the same total value.

T: (Show 1 dime and 5 pennies on one mat and 3 nickels on another mat.)

T: What is the value of the coins on this mat? (Point to the dime and pennies.)

S: 15 cents!

T: What is the value of the coins on this mat? (Point to the nickels.)

S: 15 cents!

T: So, the values are equal?

S: Yes!

T: How can that be? The coins are different!

S: That one is 10 cents and 5 more. The other is 5 + 5 + 5, so they are both 15 cents. → Three nickels is 15 cents. A dime and 5 pennies is also 15 cents.

T: Aha! So, we used different coins to make the same value?

S: Yes!

T: Let's try that! I will say an amount, and you work with your partner to show the amount in two different ways.

T: With your partner, show 28 cents two different ways.

S: (Arrange the coins on the mats while discussing with their partners.)

T: How did you make 28 cents?

S: I used a quarter and 3 pennies. My partner used 2 dimes and 8 pennies. → I also used a quarter and 3 pennies, but my partner used 2 dimes, 1 nickel, and 3 pennies.

Repeat the above sequence with the following amounts: 56 cents, 75 cents, and 1 dollar.

Part 2: Manipulate different combinations of coins in the context of word problems.

Problem 1: Tony gets 83¢ change back from the cashier at the corner store. What coins might Tony have received?

T: Read the problem to me, everyone.

S: (Read chorally.)

T: Can you draw something?

S: Yes!

T: Do that. (Allow students time to work.)

T: How did you show Tony's change?

S: I drew 8 dimes and 3 pennies. → I made 50¢ using 2 quarters, then added 3 dimes to make 80¢, and then added 3 pennies to make 83¢. → I used 3 quarters, 1 nickel, and 3 pennies.

T: Write your coin combinations and the total value below your drawing. If you used 8 dimes and 3 pennies, write that underneath like this. (Model writing the coin combination with the total value on the board, for example, 8 dimes, 3 pennies is 83 cents.)

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Challenge students working above grade level to show 83¢ two ways: using the least number of coins and using the greatest number of coins. Ask students to explain how they came up with their solutions and how it is possible for both solutions to have the same value.

T: Now, pretend that the cashier has run out of quarters. Draw Tony's change in another way without using quarters. Write your coin combination and the total value below.

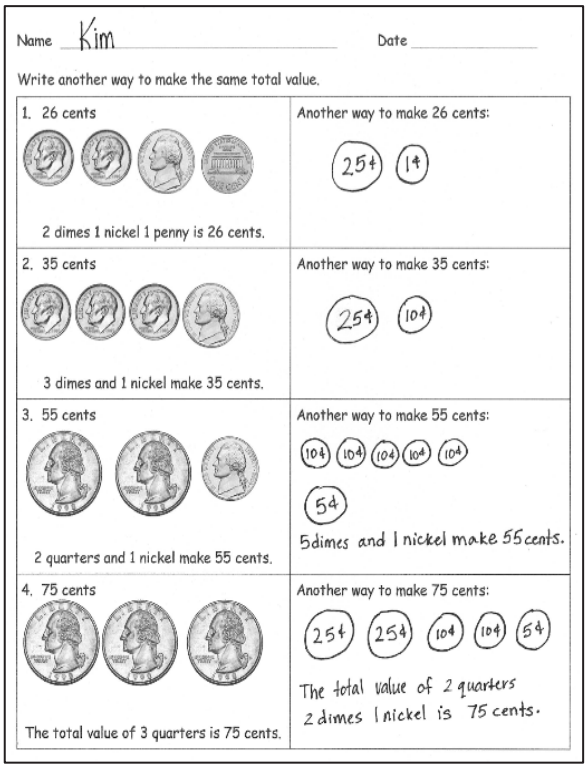
S: Mine still works! → I traded each of my quarters for 2 dimes and a nickel. Now, I have 7 dimes, 2 nickels, and 3 pennies. → I didn't use a quarter before, but this time I used 6 dimes and 4 nickels instead of 7 dimes and 2 nickels to show 80 cents.

MP.6 Problem 2: Carla has 4 dimes, 1 quarter, and 2 nickels to spend at the snack stand. Peyton has 3 coins, but he has the same amount of money to spend. What coins must Peyton have? How do you know?

T: Read the problem to me, everyone.
S: (Read chorally.)
T: Can you draw something?
S: Yes!
T: Time to draw! (Allow students time to work.)
T: What did you draw?
S: 4 dimes, 1 quarter, and 2 nickels. → A tape diagram with one part 40 cents, one part 25 cents, and one part 10 cents.
T: What is the value of Carla's money?
S: 75 cents.
MP.6 T: Show your partner how you found or can find three coins that make 75¢. (Allow time for sharing.) What coins did Peyton have?
S: 3 quarters.
T: How do you know?
S: We added 25 + 25 + 25 to make 75. → We couldn't make 75¢ with three coins if we used dimes, nickels, or pennies.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Kim Date

Write another way to make the same total value.

1. 26 cents 2 dimes 1 nickel 1 penny is 26 cents.	Another way to make 26 cents: 25¢ 1¢
2. 35 cents 3 dimes and 1 nickel make 35 cents.	Another way to make 35 cents: 25¢ 10¢
3. 55 cents 2 quarters and 1 nickel make 55 cents.	Another way to make 55 cents: 10¢ 10¢ 10¢ 10¢ 10¢ 5¢ 5 dimes and 1 nickel make 55 cents.
4. 75 cents The total value of 3 quarters is 75 cents.	Another way to make 75 cents: 25¢ 25¢ 10¢ 10¢ 5¢ The total value of 2 quarters 2 dimes 1 nickel is 75 cents.

Student Debrief (10 minutes)

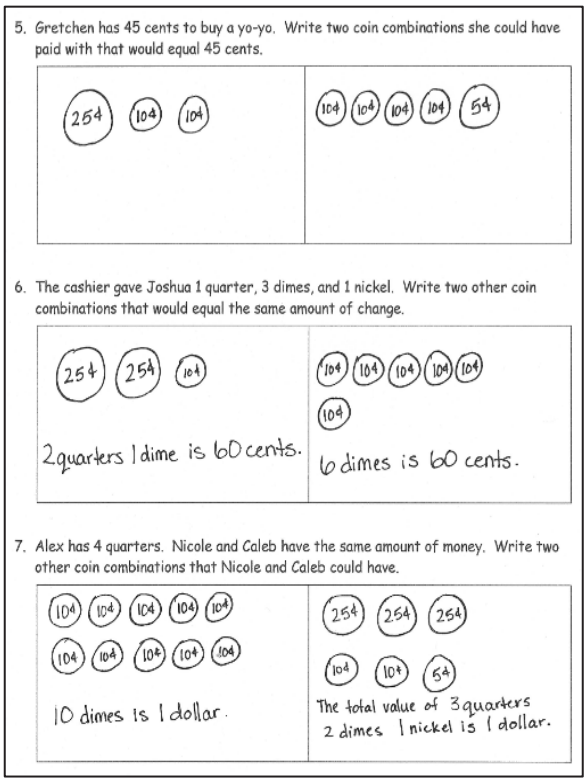
Lesson Objective: Solve word problems involving different combinations of coins with the same total value.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at your partner's coin combinations for 26 cents. Did you use the same combinations as your partner? Are there more combinations that you and your partner did not think of?
- Look at Problem 2, 35 cents. With your partner, think about how you could make 35 cents using the least number of coins. How could you make 35 cents using the largest number of coins?
- Can you think of other math skills we have learned where the same value can be represented in different ways?
- With your partner, find all the different coin combinations for 15 cents.


5. Gretchen has 45 cents to buy a yo-yo. Write two coin combinations she could have paid with that would equal 45 cents.

6. The cashier gave Joshua 1 quarter, 3 dimes, and 1 nickel. Write two other coin combinations that would equal the same amount of change.

2 quarters 1 dime is 60 cents.

6 dimes is 60 cents.

7. Alex has 4 quarters. Nicole and Caleb have the same amount of money. Write two other coin combinations that Nicole and Caleb could have.

10 dimes is 1 dollar.

The total value of 3 quarters 2 dimes 1 nickel is 1 dollar.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Write another way to make the same total value.

1. 26 cents  2 dimes 1 nickel 1 penny is 26 cents.	Another way to make 26 cents:
2. 35 cents  3 dimes and 1 nickel make 35 cents.	Another way to make 35 cents:
3. 55 cents  2 quarters and 1 nickel make 55 cents.	Another way to make 55 cents:
4. 75 cents  The total value of 3 quarters is 75 cents.	Another way to make 75 cents:

5. Gretchen has 45 cents to buy a yo-yo. Write two coin combinations she could have paid with that would equal 45 cents.

6. The cashier gave Joshua 1 quarter, 3 dimes, and 1 nickel. Write two other coin combinations that would equal the same amount of change.

7. Alex has 4 quarters. Nicole and Caleb have the same amount of money. Write two other coin combinations that Nicole and Caleb could have.

Name _____ Date _____

Smith has 88 pennies in his piggy bank. Write two other coin combinations he could have that would equal the same amount.

Name _____ Date _____

Draw coins to show another way to make the same total value.

1. 25 cents  1 dime 3 nickels is 25 cents.	Another way to make 25 cents:
2. 40 cents  4 dimes make 40 cents.	Another way to make 40 cents:
3. 60 cents  2 quarters and 1 dime makes 60 cents.	Another way to make 60 cents:
4. 80 cents  The total value of 3 quarters 1 nickel is 80 cents.	Another way to make 80 cents:

5. Samantha has 67 cents in her pocket. Write two coin combinations she could have that would equal the same amount.

6. The store clerk gave Jeremy 2 quarters, 3 nickels, and 4 pennies. Write two other coin combinations that would equal the same amount of change.

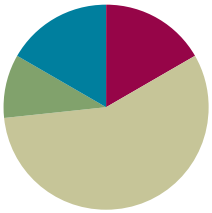
7. Chelsea has 10 dimes. Write two other coin combinations she could have that would equal the same amount.

Lesson 10

Objective: Use the fewest number of coins to make a given value.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(6 minutes)
Concept Development	(34 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Decomposition Tree **2.NBT.5** (5 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic B and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals within 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Decomposition Tree (5 minutes)

Materials: (S) Decomposition Tree (Lesson 6 Fluency Template)

Note: Today, students decompose 95 cents, applying their work from earlier in the topic.

T: (Distribute the decomposition tree template.)

T: You are going to break apart 95¢ on your decomposition tree for 90 seconds. Make as many pairs as you can. Go!

S: (Work for 90 seconds.)

T: Now, exchange your tree with your partner, and check each other's work. (Allow students 30–45 seconds to check.)

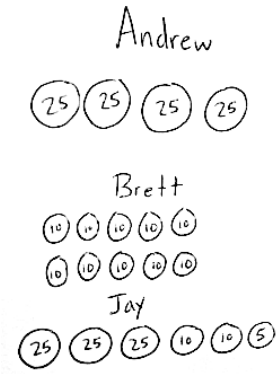
T: Return each other's papers. Did you see another way to make 95¢ on your partner's paper? (Allow students to share for another 30 seconds.)

T: Turn your paper over. Let's break apart 95¢ for another minute.

Application Problem (6 minutes)

Andrew, Brett, and Jay each have 1 dollar in change in their pockets. They each have a different combination of coins. What coins might each boy have in his pocket?

Note: This Application Problem provides practice of Lesson 9 and includes an extension (showing three combinations rather than two). To differentiate, students may be asked only to show Andrew's and Brett's coins and then talk to a friend to find a different combination that could be Jay's.



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Scaffold the Application Problem for students who are working below grade level by providing them with coins.

Concept Development (34 minutes)

Materials: (S) Personal white board, small plastic bag with 4 quarters, 10 dimes, 10 nickels, and 10 pennies

Assign partners.

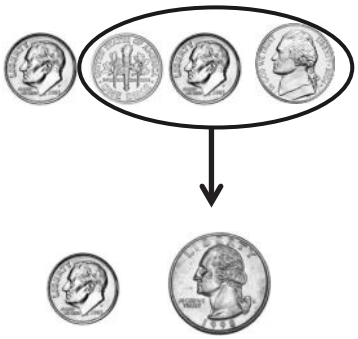
Part 1: Find the fewest number of coins.

T: With your partner, show 50 cents in two ways.
S: (Arrange the coins on the work mats.)
T: Turn and talk with a partner group near you: How did you make 50 cents?
S: I counted 5 dimes: 10, 20, 30, 40, 50. → I used 2 quarters. 25 + 25 = 50. → I used 1 quarter and 5 nickels.
T: If you were giving someone 50 cents, which combination of coins do you think she would rather have?
S: Probably 2 quarters because it's easy to hold. → Two quarters are easier to carry because they're only 2 coins.
T: It is easier if we carry fewer coins, so when we give someone change, we try to give the fewest coins possible.
T: With your partner, show 40 cents with as few coins as possible.
S: (Arrange the coins on the work mats.)
T: How did you make 40 cents?
S: I used 4 dimes. → I used 1 quarter and 3 nickels. → I used 1 quarter, 1 dime, and 1 nickel.

T: Which way has the fewest coins?
S: 1 quarter, 1 dime, and 1 nickel.
T: What strategies did you use to determine the fewest number of coins?
S: I didn't use pennies. → I used a dime instead of 2 nickels. → I tried to use a quarter because it is worth the most.
T: Yes. To use the fewest coins, we want to use coins with the greatest possible value.

Part 2: Use the fewest coins by changing coins for higher-value coins.

T: This time, everyone count out 35 cents using 3 dimes and 1 nickel.
S: (Count the change.)
T: How many coins do you have?
S: 4.
T: Can we exchange to have fewer coins?
S: Yes!
T: Tell your partner: What coins can you exchange so you have fewer coins?
S: 2 dimes and 1 nickel for 1 quarter!
T: Do that!
S: (Exchange the coins.)
T: And how many coins do you have on your mat?
S: 2.
T: That is a lot fewer! Can we make any other exchange?
S: No!
T: Now, everyone count out 60 cents using 4 dimes and 4 nickels.
S: (Count the change.)
T: How many coins do you have?
S: 8.
T: Look at your coins. Tell your partner any way you can exchange for a coin with a greater value.
S: I can change these 4 nickels for 2 dimes. → I can change 2 dimes and 1 nickel for 1 quarter. → I have 60 cents; if I put one dime aside, I can switch the rest for 2 quarters.
T: Yes. Any time we have 50 cents, we can use 2 quarters!
T: How can we change our coins for two quarters?
S: Change 4 dimes and 2 nickels for 2 quarters. → Change 4 nickels and 3 dimes for 2 quarters.
T: Make the change.



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

English language learners benefit throughout the lesson from having sentence starters to help them talk with a partner:

- I changed (exchanged) ____ for ____.
- I added five cents more by using _____.
- I made 30 cents by using _____.

T: How many coins do you have now?
S: 3.
T: Can we exchange any more coins?
S: No!
T: That means we have shown our value with the fewest number of coins possible.

Part 3: Exploring to use the fewest number of coins for a given total.

T: How can we make 27 cents using the fewest number of coins possible?
S: 1 quarter and 2 pennies.
T: How did you know?
S: Because 27 is 25 and 2 more. → A quarter is very close to 27 cents.
T: When we decompose the total into parts, we can get the fewest number of coins quickly by using the coins with the greatest value!
T: What parts can we make with coins of higher value?
S: Twenty-five. → Ten. → Five.
MP.2 T: Let's try another. With your partner, show 60 cents with the fewest number of coins possible by decomposing 60 into as many twenty-fives as you can, and then tens, and then fives.
S: (Make 60 cents.)
T: How did you decompose 60 to show it in coins?
S: I know that 60 is 50 + 10, and 50 is 2 quarters. → I know that 60 is 30 + 30, so I made 2 thirties with a quarter and a nickel each. Then, I switched the 2 nickels for a dime!
T: What is another way we could have made 60 cents? Turn and talk.
S: Six dimes because 10, 20, 30, 40, 50, 60.

Repeat the above process with the following sequence: 43 cents, 80 cents, and 1 dollar.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Use the fewest number of coins to make a given value.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

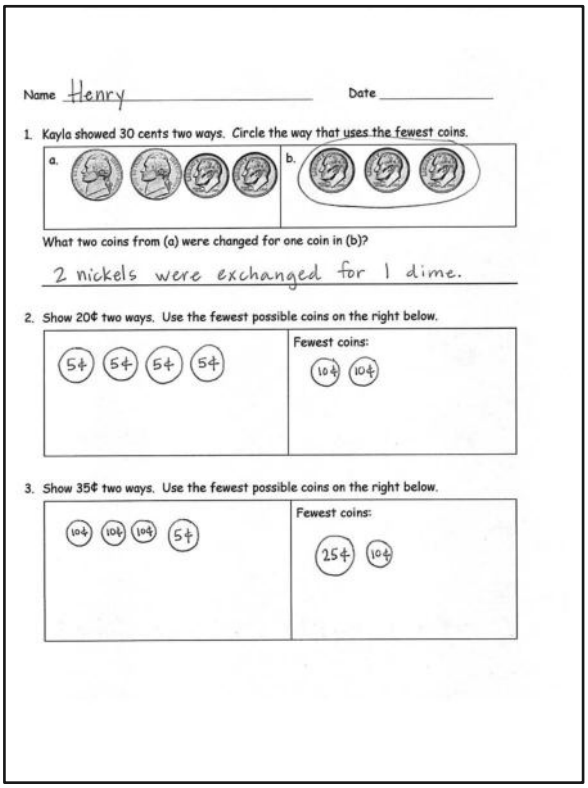
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Compare your Problem Set with your partner's. What coin was used the most when showing an amount with the fewest coins? Why did this happen?
- Yesterday, when we showed the same amount in different ways, did you always use the same coins as your partner? (No. There were lots of combinations.) Why did this happen?
- When you want to use the fewest possible coins, what is a good strategy to use?
- Look at Problem 8 on your Problem Set. Talk to your partner about how you thought about 56 cents to figure out how to make it with the least number of coins possible.
- Can you think of why you would want to use the fewest number of coins possible? (Because it is more convenient to carry and count. Because it is more efficient.)

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in todays' lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



Name Henry Date

1. Kayla showed 30 cents two ways. Circle the way that uses the fewest coins.

a. b.

What two coins from (a) were changed for one coin in (b)?

2 nickels were exchanged for 1 dime.

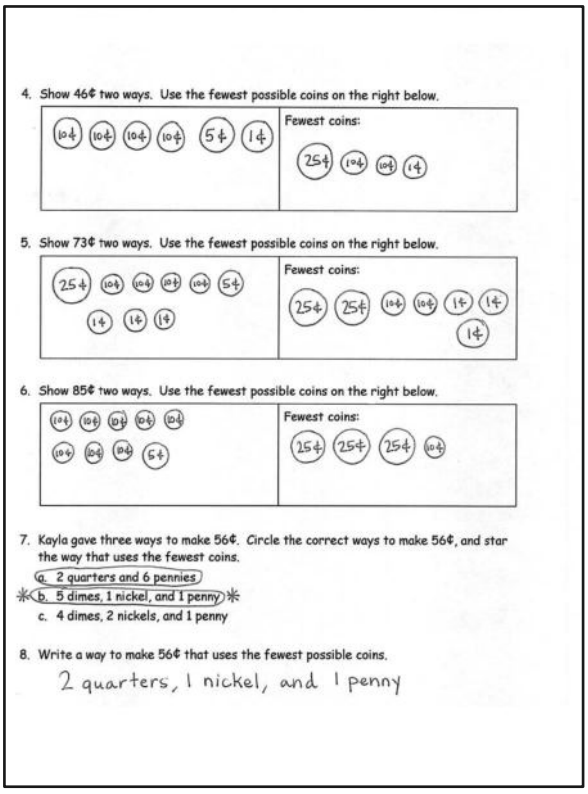
2. Show 20¢ two ways. Use the fewest possible coins on the right below.

Fewest coins: 10¢ 10¢

3. Show 35¢ two ways. Use the fewest possible coins on the right below.

10¢ 10¢ 10¢ 5¢

Fewest coins: 25¢ 10¢



4. Show 46¢ two ways. Use the fewest possible coins on the right below.

10¢ 10¢ 10¢ 10¢ 5¢ 1¢

Fewest coins: 25¢ 10¢ 10¢ 1¢

5. Show 73¢ two ways. Use the fewest possible coins on the right below.

25¢ 10¢ 10¢ 10¢ 10¢ 5¢ 1¢ 1¢ 1¢

Fewest coins: 25¢ 25¢ 10¢ 10¢ 1¢ 1¢ 1¢

6. Show 85¢ two ways. Use the fewest possible coins on the right below.

10¢ 10¢ 10¢ 10¢ 10¢ 10¢ 10¢ 10¢ 5¢

Fewest coins: 25¢ 25¢ 25¢ 10¢

7. Kayla gave three ways to make 56¢. Circle the correct ways to make 56¢, and star the way that uses the fewest coins.

a. 2 quarters and 6 pennies

b. 5 dimes, 1 nickel, and 1 penny

c. 4 dimes, 2 nickels, and 1 penny

8. Write a way to make 56¢ that uses the fewest possible coins.

2 quarters, 1 nickel, and 1 penny

Name _____ Date _____

1. Kayla showed 30 cents two ways. Circle the way that uses the fewest coins.

a.	b.
	

What two coins from (a) were changed for one coin in (b)?

_____

2. Show 20¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

3. Show 35¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

4. Show 46¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

5. Show 73¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

6. Show 85¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

7. Kayla gave three ways to make 56¢. Circle the correct ways to make 56¢, and star the way that uses the fewest coins.
   a. 2 quarters and 6 pennies
   b. 5 dimes, 1 nickel, and 1 penny
   c. 4 dimes, 2 nickels, and 1 penny

8. Write a way to make 56¢ that uses the fewest possible coins.

Name _____ Date _____

1. Show 36 cents two ways. Use the fewest possible coins on the right below.

	Fewest coins:

2. Show 74 cents two ways. Use the fewest possible coins on the right below.

	Fewest coins:

Name _____ Date _____

1. Tara showed 30 cents two ways. Circle the way that uses the fewest coins.

a.	b.
	

What coins from (a) were changed for one coin in (b)?

_____

2. Show 40¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

3. Show 55¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

4. Show 66¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

5. Show 80¢ two ways. Use the fewest possible coins on the right below.

	Fewest coins:

6. Show $1 two ways. Use the fewest possible coins on the right below.

	Fewest coins:

7. Tara made a mistake when asked for two ways to show 91¢. Circle her mistake, and explain what she did wrong.

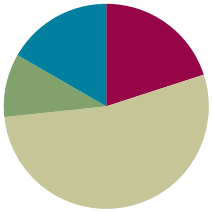
	Fewest coins:
3 quarters, 1 dime, 1 nickel, and 1 penny	9 dimes and 1 penny

Lesson 11

Objective: Use different strategies to make $1 or make change from $1.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Subtraction from Teens **2.OA.2** (9 minutes)
- Coin Exchange **2.NBT.5** (3 minutes)

Sprint: Subtraction from Teens (9 minutes)

Materials: (S) Subtraction from Teens Sprint

Note: Students practice subtraction from teens in order to gain mastery of the sums and differences within 20.

Coin Exchange (3 minutes)

Materials: (S) Personal white board

Note: In this activity, students review Lesson 10 by exchanging change combinations for the fewest coins.

T: I have 2 dimes and a nickel. How much do I have?
S: 25 cents.
T: On your personal white boards, show me at least one more way to make the same amount.
T: (Allow students time to work.) Show me your boards. (Review students' boards.)
T: Which way uses the fewest coins?
S: 1 quarter.
T: I have 4 dimes and 2 nickels. How much do I have?
S: 50 cents.
T: On your boards, show me at least one more way to make the same amount.
T: Which way uses the fewest coins?

S: 2 quarters.

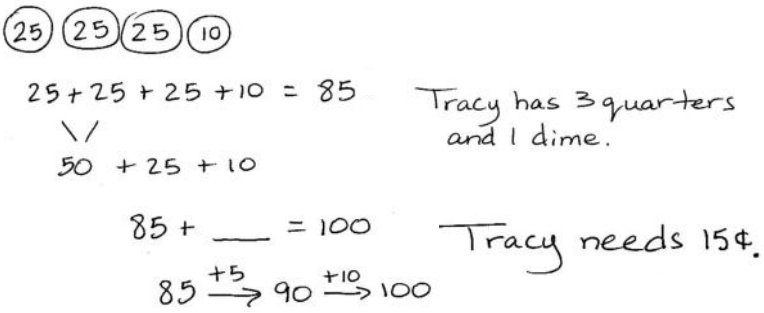
Continue with the following possible sequence: 7 nickels, 6 dimes, and 2 dimes.

Application Problem (6 minutes)

Tracy has 85 cents in her change purse. She has 4 coins.

a. Which coins are they?

b. How much more money will Tracy need if she wants to buy a bouncy ball for $1?



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Scaffold the Application Problem for English language learners by giving them coins. They can use the manipulatives to solve and share their solutions.

Note: The purpose of this Application Problem is twofold. First, it reviews the concept of representing a quantity using the fewest number of coins. Second, it serves as a bridge to today's lesson about making change from $1.

Concept Development (32 minutes)

Materials: (T) Various coins, dollar bill (S) Personal white board

Part 1: Make a dollar from a given amount.

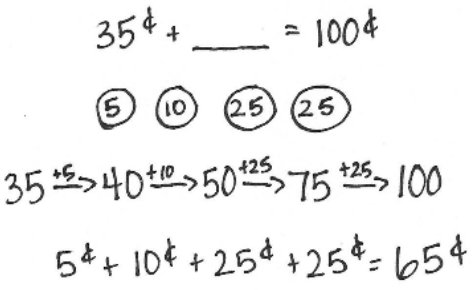
T: I have 35 cents in my hand. (Show 1 quarter and 1 dime.)

T: How much more do I need to have 100 cents or a dollar? Talk to your partner.

S: You can add a nickel, which will be 40 cents. Then, add another dime to make 50, and then add 2 quarters because that's another 50. → You can add 5 to make a ten and then add on 60. So, you need 65 cents more. → You can subtract 35 from 100. 100 – 30 is 70, and 70 – 5 is 65.

MP.1

T: I can write a number sentence like this: 35¢ + ____ = 100¢. Then, I can solve by counting up with coins (as shown to the right).



T: So, 35 cents plus what equals 100 cents?

S: 65 cents!

T: Can I also write a number sentence like this? (Write 35 + ____ = 100 on the board.)

S: Yes. 100 cents is just shown as the number 100. → We know that we are talking about cents. → One dollar can be the whole, too. → We're counting up to a dollar. That is the same as 100 cents or just a hundred.

T: (Hold up a dollar bill.) I have a dollar in my hand in change. What do you know about change?

S: It's the money you get back at the store. → If you buy something and it costs less than what you give the cashier, you get change. → If you buy something for 50 cents, but you only have a dollar, you'll get change.

T: Yes. The cashier takes your money and keeps the part to pay for your things. She gives you back the part that is left over. The leftover money is your change.

T: Now that you know about change, let's solve a problem where we make change from a dollar.

T: I'll give Student A 28 cents (count out a quarter and 3 pennies). On your personal white board, write a number sentence to represent how much I have left. For now, let's represent $1 as either 100 or 100 cents so that all our units are the same. (Pause.)

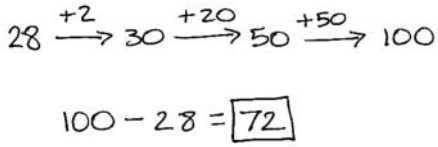
T: Show me.

S: (Show 100¢ – 28¢ = ____. → 28¢ + _____ = 100¢. → 100 – 28 = ____. → 100 cents – 28 cents = ____.)

T: Which of your suggestions uses addition to find the missing part?

S: 28¢ + _____ = 100¢.

T: Solve using the arrow way to add on or count up (as shown on the right). Then, share your work with a partner.



T: How much will I have left?

S: 72 cents!

T: Yes! Let's check this by counting up. Start with 28 cents. Let's add the dimes and then the pennies: 38, 48, 58, 68, 78, 88, 98, 99, 100. What do we have now?

S: A dollar!

T: Let's try some more problems with making change from a dollar.

Part 2: Make change from a dollar.

T: I'm holding some coins in my hand. (Hide 83 cents in the hand.)

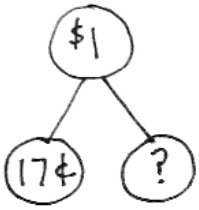
T: Student B has 1 dime, 1 nickel, and 2 pennies in her hand. What is the value of her coins?

S: 17 cents.

T: Together, we have $1. Talk to your partner. How much money is hiding in my hand? Use part–whole language as you talk.

S: I know that one part is hiding, and the other part is 17¢. → I know that $1 is the whole. → I know that if 17¢ is one part, I can add another part to make $1.

T: On your personal white board, draw a number bond to show what you know. (See the figure to the right.)



T: We agree that the whole is $1, and one part is 17¢. Now, write an equation from the number bond and solve. (Provide work time.) Show me.

S: (17 + 83 = 100. → 100¢ – 17¢ = 83¢.)

T: Let's see if you were right! (Open the hand for students to count the coins.) I'm holding 3 dimes, 2 quarters, 3 pennies. Draw it on your boards, find the total, and circle your answer. (Provide work time.) Show me.

S: (Show 83 cents.)

T: If I had a dollar, and I wanted to buy something that cost 83 cents, how much change should I receive?

S: 17 cents!

T: Turn and talk. What coins would I probably get?

S: A dime, a nickel, and 2 pennies. → Three nickels and 2 pennies.

T: Let's try another situation. Yesterday, I had $1 in coins. I gave my sister all of the coins to buy some candy. When she returned, she gave me 66¢ in change. (Count on with 2 quarters, 1 dime, 1 nickel, 1 penny.) How much did she spend on candy?

T: Can you draw something?

S: Yes!

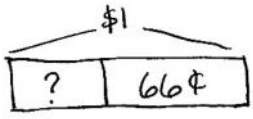
T: Do that.

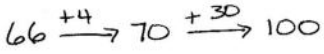
T: (Provide work time.) Look at your drawing. Turn and talk: What are you trying to find?

S: We need to find out how much the candy cost. → We have the whole and a part. We need to find the missing part.

T: Write a number sentence and statement to match your work. (Pause while students work.) Explain to your partner how you solved.

S: I drew 66¢. Then, I added 4 pennies to make 70. Then, I added a quarter and a nickel to make $1. → I drew a tape diagram. Then, I subtracted 66¢ from 100¢. → I drew a number bond with 66¢ in one part and a question mark in the other part. I put $1 in the whole.





T: I see a couple of different number sentences. Let's share them.

S: 100 – ____ = 66. → 66¢ + ____ = 100¢.
→ 100 cents – 66 cents = ____ cents.
→ ____ + 66 cents = 1 dollar.

T: So, the answer is …?

S: 34 cents!

T: These are the coins the cashier kept. (Show a quarter, a nickel, and 4 pennies.) Turn and talk. Count up from 66 to see if together they make a dollar.

S: Sixty-six plus 4 makes 70, and then a nickel makes 75, and then another quarter makes a dollar. → Sixty-six and 4 makes 70, plus 25 is 95, and then another nickel makes a dollar.

T: Does 34¢ + 66¢ = 100¢?
S: Yes!
T: And is 100 cents equal to a dollar?
S: Yes!
T: I think you're ready to work through a few problems with a partner.

Part 3: Choose your own strategy to solve.

Instruct partners to solve the following problems on their personal white boards:

- 100 – 45 = ____
- 100¢ – 29¢ = ____
- ____ + 72 cents = 100 cents

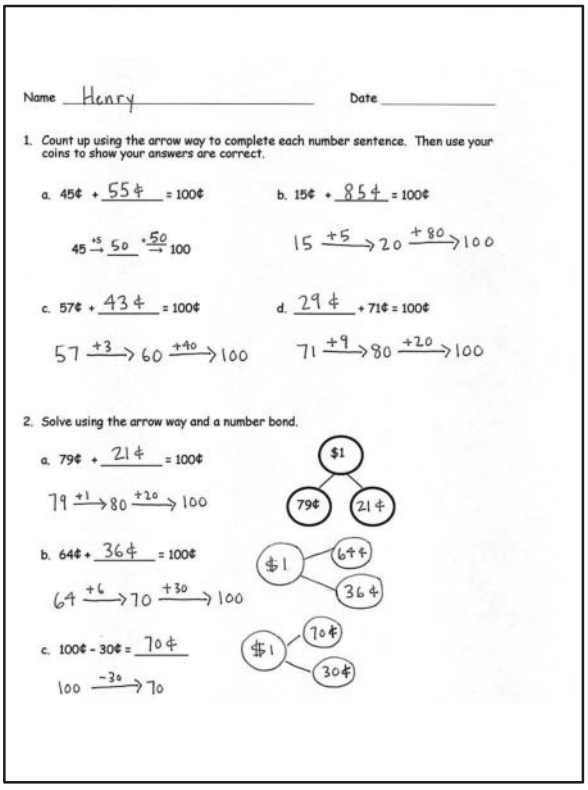
Then, instruct students to explain their solution strategies to a partner. Circulate and listen in on student conversations to check for understanding. Then, invite students to complete the Problem Set independently.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge students who are performing above grade level to write their own word problems to contextualize the numbers and operations in the lesson. Encourage students to swap and share their word problems with other students or with the class.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Henry Date

1. Count up using the arrow way to complete each number sentence. Then use your coins to show your answers are correct.

a. 45¢ + 55¢ = 100¢ — 45 +5→ 50 +50→ 100

b. 15¢ + 85¢ = 100¢ — 15 +5→ 20 +80→ 100

c. 57¢ + 43¢ = 100¢ — 57 +3→ 60 +40→ 100

d. 29¢ + 71¢ = 100¢ — 71 +9→ 80 +20→ 100

2. Solve using the arrow way and a number bond.

a. 79¢ + 21¢ = 100¢ — 79 +1→ 80 +20→ 100; $1 = 79¢ + 21¢

b. 64¢ + 36¢ = 100¢ — 64 +6→ 70 +30→ 100; $1 = 64¢ + 36¢

c. 100¢ - 30¢ = 70¢ — 100 -30→ 70; $1 = 70¢ + 30¢

Student Debrief (10 minutes)

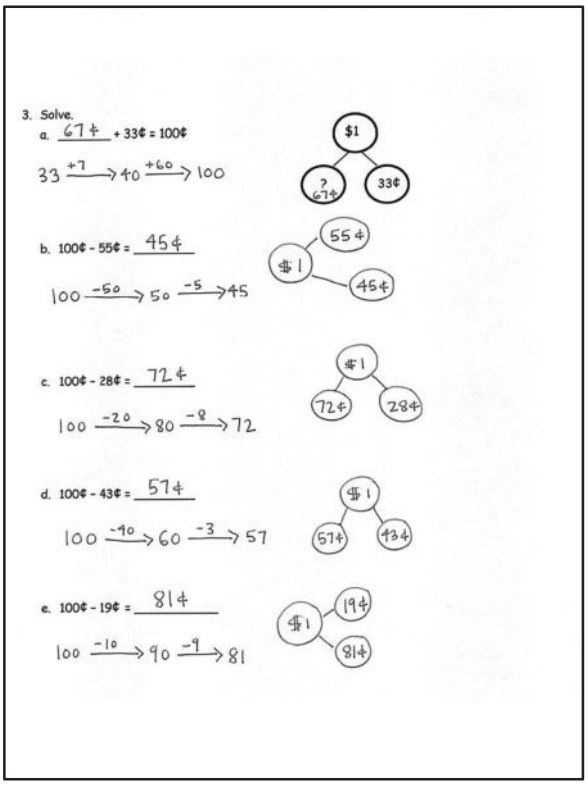
Lesson Objective: Use different strategies to make $1 or make change from $1.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at your Problem Set, and compare your coin choices with your partner's when you solved each problem the arrow way. Did you make the same coin choices as your partner? Is one of your ways easier to get to $1?
- When we are using the arrow way, are friendly numbers important? Show your partner one problem on your Problem Set where you used a friendly number.
- Look at the second page of the Problem Set. Explain to your partner the strategy you used to figure out the two parts that made $1.
- Look at the second page of the Problem Set. Point to where you see the $1 in each money equation. Use part–whole language to tell your partner about each part of the money equation.
- Explain to your partner how you would think about the two parts that make a dollar as an addition problem. How would you think about it as a subtraction problem?



Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in todays' lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Subtraction from Teens

1.	11 – 10 =	
2.	12 – 10 =	
3.	13 – 10 =	
4.	19 – 10 =	
5.	11 – 1 =	
6.	12 – 2 =	
7.	13 – 3 =	
8.	17 – 7 =	
9.	11 – 2 =	
10.	11 – 3 =	
11.	11 – 4 =	
12.	11 – 8 =	
13.	18 – 8 =	
14.	13 – 4 =	
15.	13 – 5 =	
16.	13 – 6 =	
17.	13 – 8 =	
18.	16 – 6 =	
19.	12 – 3 =	
20.	12 – 4 =	
21.	12 – 5 =	
22.	12 – 9 =	

23.	19 – 9 =	
24.	15 – 6 =	
25.	15 – 7 =	
26.	15 – 9 =	
27.	20 – 10 =	
28.	14 – 5 =	
29.	14 – 6 =	
30.	14 – 7 =	
31.	14 – 9 =	
32.	15 – 5 =	
33.	17 – 8 =	
34.	17 – 9 =	
35.	18 – 8 =	
36.	16 – 7 =	
37.	16 – 8 =	
38.	16 – 9 =	
39.	17 – 10 =	
40.	12 – 8 =	
41.	18 – 9 =	
42.	11 – 9 =	
43.	15 – 8 =	
44.	13 – 7 =	

B

Number Correct: _____

Improvement: _____

Subtraction from Teens

1.	11 – 1 =	
2.	12 – 2 =	
3.	13 – 3 =	
4.	18 – 8 =	
5.	11 – 10 =	
6.	12 – 10 =	
7.	13 – 10 =	
8.	18 – 10 =	
9.	11 – 2 =	
10.	11 – 3 =	
11.	11 – 4 =	
12.	11 – 7 =	
13.	19 – 9 =	
14.	12 – 3 =	
15.	12 – 4 =	
16.	12 – 5 =	
17.	12 – 8 =	
18.	17 – 7 =	
19.	13 – 4 =	
20.	13 – 5 =	
21.	13 – 6 =	
22.	13 – 9 =	

23.	16 – 6 =	
24.	14 – 5 =	
25.	14 – 6 =	
26.	14 – 7 =	
27.	14 – 9 =	
28.	20 – 10 =	
29.	15 – 6 =	
30.	15 – 7 =	
31.	15 – 9 =	
32.	14 – 4 =	
33.	16 – 7 =	
34.	16 – 8 =	
35.	16 – 9 =	
36.	20 – 10 =	
37.	17 – 8 =	
38.	17 – 9 =	
39.	16 – 10 =	
40.	18 – 9 =	
41.	12 – 9 =	
42.	13 – 7 =	
43.	11 – 8 =	
44.	15 – 8 =	

Name _____ Date _____

1. Count up using the arrow way to complete each number sentence. Then, use your coins to show your answers are correct.

   a. 45¢ + _____ = 100¢

   45 $\xrightarrow{+5}$ _____ $\xrightarrow{+\_\_\_}$ 100

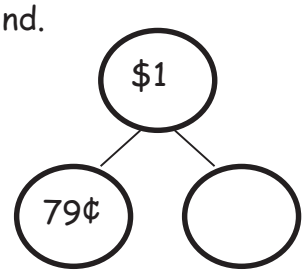
   b. 15¢ + _____ = 100¢

   c. 57¢ + _____ = 100¢

   d. _____ + 71¢ = 100¢

2. Solve using the arrow way and a number bond.

   a. 79¢ + _____ = 100¢

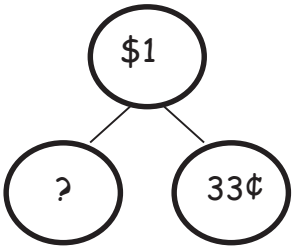


   b. 64¢ + _____ = 100¢

   c. 100¢ – 30¢ = _____

3. Solve.

a. _____ + 33¢ = 100¢



b. 100¢ – 55¢ = _____

c. 100¢ – 28¢ = _____

d. 100¢ – 43¢ = _____

e. 100¢ – 19¢ = _____

Name _____ Date _____

Solve.

1. 100¢ – 46¢ = _____

2. _____ + 64¢ = 100¢

3. _____ + 13 cents = 100 cents

Name _____ Date _____

1. Count up using the arrow way to complete each number sentence. Then, use coins to check your answers, if possible.

   a. 25¢ + _____ = 100¢

   25 $\xrightarrow{+5}$ _____ $\xrightarrow{+\_\_\_}$ 100

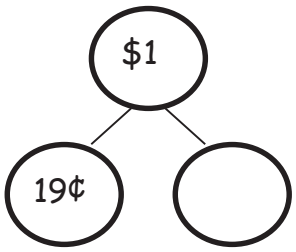
   b. 45¢ + _____ = 100¢

   c. 62¢ + _____ = 100¢

   d. _____ + 79¢ = 100¢

2. Solve using the arrow way and a number bond.

   a. 19¢ + _____ = 100¢



   b. 77¢ + _____ = 100¢

   c. 100¢ – 53¢ = _____

3. Solve.

a. _____ + 38¢ = 100¢

b. 100¢ – 65¢ = _____

c. 100¢ – 41¢ = _____

d. 100¢ – 27¢ = _____

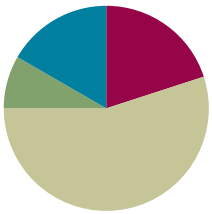
e. 100¢ – 14¢ = _____

Lesson 12

Objective: Solve word problems involving different ways to make change from $1.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Adding Across a Ten **2.OA.2** (9 minutes)
- Making $1 **2.NBT.5** (3 minutes)

Sprint: Adding Across a Ten (9 minutes)

Materials: (S) Adding Across a Ten Sprint

Note: This Sprint gives practice with the grade level fluency of adding within 20.

Making $1 (3 minutes)

Note: Students review making $1 by counting up with *change unknown* problems as a review of previous lesson concepts.

T: (Post 45 cents + _____ = 100 cents.) Read the problem. How many cents are in $1?
S: 100 cents.
T: I have 45 cents. What is the next ten cents I can make?
S: 50 cents.
T: 45 cents needs how much more to make 50 cents?
S: 5 cents.
T: 50 cents needs how much more to make 100 cents?
S: 50 cents.
T: 45 cents and what makes 1 dollar?
S: 55 cents.

Continue with the following possible sequence: 28 cents, 73 cents, and 14 cents.

Application Problem (5 minutes)

T: We can write 100 cents as $1 in our number sentence.

Richie has 24 cents. How much more money does he need to make $1?

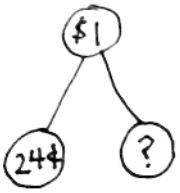
Note: This *add to with change unknown* type problem serves as a bridge from yesterday's lesson, where students used simplifying strategies to make change from $1 but always represented the dollar as 100 cents within number sentences. Use this problem as a chance to introduce that students may write $1 – 24¢ = ___ or 24¢ + ___ = $1.

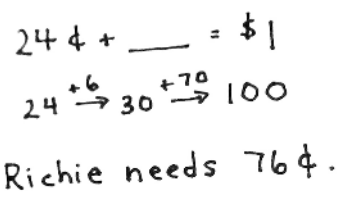
NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Scaffold the Application Problem for students who are still having difficulties with part–whole relationships by providing a number bond template and helping them fill it out: "Is 24 cents a part or the whole? How many pennies equal $1?"

Concept Development (33 minutes)

Materials: (T) Chart with RDW steps
(S) Personal white board





Part 1: Solve a *take from with result unknown* type problem.

Shay buys a balloon for 57 cents. She hands the cashier 1 dollar. How much change will she receive?

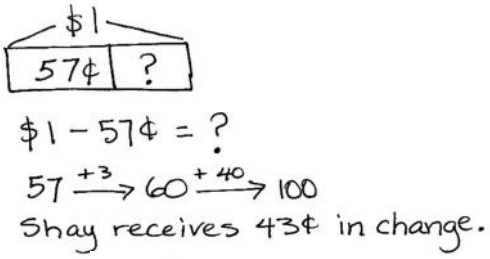
T: What do we do first?

S: Read the problem.

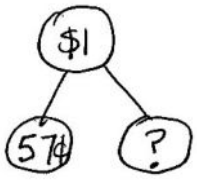
T: Yes. Let's read the problem together.

T/S: (Read aloud.)

T: I'll give you a minute to draw quietly. When I give the signal, talk to your partner about how your drawing (as shown to the right) matches the story. (Signal.)



S: Since 57 cents is part of 1 dollar, I drew a number bond. (See the figure to the right.) → I drew a tape diagram with the total and a part. The question mark will be for the change.



T: Look at your drawing. What are you trying to find?

S: I am trying to find out how much change Shay will get back.

T: Go ahead and do that. Write a number sentence and statement to match your work. (Pause while students work.) Explain to your partner how you solved the problem.

S: I thought of the related addition: 57¢ + ____ = $1. Then, I used the arrow way to count on. (See the figure above.) → I wrote 100 – 57 = ____. I took away 1 from both numbers to make it easier to solve without renaming, so 99 – 56 = 43.

T: What's the statement of your solution?

S: Shay receives 43 cents in change.

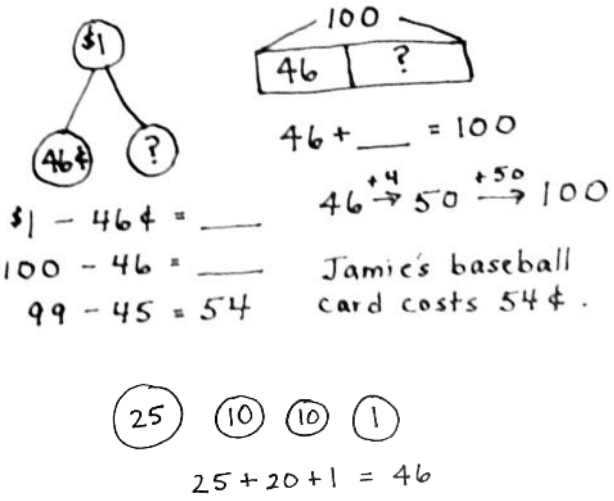
T: Reread the problem to yourself. Does your answer make sense? How do you know?

S: Yes, because if I add the cost of the balloon and the change, I get 100 cents. → My answer makes sense because 57 + 43 = 100. 57¢ + 43¢ = $1. I wrote it our new way we learned today, and it's true because a dollar is the same as 100 cents.

T: That's right! I think you're ready for a challenge. Here we go ….

Part 2: Solve a *take from with change unknown* type problem.

Jamie buys a baseball card. He gives the cashier 1 dollar. Jamie gets 2 dimes, 1 quarter, and 1 penny in change. How much did Jamie's baseball card cost?



T: What do we do first?

S: Read the problem.

T: Yes. Let's read the problem together.

T/S: (Read aloud.)

T: I'll give you a minute to draw quietly. When I give the signal, talk to your partner about how your drawing matches the story. (See the figure to the right.)

T: I drew Jamie's change: 2 dimes, 1 quarter, and 1 penny. (See the figure to the right.) → I drew a part–whole model, since I know $1 is the total. → I drew a number bond. I know that Jamie's change is one part, so the baseball card is the question mark.

T: Turn and talk: Look at your drawing. What are you trying to find?

S: I am trying to find the cost of Jamie's baseball card. → I'm trying to add something to 46 cents to make $1. → I'm trying to subtract from $1 to find how much the baseball card costs.

T: Write a number sentence and a statement to match your work. (Pause while students work.) Explain to your partner how you solved.

S: First, I added, 25 + 10 = 35. 35 + 10 = 45, plus 1 more equals 46. → I added the quarter, then the two dimes, and then the penny. I wrote 25 + 20 + 1 = 46. 25 + 20 is 45; then, 1 more is 46. → After I added, I subtracted 100 – 46 to get the other part. I took one away from both numbers to make it a simpler problem, so 99 – 45 = 54. → I thought of addition: 46 + ____ = 100. Then, I used the arrow way to count on.

MP.1

T: What's the statement of your solution?

T: Jamie's baseball card cost 54 cents.

T: Reread the problem to yourself. Does your answer make sense? How do you know?

S: Yes, because if I add Jamie's change to the cost of the baseball card, it equals $1. → My answer makes sense because 46¢ + 54¢ = $1.

T: Yes! Now, work through this next one, and discuss it with a partner.

NOTES ON MULTIPLE MEANS OF EXPRESSION:

Support English language learners' language growth as well as their mathematical learning by using their background knowledge. For instance, for native Spanish speakers, connect the English words *quarter, part,* and *whole* with the Spanish *cuarto, parte,* and *todo*.

Part 3: Solve a multi-step *add to with change unknown* type problem.

Penelope wants to buy a toy whistle that costs $1. She has 15 pennies, 2 nickels, 2 dimes, and 1 quarter. How much more money does Penelope need to buy the whistle?

Extension: If Penelope's brother gives her the rest of the money to buy the whistle, what different combinations of coins might he give her?

T: Follow these steps with your partner. (Read and post the steps.)
- Read the problem.
- Draw a picture or model.
- Write a number sentence and statement to match your work.
- Reread the problem. Check to see if your answer makes sense.

T: (Circulate and provide support as needed.)

T: So, how much more money does Penelope need to buy the whistle? Make a statement.

S: Penelope needs 30 more cents to buy the whistle.

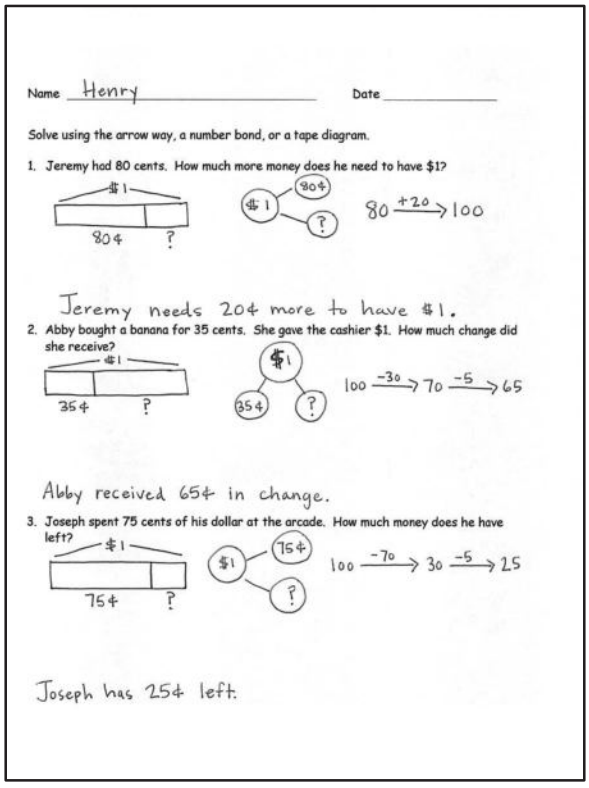
T: I saw you working hard on that extension question. Which combinations of coins might Penelope's brother give her?

S: 1 quarter and 1 nickel. → 3 dimes. → 10 pennies and 2 dimes.

T: Nice work! Off to the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Henry Date

Solve using the arrow way, a number bond, or a tape diagram.

1. Jeremy had 80 cents. How much more money does he need to have $1?

Jeremy needs 20¢ more to have $1.

2. Abby bought a banana for 35 cents. She gave the cashier $1. How much change did she receive?

Abby received 65¢ in change.

3. Joseph spent 75 cents of his dollar at the arcade. How much money does he have left?

Joseph has 25¢ left.

Student Debrief (10 minutes)

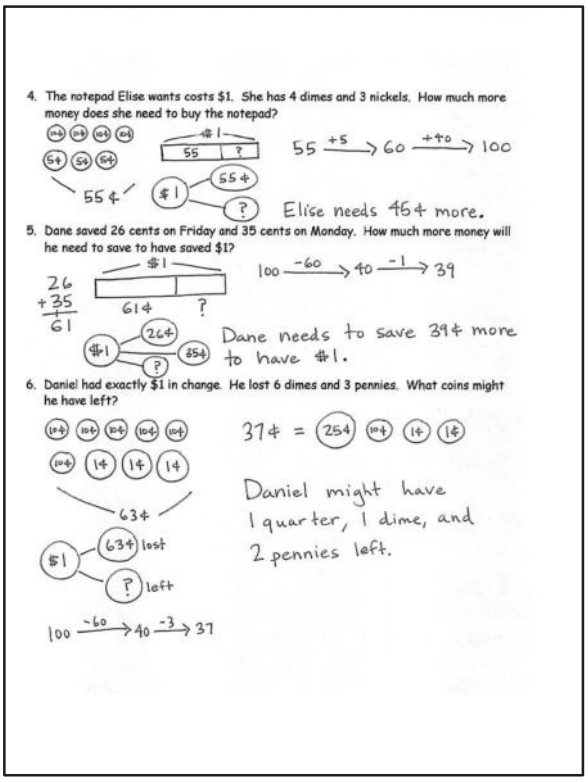
Lesson Objective: Solve word problems involving different ways to make change from $1.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What is another way we can think about $1? (As 100¢.)
- Look at your Problem Set. In each problem, there are cents and 1 dollar. Talk to your partner about how these units are the same. How are these units different?
- Look at Problem 2, where Abby is buying a banana. (Write $1 – 35¢ = ___ on the board.) Did anyone use a subtraction sentence like this one with their model? Talk to your partner about why we can take 35 cents away from 1 dollar.
- When you think about trading $1 for 100¢, does it remind you about what you know about place value and changing units in a place value chart?
- Look at Problem 5 on the Problem Set. Describe the steps you took to solve.


4. The notepad Elise wants costs $1. She has 4 dimes and 3 nickels. How much more money does she need to buy the notepad?

55 +5→ 60 +40→ 100

55¢ $1 55¢ ?

Elise needs 45¢ more.

5. Dane saved 26 cents on Friday and 35 cents on Monday. How much more money will he need to save to have saved $1?

26 + 35 = 61

$1 61¢ ?

100 -60→ 40 -1→ 39

$1 26¢ 35¢ ?

Dane needs to save 39¢ more to have $1.

6. Daniel had exactly $1 in change. He lost 6 dimes and 3 pennies. What coins might he have left?

37¢ = 25¢ 10¢ 1¢ 1¢

Daniel might have 1 quarter, 1 dime, and 2 pennies left.

63¢

$1 63¢ lost

? left

100 -60→ 40 -3→ 37

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in todays' lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Adding Across a Ten

1.	9 + 2 =	
2.	9 + 3 =	
3.	9 + 4 =	
4.	9 + 7 =	
5.	7 + 9 =	
6.	10 + 1 =	
7.	10 + 2 =	
8.	10 + 3 =	
9.	10 + 8 =	
10.	8 + 10 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 9 =	
15.	9 + 8 =	
16.	7 + 4 =	
17.	10 + 5 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 6 =	

23.	4 + 7 =	
24.	4 + 8 =	
25.	5 + 6 =	
26.	5 + 7 =	
27.	3 + 8 =	
28.	3 + 9 =	
29.	2 + 9 =	
30.	5 + 10 =	
31.	5 + 8 =	
32.	9 + 6 =	
33.	6 + 9 =	
34.	7 + 6 =	
35.	6 + 7 =	
36.	8 + 6 =	
37.	6 + 8 =	
38.	8 + 7 =	
39.	7 + 8 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

B

Number Correct: _____

Improvement: _____

Adding Across a Ten

1.	10 + 1 =	
2.	10 + 2 =	
3.	10 + 3 =	
4.	10 + 9 =	
5.	9 + 10 =	
6.	9 + 2 =	
7.	9 + 3 =	
8.	9 + 4 =	
9.	9 + 8 =	
10.	8 + 9 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 7 =	
15.	7 + 8 =	
16.	7 + 4 =	
17.	10 + 4 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 8 =	

23.	5 + 6 =	
24.	5 + 7 =	
25.	4 + 7 =	
26.	4 + 8 =	
27.	4 + 10 =	
28.	3 + 8 =	
29.	3 + 9 =	
30.	2 + 9 =	
31.	5 + 8 =	
32.	7 + 6 =	
33.	6 + 7 =	
34.	8 + 6 =	
35.	6 + 8 =	
36.	9 + 6 =	
37.	6 + 9 =	
38.	9 + 7 =	
39.	7 + 9 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

Name _____ Date _____

Solve using the arrow way, a number bond, or a tape diagram.

1. Jeremy had 80 cents. How much more money does he need to have $1?

2. Abby bought a banana for 35 cents. She gave the cashier $1. How much change did she receive?

3. Joseph spent 75 cents of his dollar at the arcade. How much money does he have left?

4. The notepad Elise wants costs $1. She has 4 dimes and 3 nickels. How much more money does she need to buy the notepad?

5. Dane saved 26 cents on Friday and 35 cents on Monday. How much more money will he need to save to have saved $1?

6. Daniel had exactly $1 in change. He lost 6 dimes and 3 pennies. What coins might he have left?

Name _____ Date _____

Solve using the arrow way, a number bond, or a tape diagram.

Jacob bought a piece of gum for 26 cents and a newspaper for 61 cents. He gave the cashier $1. How much money did he get back?

Name _____ Date _____

Solve using the arrow way, a number bond, or a tape diagram.

1. Kevin had 100 cents. He spent 3 dimes, 3 nickels, and 4 pennies on a balloon. How much money does he have left?

2. Colin bought a postcard for 45 cents. He gave the cashier $1. How much change did he receive?

3. Eileen spent 75 cents of her dollar at the market. How much money does she have left?

4. The puzzle Casey wants costs $1. She has 6 nickels, 1 dime, and 11 pennies. How much more money does she need to buy the puzzle?

5. Garret found 19 cents in the sofa and 34 cents under his bed. How much more money will he need to find to have $1?

6. Kelly has 38 fewer cents than Molly. Molly has $1. How much money does Kelly have?

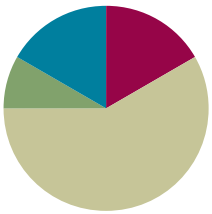
7. Mario has 41 more cents than Ryan. Mario has $1. How much money does Ryan have?

Lesson 13

Objective: Solve two-step word problems involving dollars or cents with totals within $100 or $1.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)
- Decomposition Tree **2.NBT.5** (5 minutes)

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic B and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Decomposition Tree (5 minutes)

Materials: (S) Decomposition Tree (Lesson 6 Fluency Template)

Note: Students are given 90 seconds to decompose a dollar.

T: (Distribute the decomposition tree template.)

T: You are going to break apart $1 on your decomposition tree for 90 seconds. Make as many pairs as you can. Go!

S: (Work for 90 seconds.)

T: Now, exchange your tree with your partner, and check each other's work. (Allow students 30–45 seconds to check.)

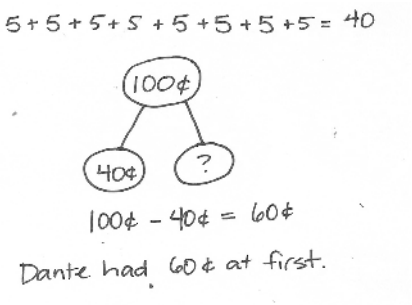
T: Return each other's papers. Did you see another way to make $1 on your partner's paper? (Allow students to share for another 30 seconds.)

T: Turn your paper over. Let's break apart $1 for another minute.

Application Problem (5 minutes)

Dante had some money in a jar. He puts 8 nickels into the jar. Now he has 100 cents. How much money was in the jar at first?

Note: In this *add to with start unknown* problem, students must pay close attention to the question, as they may incorrectly jump to the conclusion that they should subtract 100 – 8. Ask questions that guide students toward seeing that 100 cents equals 20 nickels, or guide them toward calculating the value of 8 nickels and subtracting that from 100.



Concept Development (35 minutes)

Materials: (T) Document camera (if available)
(S) Personal white board

Part 1: Solve an *add to with change unknown* type problem.

Gary has 2 dimes, 5 nickels, and 13 pennies. His brother gives him one more coin. Now he has 68 cents. What coin did his brother give him?

T: What do we do first when we see a word problem?
S: Read it.
T: Yes. Let's read the problem together.
T/S: (Read aloud.)
T: What can you draw?
S: Gary's coins. → We can draw 2 dimes, 5 nickels, 13 pennies, and a question mark coin. → A tape diagram.
T: Great! Do it. (Pause while students draw.)
T: Turn and talk: Look at your drawing. What are you trying to find?
S: The value of the coin Gary's brother gave him. → We need to find the value of the question mark coin.
T: Go ahead and do that. Write a number sentence and statement to match your work. (Allow students time to work.) Explain to your partner how you solved the problem.

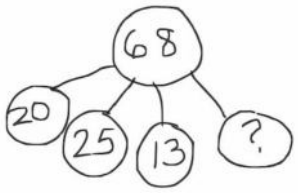
NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Support students who are performing below grade level by talking them through the Application Problem one step at a time: "How much money did Dante put in the jar? How much does he have now? Are nickels and cents the same unit? Can we add or subtract different units? What can we do to make them the same unit so that we can solve the problem?" And, if necessary, ask, "What is the value of 8 nickels?"

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

At times, students can discuss what they will draw before drawing. At other times, they might go ahead and draw. Use professional judgment to adapt to varying circumstances.

S: I skip-counted by tens, then fives, then ones: 10, 20, 25, 30, 35, 40, 45, 46, …, 58. Then, I counted 10 more to get to 68. → First, I found the value of the dimes, nickels, and pennies. 20 + 25 + 13 = 58. I know 68 is 10 more than 58, so the coin is a dime. → First, I counted up the coins I know and got 58¢. 68¢ – 58¢ = 10¢.



T: What was the value of Gary's money before his brother gave him a coin?

S: 58¢.

T: What's your number sentence?

S: 58¢ + ___ = 68¢. → 68¢ – 58¢ = 10¢.

T: And what is the statement of your solution?

S: Gary's brother gave him a dime.

T: Yes! Look how we can also represent this problem with a number bond (pictured above to the right).

T: Turn and talk. Use part–whole language to describe how your drawing matches mine.

S: My tape diagram shows two parts and a whole. → Your diagram shows each coin as a different part. That's how I added to find the value of Gary's coins.

T: Great work! Let's do another one.

Part 2: Solve a two-step problem.

Hailey bought a pretzel stick for a dime and a nickel. She also bought a juice box for 18 cents more than the pretzel stick. How much did she spend on the pretzel and juice box?

T: What do we do first when we see a word problem?

S: Read it.

T: Yes. Let's read the problem together.

T/S: (Read aloud.)

T: What can you draw?

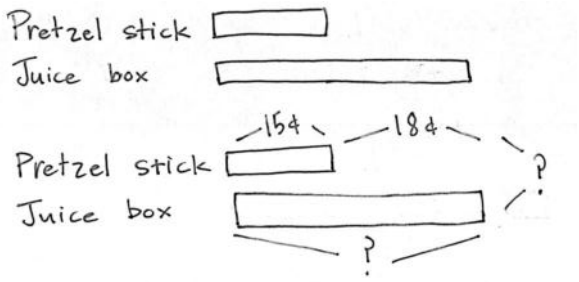
S: The juice box and pretzel stick. → I'm going to write how much they cost, too. → A tape diagram for both.

T: Go ahead and draw. (Pause while students draw.)

T: Turn and talk: Look at your drawing. What are you trying to find?

S: How much Hailey spent on the pretzel and juice box. → First, you need to know how much the juice box cost.

T: Go ahead and do that. Write a number sentence and statement to match your work. (Allow students time to work.) Explain to your partner how you solved.



S: I made two tape diagrams that were the same size. Then, I made the juice box tape diagram longer to show the extra 18¢. → I added 15¢ + 18¢ = 33¢ to find out the cost of the juice box. → To find the total, I added 30 + 10 + 3 + 5 = 48.

T: How much did the juice box cost?

S: 33 cents!

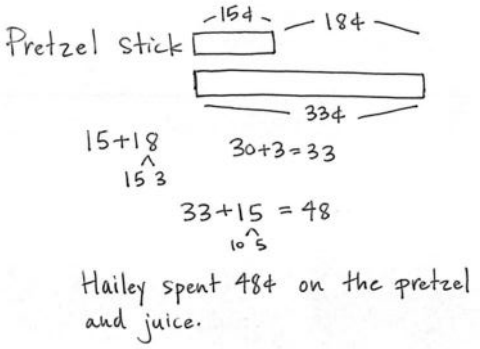
T: What's your number sentence to find the total?

S: 15¢ + 33¢ = 48¢.

T: And what is the statement of your solution?

S: Hailey spent 48¢ on the pretzel and juice.

T: Terrific! Let's work on one more problem together.



Part 3: Solve a *take from with start unknown* type problem.

Wendell bought a game at the store for $16. He had 2 five-dollar bills and 4 one-dollar bills left over. How much money did he have before buying the game?

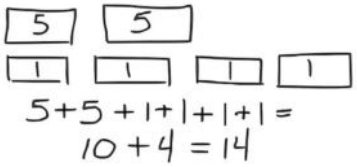
T: Read the problem to me, everyone.

S: (Read chorally.)

T: Can you draw something?

S: Yes!

T: Do that. (Provide work time.)



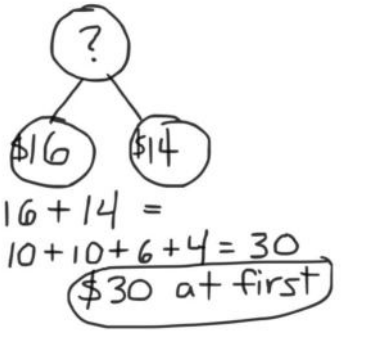
T: Turn and talk: Look at your drawing. What are you trying to find?

S: The amount of money he had before he bought the game. → We need to find the value of his change to know.

T: Go ahead and do that. Write a number sentence and statement to match your work. (Allow students time to work.) Explain to your partner how you solved the problem.

MP.1

S: First, I drew Wendell's bills and counted by fives and ones. He got $14 in change. → I drew a number bond. The cost of the game is one part, and the change is the other part. I made 16 + 14 into 10 + 10 + 6 + 4. That's 3 tens, or 30. → I added $16 + $10 + $4 = $30.



T: What was the value of Wendell's change?

S: $14.

T: What's your number sentence?

S: $16 + $14 = $30.

Wendell had $30 at first.

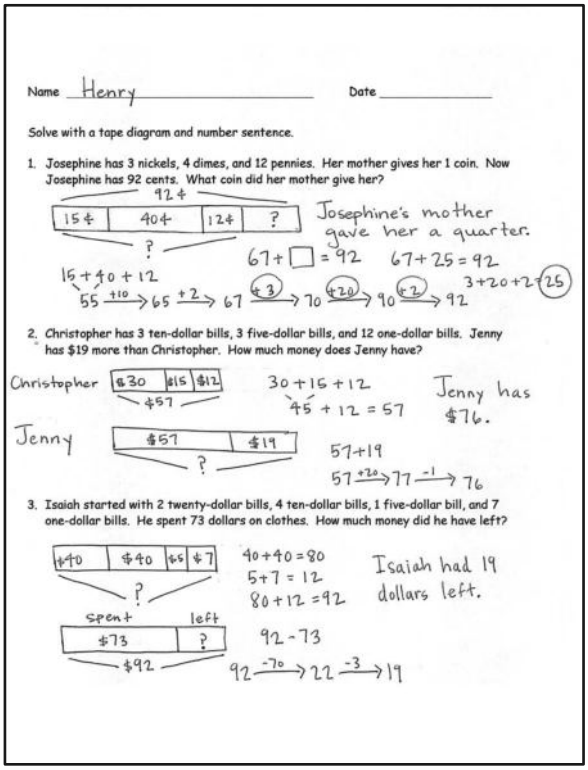
T: And what is the statement of your solution?

S: Wendell had $30 before buying the game.

T: Great. You're now ready to work on the Problem Set. Remember the strategies we have been practicing.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.


Name Henry Date

Solve with a tape diagram and number sentence.

1. Josephine has 3 nickels, 4 dimes, and 12 pennies. Her mother gives her 1 coin. Now Josephine has 92 cents. What coin did her mother give her?

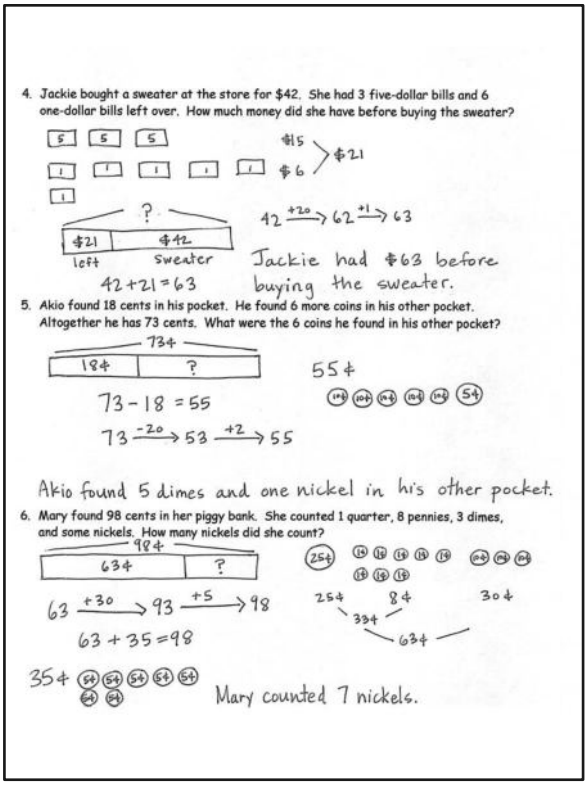
Josephine's mother gave her a quarter.

2. Christopher has 3 ten-dollar bills, 3 five-dollar bills, and 12 one-dollar bills. Jenny has $19 more than Christopher. How much money does Jenny have?

Jenny has $76.

3. Isaiah started with 2 twenty-dollar bills, 4 ten-dollar bills, 1 five-dollar bill, and 7 one-dollar bills. He spent 73 dollars on clothes. How much money did he have left?

Isaiah had 19 dollars left.


4. Jackie bought a sweater at the store for $42. She had 3 five-dollar bills and 6 one-dollar bills left over. How much money did she have before buying the sweater?

Jackie had $63 before buying the sweater.

5. Akio found 18 cents in his pocket. He found 6 more coins in his other pocket. Altogether he has 73 cents. What were the 6 coins he found in his other pocket?

Akio found 5 dimes and one nickel in his other pocket.

6. Mary found 98 cents in her piggy bank. She counted 1 quarter, 8 pennies, 3 dimes, and some nickels. How many nickels did she count?

Mary counted 7 nickels.

Student Debrief (10 minutes)

Lesson Objective: Solve two-step word problems involving dollars or cents with totals within $100 or $1.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Before you begin solving a word problem, what are some things you should think about? (I should think about what type of models to use, whether there is more than one part to the problem, what operations to use, and what strategies I can use to help me.)
- Look at Problem 1 of your Problem Set. Could skip-counting help you solve one part of the problem quickly?
- Look at Problem 2. Tell your partner what you did first. Take your partner through your entire solution path.
- Talk to your partner about the models you used to solve word problems today. Share with your partner how you used a model on your Problem Set.
- Share your strategy for figuring out the coins Akio found in his pocket.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Solve with a tape diagram and number sentence.

1. Josephine has 3 nickels, 4 dimes, and 12 pennies. Her mother gives her 1 coin. Now Josephine has 92 cents. What coin did her mother give her?

2. Christopher has 3 ten-dollar bills, 3 five-dollar bills, and 12 one-dollar bills. Jenny has $19 more than Christopher. How much money does Jenny have?

3. Isaiah started with 2 twenty-dollar bills, 4 ten-dollar bills, 1 five-dollar bill, and 7 one-dollar bills. He spent 73 dollars on clothes. How much money does he have left?

4. Jackie bought a sweater at the store for $42. She had 3 five-dollar bills and 6 one-dollar bills left over. How much money did she have before buying the sweater?

5. Akio found 18 cents in his pocket. He found 6 more coins in his other pocket. Altogether he has 73 cents. What were the 6 coins he found in his other pocket?

6. Mary found 98 cents in her piggy bank. She counted 1 quarter, 8 pennies, 3 dimes, and some nickels. How many nickels did she count?

Name _____ Date _____

Solve with a tape diagram and number sentence.

Gary went to the store with 4 ten-dollar bills, 3 five-dollar bills, and 7 one-dollar bills. He bought a sweater for $26. What bills did he leave the store with?

Name _____ Date _____

1. Kelly bought a pencil sharpener for 47 cents and a pencil for 35 cents. What was her change from $1?

2. Hae Jung bought a pretzel for 3 dimes and a nickel. She also bought a juice box. She spent 92 cents. How much was the juice box?

3. Nolan has 1 quarter, 1 nickel, and 21 pennies. His brother gave him 2 coins. Now he has 86 cents. What 2 coins did his brother give him?

4. Monique saved 2 ten-dollar bills, 4 five-dollar bills, and 15 one-dollar bills. Harry saved $16 more than Monique. How much money does Harry have saved?

5. Ryan went shopping with 3 twenty-dollar bills, 3 ten-dollar bills, 1 five-dollar bill, and 9 one-dollar bills. He spent 59 dollars on a video game. How much money does he have left?

6. Heather had 3 ten-dollar bills and 4 five-dollar bills left after buying a new pair of sneakers for $29. How much money did she have before buying the sneakers?

Name _____ Date _____

1. Hank emptied his pockets and found these coins.

a. How much money does Hank have? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

b. Hank gave his brother Luke a quarter and some more coins. Now, Luke has 57 cents. Draw and label one possible picture of Luke's coins.

c. Hank's sister Maria found a dollar bill under her bed and used it to buy an iced tea for 45 cents. How much change will Maria get back? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

2. Karen has 1 twenty-dollar bill, 2 ten-dollar bills, 4 five-dollar bills, and 8 one-dollar bills.

   a. How much money does Karen have? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

   b. Karen buys a book for 12 dollars and a fruit smoothie for 4 dollars. Karen gives the cashier the twenty-dollar bill. How much change will she receive? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

3. Alex sorted the fruits in his shopping basket. The table below shows what he bought.

Oranges	Lemons	Bananas	Pears
2	5	3	4

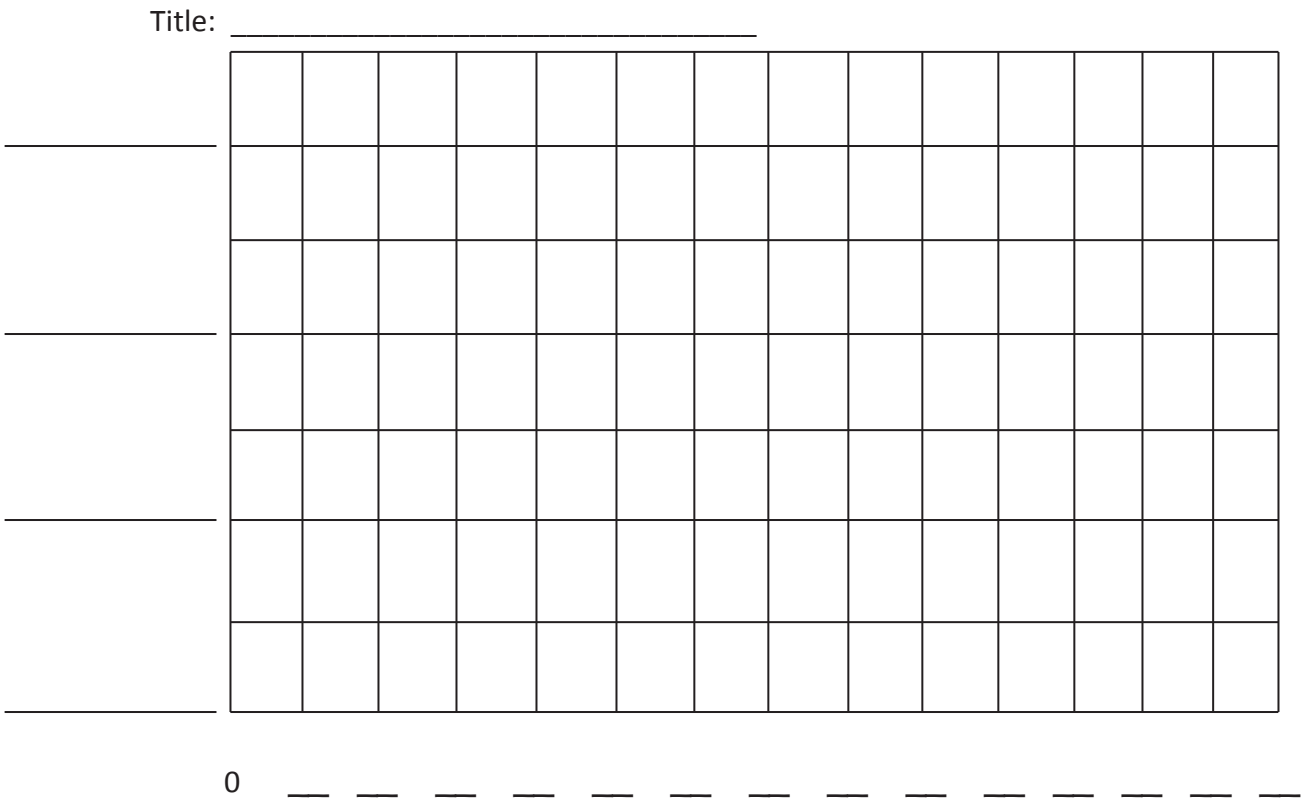
   a. Draw and label a picture graph to represent the fruits in Alex's shopping basket.

Title _____

_____ _____ _____ _____

Legend: _____

b. Draw and label a bar graph to represent the fruits in Alex's shopping basket.



c. How many pieces of fruit did Alex buy in all?

d. How many more lemons and pears does Alex have than oranges and bananas? Explain your thinking using pictures, numbers, or words.

4. Denise found 4 nickels in the car, 32 cents in her room, and 21 pennies and 1 quarter in her desk drawer.

   a. How much money did Denise find in all? Write the answer using the $ or ¢ symbol.

   b. Denise spent 42 cents on one banana and lost 19 cents. How much money does Denise have left? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

Mid-Module Assessment Task Standards Addressed	Topics A–B

Use place value understanding and properties of operations to add and subtract.

2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Work with time and money.

2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

Represent and interpret data.

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Evaluating Student Learning Outcomes

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency*. In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for students is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the students CAN do now and what they need to work on next.

A Progression Toward Mastery				
Assessment Task Item and Standards Assessed	**STEP 1 Little evidence of reasoning without a correct answer. (1 Point)**	**STEP 2 Evidence of some reasoning without a correct answer. (2 Points)**	**STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)**	**STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)**
1 **2.NBT.5** **2.MD.8**	The student solves one out of five parts correctly.	The student solves two or three out of five parts correctly.	The student solves four out of five parts correctly.	The student correctly: a. Answers 78¢ and explains using pictures, numbers, or words. b. Draws and labels a coin combination that totals 57 cents, such as QDDDPP or QDDNNPP. c. Answers 55¢ and explains using pictures, numbers, or words.
2 **2.NBT.5** **2.MD.8**	The student solves one out of four parts correctly.	The student solves two out of four parts correctly.	The student solves three out of four parts correctly.	The student correctly: a. Answers $68 and explains using pictures, numbers, or words. b. Answers $4 change and explains using pictures, numbers, or words.
3 **2.MD.10**	The student solves fewer than three out of seven parts correctly.	The student solves three to four out of seven parts correctly.	The student solves five to six out of seven parts correctly.	The student correctly: a. Draws and labels the picture graph to show 2 oranges, 5 lemons, 3 bananas, and 4 pears.

A Progression Toward Mastery				
				b. Draws and labels the bar graph to show 2 oranges, 5 lemons, 3 bananas, and 4 pears. c. Answers 14 pieces of fruit. d. Answers 4 more lemons and pears and explains using pictures, numbers, or words.
4 **2.NBT.5** **2.MD.8**	The student solves zero out of three parts correctly.	The student solves one out of three parts correctly.	The student solves two out of three parts correctly.	The student correctly: a. Answers 98¢. b. Answers 37¢ and explains using pictures, numbers, or words.

Name Janine Date

1. Hank emptied his pockets and found these coins.

a. How much money does Hank have? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

25¢ + 40¢ + 10¢ + 3¢

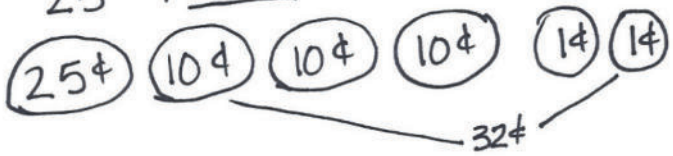
Hank has 78¢.

25¢ + 50¢ + 3¢

75¢ + 3¢ = 78¢

b. Hank gave his brother Luke a quarter and some more coins. Now, Luke has 57 cents. Draw and label one possible picture of Luke's coins.

25¢ + 32¢ = 57¢



c. Hank's sister Maria found a dollar bill under her bed and used it to buy an iced tea for 45 cents. How much change will Maria get back? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

45¢ + 55¢ = $1

45¢ +5¢→ 50¢ +50¢→ $1

Maria will get 55¢ back.

2. Karen has 1 twenty-dollar bill, 2 ten-dollar bills, 4 five-dollar bills, and 8 one-dollar bills.
   a. How much money does Karen have? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

$20 + $10 + $10 + $5 + $5 + $5 + $5 + $8

$20 + $20 + $20 + $8

Karen has $68.

   b. Karen buys a book for 12 dollars and a fruit smoothie for 4 dollars. Karen gives the cashier the twenty dollar bill. How much change will she receive? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

$12 + $4 = $16

$20 − $16 = $4

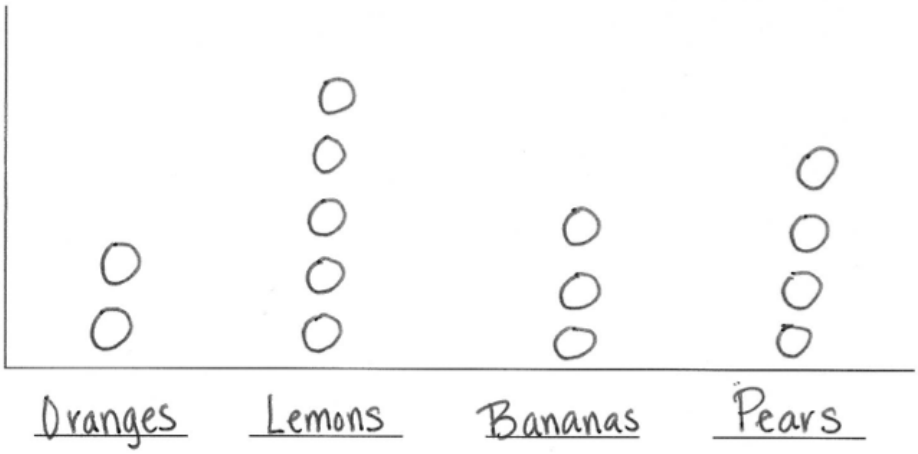
Karen will receive $4.

3. Alex sorted the fruits in his shopping basket. The table below shows what he bought.

Oranges	Lemons	Bananas	Pears
2	5	3	4

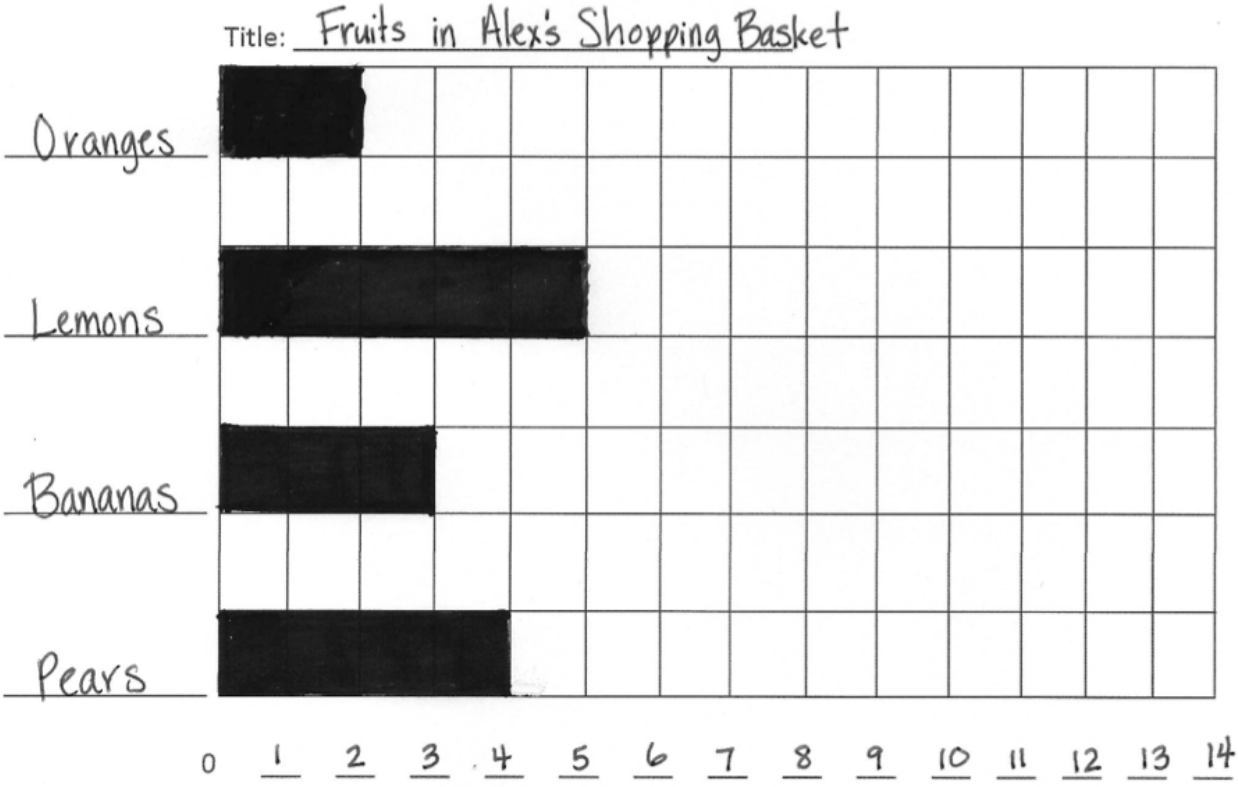
   a. Draw and label a picture graph to represent the fruits in Alex's shopping basket.

Title Fruits in Alex's basket



Legend: Each 0 = 1 piece of fruit

b. Draw and label a bar graph to represent the fruits in Alex's shopping basket.



c. How many pieces of fruit did Alex buy in all?

2 + 3 + 5 + 4
5 + 5 + 4
10 + 4 = 14

Alex buys 14 pieces of fruit.

d. How many more lemons and pears does Alex have than oranges and bananas? Explain your thinking using pictures, numbers, or words.

5 + 4 = 9 2 + 3 = 5

9 − 5 = 4

Alex has 4 more lemons and pears.

4. Denise found 4 nickels in the car, 32 cents in her room, and 21 pennies and 1 quarter in her desk drawer.
   a. How much money did Denise find in all? Write the answer using the $ or ¢ symbol.

$20 + 32 + 21 + 25$

$52 + 46 = 98$

Denise finds 98¢.

   b. Denise spent 42 cents on one banana and lost 19 cents. How much money does Denise have left? Write the answer using the $ or ¢ symbol. Explain your thinking using pictures, numbers, or words.

$98 - 42 = 56$

$$\begin{array}{r} {}^{4}\cancel{5}{}^{16}\cancel{6} \\ -\ 19 \\ \hline 37 \end{array}$$

Denise has 37¢ left.

Topic C

Creating an Inch Ruler

2.MD.1

Focus Standard:		2.MD.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
Instructional Days:		2	
Coherence	**-Links from:**	G1–M3	Ordering and Comparing Length Measurements as Numbers
	-Links to:	G3–M7	Geometry and Measurement Word Problems

Topic C reinforces the measurement concepts and skills learned in Module 2, while focusing on customary units. In Lesson 14, students use an inch tile to measure various objects using iteration. By connecting to prior learning, students deepen their understanding of a length unit, seeing again that, just as it was with the centimeter cube, the length unit is the distance from one end of the tile (or cube) to the other or from one hash mark to the next.

In Lesson 15, students create inch rulers using the same process as they did in Module 2 to create centimeter rulers, using the mark and advance technique with inch tiles to record each length unit with a hash mark. Whereas in Module 2 students made rulers 30 centimeters long and related 100 centimeters to a new unit, the meter (supporting work with the base-ten system), they now relate 12 inches to a new unit, the foot (supporting their work with arrays by recognizing that a new unit can be made with any value). They then use their inch rulers to measure and compare objects around the classroom (**2.MD.1**). Through practice, the foundational concept that the zero point on a ruler is the beginning of the total length and each number on the ruler indicates the number of length units from zero is reinforced.

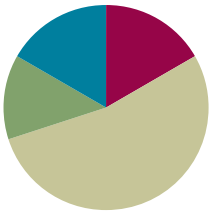
A Teaching Sequence Toward Mastery of Creating an Inch Ruler	
Objective 1:	**Connect measurement with physical units by using iteration with an inch tile to measure. (Lesson 14)**
Objective 2:	**Apply concepts to create inch rulers; measure lengths using inch rulers. (Lesson 15)**

Lesson 14

Objective: Connect measurement with physical units by using iteration with an inch tile to measure.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(8 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Subtraction Fact Flash Cards (5 minutes)

Materials: (T) Subtraction fact flash cards set 2 (Fluency Template)

Note: This is a teacher-directed, whole-class activity. By practicing subtraction facts, students gain mastery of differences within 20.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic C and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

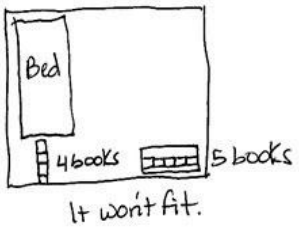
Invite English language learners to demonstrate understanding by explaining the problem in their native languages or by acting it out using books and a bookshelf in class. Extend this invitation to any students who need such support.

Application Problem (8 minutes)

Frances is moving the furniture in her bedroom. She wants to move the bookcase to the space between her bed and the wall, but she is not sure it will fit.

Talk with a partner: What could Frances use as a measurement tool if she doesn't have a ruler? How could she use it?

Show your thinking on your personal white board using pictures, numbers, or words.



Frances can put the book at one end of the bookcase and mark where the book ends. Then she moves the book forward so it's right on the mark. She keeps doing that to find the total length. Then she does that between the wall and the bed.

Extension of Thinking

She can use any size book but it'll be faster if she uses a big book because she won't have to mark and move it as many times.

Note: Today's Application Problem is designed to activate prior knowledge of measurement (the focus of Module 2), in particular, the concept of using iteration with one physical unit to measure, in anticipation of the Concept Development.

Concept Development (32 minutes)

Materials: (T) 1 inch tile, 1 centimeter cube (S) Personal white board with Application Problem work, 1 inch tile, Problem Set

Note: Today's Concept Development draws upon measurement concepts and skills learned in Module 2. Students refresh and apply their knowledge about these concepts, but now they use an inch tile instead of a centimeter cube.

Call students to bring their Application Problem work and sit in a circle on the carpet. Invite them to share their thinking.

T: When talking about our story problem, someone mentioned the mark and move forward strategy. Could you explain that a little more if Frances uses a book as a measurement tool?

S: She could put the book down at the beginning of the bookcase and mark where it ends and then move the book forward so it starts on that mark and mark where it ends again. She keeps doing that until the whole length of the bookcase is measured. → She can't leave any space between the book and the mark.

T: How might that help Frances solve her problem?

S: If the bookcase is 5 books long and the space between the wall and the bed is 4 books long, she knows the bookcase won't fit. → If she measures the bookcase and can fit the same number of books or more, then she knows it will fit.

T: Does the size of the book matter?

S: No, but she has to use the same-size book to measure the bookcase and the space. → If she uses a small book, she'll have to move it a lot of times to measure. → If she uses a larger book, she'll cover the space faster.

T: You remembered all of the important ideas!

T: (Hold up the centimeter cube.) Take a moment to remember how we used this earlier in the year. What is it called? How did we use it? (Allow students time to share with a partner.)

S: It's a centimeter cube! → We used it to measure things. → Sometimes we used more than one cube, and sometimes we used just one. → We did mark and move forward, and we had to be careful not to leave any space in between. → We used it to make a ruler!

T: Today, we're going to look at a different unit of measurement, the **inch**.

T: (Hold up an inch tile alongside the centimeter cube.) How does the size of the inch tile compare to the size of the centimeter cube?

S: The inch tile is bigger!

T: Can we use the inch tile to measure in the same way that we used the centimeter cube?

S: Yes!

Draw a 4-inch line on the board. Put a hash mark at the beginning and end of the line.

T: Watch how I use the inch tile to measure this line. I put the tile at the beginning of the line on the hash mark and make another mark where the tile ends. Then, I move the tile forward and place the edge right on top of the mark. (Demonstrate step by step until the total length of the line is measured.)

T: Talk with your partner: What do you notice about the spaces between the hash marks?

S: They're all the same length.

T: Exactly! How many inch tiles long is my line?

S: 4 inch tiles long.

T: Correct! What happens if my line isn't exactly 4 inch tiles long? Discuss with your partner.

S: If it's a half or more of a tile longer, it is about 5 inch tiles long. → If it's less than half of a tile, it is about 4 inch tiles long.

T: Yes! (Demonstrate on the board by extending and shortening the line and measuring.)

T: Now it's your turn! We're going to use the Problem Set for the rest of the lesson.

MP.6 T: Use your inch tile and the mark and move forward strategy to measure the objects listed on the Problem Set. Record each measurement in the table.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Some students may mistakenly count the hash marks and give an answer of 5 inch tiles. Visually demonstrate to them that the space from the beginning of the line to the first mark is 1 length unit by placing a tile there. Have students count as each subsequent space is filled with the tile.

Note: This activity provides an opportunity to work with a small group that needs support with any aspects of today's lesson.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

Lesson Objective: Connect measurement with physical units by using iteration with an inch tile to measure.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

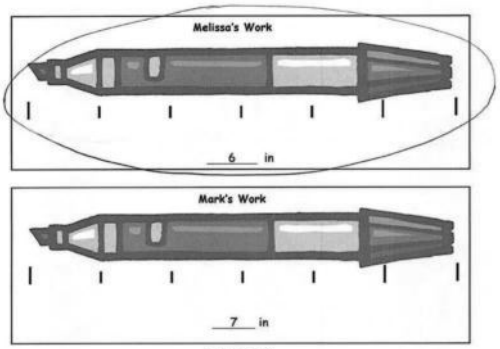
- Look at the things you measured in your Problem Set. Talk to your partner about how attending to precision was particularly important today. (Using iteration and hash marks calls for precise work.)
- Did your measurement of each item in your Problem Set come out to the same number of inch tiles as your partner's? If not, see if you can figure out why. (One student could have counted the hash marks instead of the length units.)
- Talk to your partner about why Melissa and Mark came up with different measurements for the marker.
- We remembered using centimeter cubes and practiced using inch tiles today. How is using larger length units helpful? Remember our bookcase problem. How are larger length units less precise?

Name Henry Date

1. Measure the objects below with an inch tile. Record the measurements in the table provided.

Object	Measurement
Pair of scissors	5 inches
Marker	6 inches
Pencil	7 inches
Eraser	2 inches
Length of worksheet	11 inches
Width of worksheet	8 inches
Length of desk	17 inches
Width of desk	23 inches

2. Mark and Melissa both measured the same marker with an inch tile but came up with different lengths. Circle the student work that is correct and explain why you chose that work.



Explanation:

Melissa's work is correct. She counted the inches and Mark counted the hash marks.

- When is using smaller units helpful? Which of the items on your worksheet would you prefer to measure with inch tiles? With centimeter cubes? Why?
- When you are thinking about measuring, how would you decide on which length unit to use?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Note: The Homework requires students to have an inch tile to measure. Consider sending home 1-inch squares of paper instead of plastic tiles.

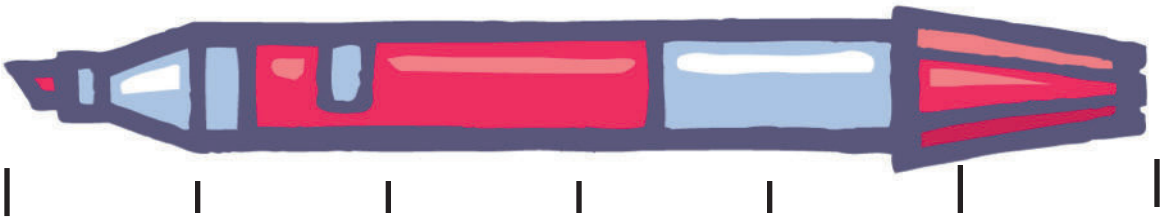
Name _____ Date _____

1. Measure the objects below with an inch tile. Record the measurements in the table provided.

Object	Measurement
Pair of scissors	
Marker	
Pencil	
Eraser	
Length of worksheet	
Width of worksheet	
Length of desk	
Width of desk	

2. Mark and Melissa both measured the same marker with an inch tile but came up with different lengths. Circle the student work that is correct, and explain why you chose that work.

Melissa's Work



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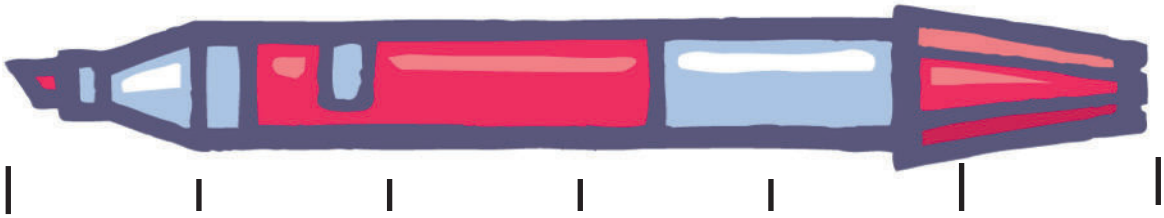
Mark's Work



7 in

Explanation:

_____

_____

_____

Name _____ Date _____

Measure the lines below with an inch tile.

Line A _____

Line A is about _____ inches.

Line B _____

Line B is about _____ inches.

Line C _____

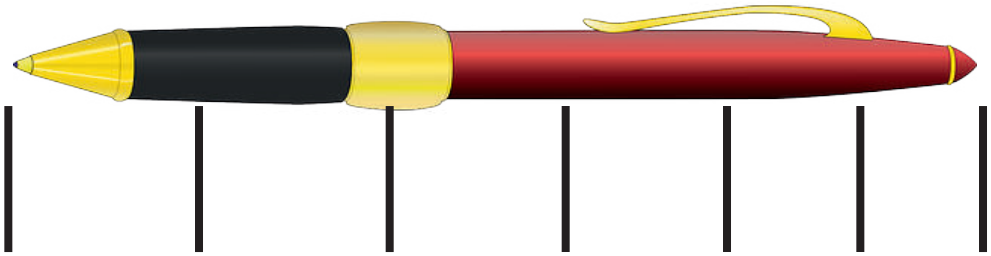
Line C is about _____ inches.

Name _____ Date _____

1. Measure these objects found in your home with an inch tile. Record the measurements in the table provided.

Object	Measurement
Length of a kitchen fork	
Height of a juice glass	
Length across the center of a plate	
Length of the refrigerator	
Length of a kitchen drawer	
Height of a can	
Length of a picture frame	
Length of a remote control	

2. Norberto begins measuring his pen with his inch tile. He marks off where each tile ends. After two times, he decides this process is taking too long and starts to guess where the tile would end and then marks it.



Explain why Norberto's answer will not be correct.

_____

_____

_____

3. Use your inch tile to measure the pen. How many inch tiles long is the pen?

11 - 1	11 - 2
11 - 3	11 - 4
11 - 5	11 - 6
11 - 7	11 - 8
11 - 9	12 - 3

subtraction fact flash cards set 2

12 - 4	12 - 5
12 - 6	12 - 7
12 - 8	12 - 9
13 - 4	13 - 5
13 - 6	13 - 7

subtraction fact flash cards set 2

13 - 8	13 - 9
14 - 5	14 - 6
14 - 7	14 - 8
14 - 9	15 - 6
15 - 7	15 - 8

subtraction fact flash cards set 2

15 - 9	16 - 7
16 - 8	16 - 9
17 - 8	17 - 9
18 - 9	19 - 11
20 - 19	20 - 1

subtraction fact flash cards set 2

20 - 18	20 - 2
20 - 17	20 - 3
20 - 16	20 - 4
20 - 15	20 - 5
20 - 14	20 - 6

subtraction fact flash cards set 2

20 - 13	20 - 7
20 - 12	20 - 8
20 - 11	20 - 9
20 - 10	

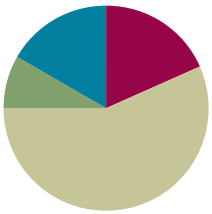
subtraction fact flash cards set 2

Lesson 15

Objective: Apply concepts to create inch rulers; measure lengths using inch rulers.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Application Problem	(5 minutes)
Concept Development	(34 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Sprint: Adding and Subtracting by 2 **2.OA.2** (9 minutes)
- Subtraction Fact Flash Cards **2.OA.2** (2 minutes)

Sprint: Adding and Subtracting by 2 (9 minutes)

Materials: (S) Adding and Subtracting by 2 Sprint

Note: Students practice adding and subtracting by 2 to gain mastery of the sums and differences within 20.

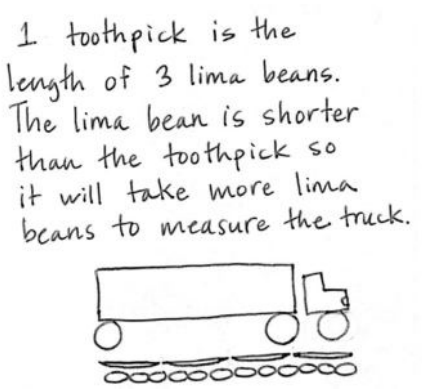
Subtraction Fact Flash Cards (2 minutes)

Materials: (T) Subtraction fact flash cards set 2 (Lesson 14 Fluency Template)

Note: By practicing subtraction facts, students gain mastery of differences within 20.

This can be a teacher-directed, whole-class activity or an opportunity for students to work in pairs. The teacher can hold the cards and use choral response or distribute the cards and have students pair up to question each other.

Application Problem (5 minutes)



Materials: (S) Small object approximately 6 inches long or less, 9 lima beans, 3 toothpicks per pair

Edwin and Tina have the same toy truck. Edwin says his is 4 toothpicks long. Tina says hers is 12 lima beans long. How can they both be right?

Work with a partner to measure your object. Partner A, measure with lima beans. Partner B, measure with toothpicks. Use words or pictures to explain how Edwin and Tina can both be right.

Note: This problem gives students a hands-on opportunity to reason through the relationship between the size and number of length units: the smaller the length unit, the larger the number of units, and the larger the length unit, the smaller the number of units. This anticipates the comparison between centimeters and inches that students explore in Lesson 18.

Concept Development (34 minutes)

Materials: (S) 12-inch long × 2-inch wide strip of tag board or sentence strip, paper or math journal, 1 inch tile, 2-inch paper clip, 3 × 5 index card

Pass out tag board and inch tiles.

T: Yesterday, we used a 1-inch tile to measure the length of various objects. Today, we're going to create a tool that will help us measure inches in a more efficient way.

T: Remember how we made centimeter rulers earlier in the year? Let's make an inch ruler today!

T: Watch how I make the first hash mark on my ruler. (Demonstrate placing the tile at the left end of the tag board, drawing the line, and writing 1 above it.)

T: Now, you do the same.

Circulate to ensure that all students are marking the hash marks correctly on the tag board.

T: What does the number 1 mean?

S: It's one length unit. → It's where the length unit ends. → It's the space you have measured so far.

T: Yes. And what do we call this length unit that we're using?

S: An inch!

NOTES ON MULTIPLE MEANS OF ACTION AND REPRESENTATION:

For blind or visually impaired students, glue toothpicks or wax-covered yarn to the hash marks on their rulers, enabling them to feel the length units on their rulers.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Some students have a deeper understanding of concepts of measurement. Give them the opportunity to explain to their peers, using words, drawings, or actions, their understanding of notions such as why there can be no gaps or overlaps when creating their rulers.

T: Yes. And where should 0 go on our rulers?
S: At the very beginning of the ruler. → Before the number 1.
T: Let's write 0 at the left edge of the ruler. (Model as students do the same.)
T: What does the 0 mean?
S: It means you haven't measured anything yet. → It's where you start to measure.
T: So, when we put our tile at the edge of the ruler and then marked the end of the tile with the hash mark, we actually measured 1 inch.
T: You're going to finish making your rulers now. Each time you move your tile forward, be sure to put it down right on top of the line. Why is it important not to have any gaps between the tiles?
S: Our measurements would all be different. → The length units have to be equal.
T: Correct! Remember to write each number directly above the hash marks as you go.

Support students who need assistance, and allow those who show mastery to complete their rulers independently. Early finishers can explore measuring objects around the room. When all students have finished, distribute the paper, paper clips, and index cards.

T: What is the last number on your ruler?
S: 12.
T: So, this ruler measures 12 what?
S: 12 inches!
T: Yes! And 12 inches make a larger unit called a **foot**.
T: Everyone say this with me: 12 inches equals 1 foot.
S: (Repeat.)
T: Show your partner how to measure your paper clip with the ruler. (Watch for misconceptions.)
T: How long is the paper clip?
S: 2 inches.
T: So, the number 2 means the number of inches so far. The end of this paper clip is where 2 length units, in this case, inches, end.
T: Now, on your paper, use your ruler to draw a line that is 2 inches long. (Pause.)
T: Lay your paper clip along the line you drew. What do you notice?
S: They're the same length!
T: Tell your partner: How many more inches would we need to add to make a foot? How do you know?
S: Two inches plus 10 inches equals 12 inches, and 12 inches equals 1 foot.
T: Now, measure the length of the index card. Check your answer with a partner. (Allow students time to check answers.)
MP.2
T: How long is the index card?
S: 5 inches.

T: So, the card is the same length as the space between 0 and 5 on your ruler. It is the same length as 5 inches.

T: Use your ruler to draw a line that is 5 inches long. Then, lay your index card along the line, and compare the two lengths.

MP.2

S: They're both 5 inches long. → They're the same length.

T: 5 inches plus how many inches equal 1 foot?

S: 7 inches!

T: So, a foot is composed of 12 inches, just as a unit of ten is composed of 10…?

S: Ones!

T: And a unit of one hundred is composed of 10…?

S: Tens!

T: A dollar is composed of 100…?

S: Cents!

T: How many inches equal one foot? Give me a complete sentence.

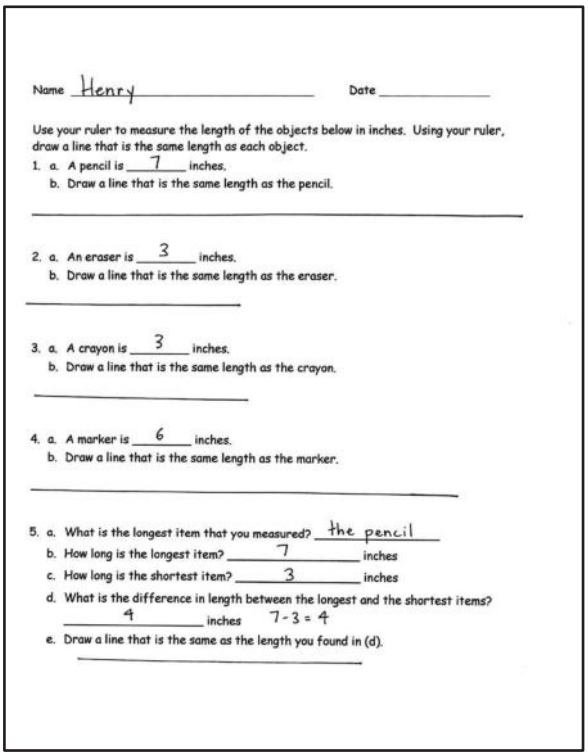
S: 12 inches equal 1 foot!

T: Why is it more efficient to use a ruler than to measure using inch tiles?

S: You can measure all at once instead of going 1 plus 1 plus 1. → Everybody has rulers, but I only see inch tiles in school. → It takes a lot longer to mark and move forward than to just use a ruler. → On the ruler, the inches all stay together in the same place, so it's like all the inch tiles are connected, which is easier to use.

T: That's a great way to think of the ruler! And I'd much rather measure my desk with a ruler than with a single inch tile!

If students need more support measuring or drawing lines of equal length, repeat the procedure to measure the width of the index card and draw a line of equal length. Otherwise, as students demonstrate proficiency using the ruler to measure and draw lines of equal lengths, allow them to move on to the Problem Set.



Name Henry Date

Use your ruler to measure the length of the objects below in inches. Using your ruler, draw a line that is the same length as each object.

1. a. A pencil is 7 inches.
   b. Draw a line that is the same length as the pencil.

2. a. An eraser is 3 inches.
   b. Draw a line that is the same length as the eraser.

3. a. A crayon is 3 inches.
   b. Draw a line that is the same length as the crayon.

4. a. A marker is 6 inches.
   b. Draw a line that is the same length as the marker.

5. a. What is the longest item that you measured? the pencil
   b. How long is the longest item? 7 inches
   c. How long is the shortest item? 3 inches
   d. What is the difference in length between the longest and the shortest items? 4 inches 7 - 3 = 4
   e. Draw a line that is the same as the length you found in (d).

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

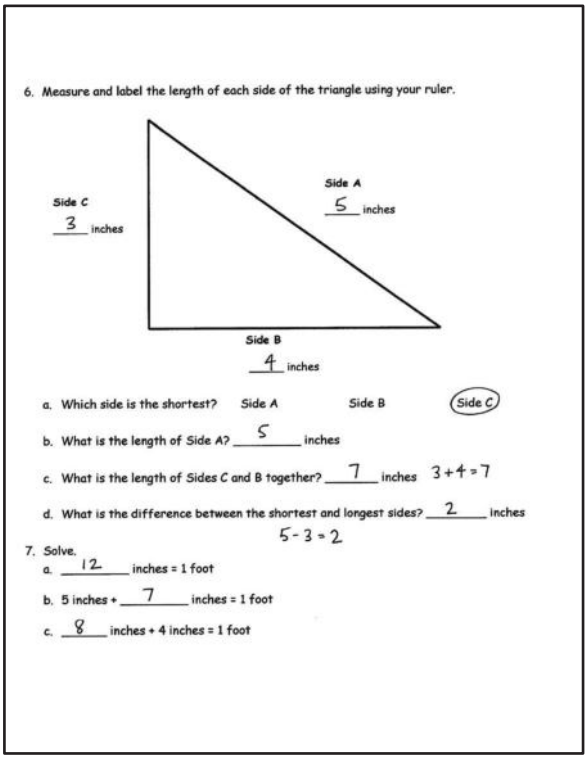
Student Debrief (10 minutes)

Lesson Objective: Apply concepts to create inch rulers; measure lengths using inch rulers.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.


6. Measure and label the length of each side of the triangle using your ruler.

Side C: 3 inches

Side A: 5 inches

Side B: 4 inches

a. Which side is the shortest? Side A Side B (Side C)

b. What is the length of Side A? 5 inches

c. What is the length of Sides C and B together? 7 inches 3+4=7

d. What is the difference between the shortest and longest sides? 2 inches 5-3=2

7. Solve.

a. 12 inches = 1 foot

b. 5 inches + 7 inches = 1 foot

c. 8 inches + 4 inches = 1 foot

- Look at the things you measured on your Problem Set. Did you have to round to the nearest inch on any of the items? Was it easier to measure objects or the lines on the triangle? Why? (Lines were easier to measure because there is a definite starting and ending point. → Objects are three-dimensional. → The triangle was harder because I had to keep turning my ruler.)
- When you compared the length of two objects on your Problem Set, did you use an equation? What operation did you use in your equation?
- When we add 5 and 7, many of us make ten and add two more. What about if we add 9 inches and 6 inches? Would we make ten? How many does 9 need to make a foot? How many extra inches would there be? So, 9 + 6 = 1 ten 5 ones, and 9 inches + 6 inches = 1 foot 3 inches. Explain to your partner how you might add 8 inches and 7 inches, making a foot first.
- There are many different types of units. Most of the time, there are units within units. For example, within a foot there are inches, and within a dollar there are cents. What units are within a hundred? A ten? A meter? How does having smaller units and larger units help us?
- Think about when we were making our inch rulers today. Tell your partner exactly what the length unit was on our rulers. Will length units always be an inch?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Adding and Subtracting by 2

1.	0 + 2 =	
2.	2 + 2 =	
3.	4 + 2 =	
4.	6 + 2 =	
5.	8 + 2 =	
6.	10 + 2 =	
7.	12 + 2 =	
8.	14 + 2 =	
9.	16 + 2 =	
10.	18 + 2 =	
11.	20 – 2 =	
12.	18 – 2 =	
13.	16 – 2 =	
14.	14 – 2 =	
15.	12 – 2 =	
16.	10 – 2 =	
17.	8 – 2 =	
18.	6 – 2 =	
19.	4 – 2 =	
20.	2 – 2 =	
21.	2 + 0 =	
22.	2 + 2 =	

23.	2 + 4 =	
24.	2 + 6 =	
25.	2 + 8 =	
26.	2 + 10 =	
27.	2 + 12 =	
28.	2 + 14 =	
29.	2 + 16 =	
30.	2 + 18 =	
31.	0 + 22 =	
32.	22 + 22 =	
33.	44 + 22 =	
34.	66 + 22 =	
35.	88 – 22 =	
36.	66 – 22 =	
37.	44 – 22 =	
38.	22 – 22 =	
39.	22 + 0 =	
40.	22 + 22 =	
41.	22 + 44 =	
42.	66 + 22 =	
43.	888 – 222 =	
44.	666 – 222 =	

B

Number Correct: _____

Improvement: _____

Adding and Subtracting by 2

1.	2 + 0 =	
2.	2 + 2 =	
3.	2 + 4 =	
4.	2 + 6 =	
5.	2 + 8 =	
6.	2 + 10 =	
7.	2 + 12 =	
8.	2 + 14 =	
9.	2 + 16 =	
10.	2 + 18 =	
11.	20 – 2 =	
12.	18 – 2 =	
13.	16 – 2 =	
14.	14 – 2 =	
15.	12 – 2 =	
16.	10 – 2 =	
17.	8 – 2 =	
18.	6 – 2 =	
19.	4 – 2 =	
20.	2 – 2 =	
21.	0 + 2 =	
22.	2 + 2 =	

23.	4 + 2 =	
24.	6 + 2 =	
25.	8 + 2 =	
26.	10 + 2 =	
27.	12 + 2 =	
28.	14 + 2 =	
29.	16 + 2 =	
30.	18 + 2 =	
31.	0 + 22 =	
32.	22 + 22 =	
33.	22 + 44 =	
34.	66 + 22 =	
35.	88 – 22 =	
36.	66 – 22 =	
37.	44 – 22 =	
38.	22 – 22 =	
39.	22 + 0 =	
40.	22 + 22 =	
41.	22 + 44 =	
42.	66 + 22 =	
43.	666 – 222 =	
44.	888 – 222 =	

Name _____ Date _____

Use your ruler to measure the length of the objects below in inches. Using your ruler, draw a line that is the same length as each object.

1. a. A pencil is _____ inches.
   b. Draw a line that is the same length as the pencil.

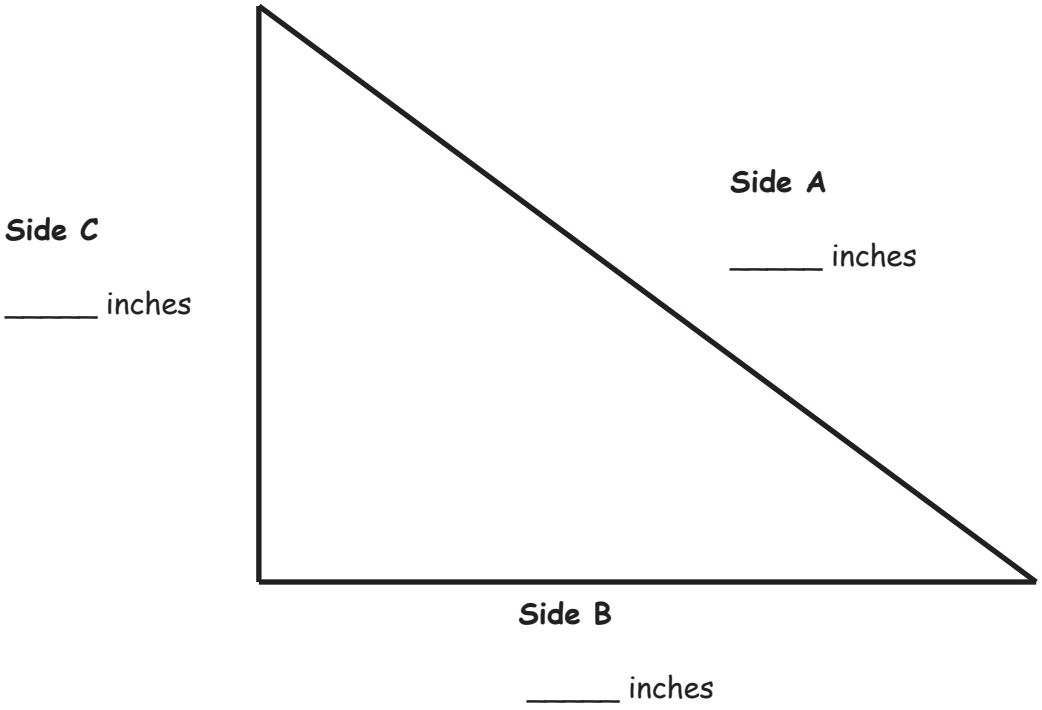
2. a. An eraser is _____ inches.
   b. Draw a line that is the same length as the eraser.

3. a. A crayon is _____ inches.
   b. Draw a line that is the same length as the crayon.

4. a. A marker is _____ inches.
   b. Draw a line that is the same length as the marker.

5. a. What is the longest item that you measured? _____
   b. How long is the longest item? _____ inches
   c. How long is the shortest item? _____ inches
   d. What is the difference in length between the longest and the shortest items? _____ inches
   e. Draw a line that is the same as the length you found in (d).

6. Measure and label the length of each side of the triangle using your ruler.



a. Which side is the shortest? Side A Side B Side C

b. What is the length of Side A? _____ inches

c. What is the length of Sides C and B together? _____ inches

d. What is the difference between the shortest and longest sides?
_____ inches

7. Solve.
   a. _____ inches = 1 foot

   b. 5 inches + _____ inches = 1 foot

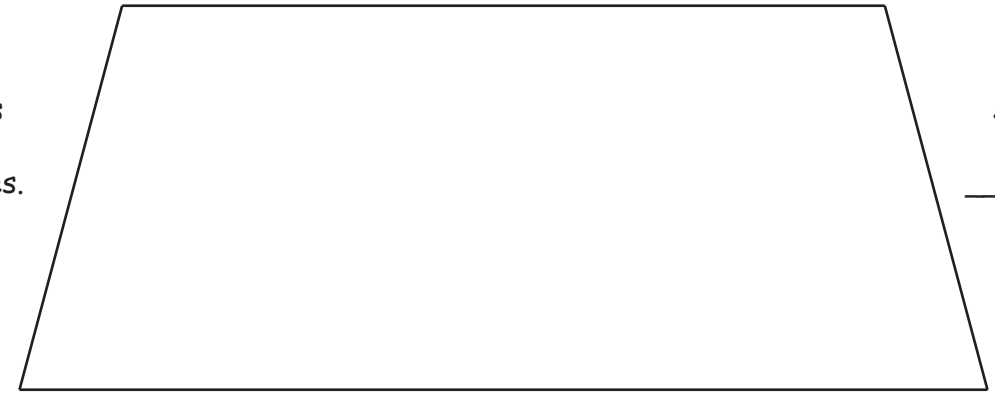
   c. _____ inches + 4 inches = 1 foot

Name _____ Date _____

Measure and label the sides of the shape below.

Side A is _____ inches.

Side B is _____ inches.



Side C is _____ inches.

Side D is _____ inches.

What is the sum of the length of Side B and the length of Side C? _____ inches

Name _____ Date _____

Measure the length of each household object with your ruler, and then use your ruler to draw a line equal to the length of each object in the space provided.

1. a. A dinner fork is _____ inches.
   b. Draw a line that is the same length as the fork.

2. a. A tablespoon is _____ inches.
   b. Draw a line that is the same length as the tablespoon.

Measure two other household objects.

3. a. _____ is _____ inches.
   b. Draw a line that is the same length as the _____.

4. a. _____ is _____ inches.
   b. Draw a line that is the same length as the _____.

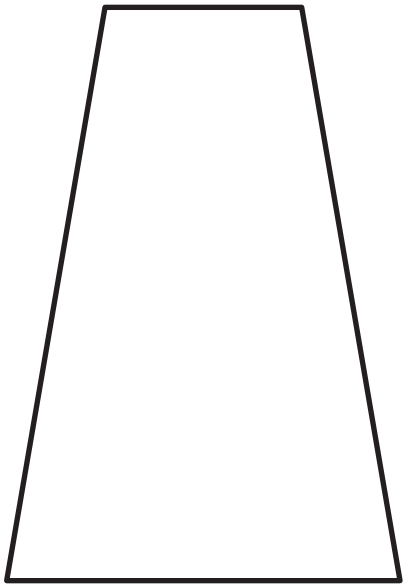
5. a. What was the longest object you measured? _____
   b. What was the shortest object you measured? _____
   c. The difference between the longest object and the shortest object is _____ inches.

6. Measure and label the length of each side of each shape in inches using your ruler.

a. The longer side of the rectangle is _____ inches.

b. The shorter side of the rectangle is _____ inches.

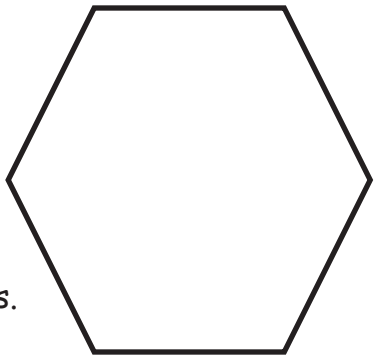
c. The longer side of the rectangle is _____ inches longer than the shorter side of the rectangle.



d. The shortest side of the trapezoid is _____ inches.

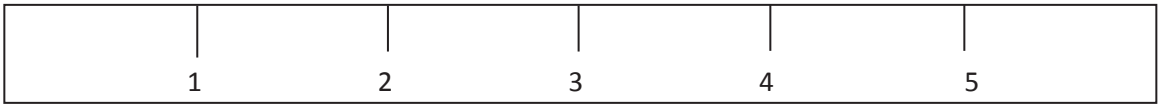
e. The longest side of the trapezoid is _____ inches.

f. The longest side of the trapezoid is _____ inches longer than the shortest side.



g. Each side of the hexagon is _____ inches.

h. The total length around the hexagon is _____ inches.



Topic D

Measuring and Estimating Length Using Customary and Metric Units

2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4

Focus Standards:		2.MD.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
		2.MD.2	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
		2.MD.3	Estimate lengths using units of inches, feet, centimeters, and meters.
		2.MD.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
Instructional Days:		4	
Coherence	**-Links from:**	G1–M3	Ordering and Comparing Length Measurements as Numbers
		G2–M2	Addition and Subtraction of Length Units
	-Links to:	G3–M2	Place Value and Problem Solving with Units of Measure

Topic D builds upon the work students completed in Module 2 with centimeter units, as students now explore measurement using both customary and metric units. In Lesson 16, students rotate through various centers and measure a variety of objects with inch rulers and yardsticks, strategically choosing the appropriate measurement tool and units for measuring a given object (**2.MD.1**). By doing so, they develop mental images of customary benchmark lengths.

Next, in Lesson 17, students deepen their measurement sense by applying their experiences in Lesson 16 to estimating the lengths of different objects and then checking their estimates by measuring (**2.MD.3**). For example, a student might estimate that a desk is three feet tall and then measure to discover that it is actually three feet six inches tall.

Then, in Lesson 18, students measure the same objects twice, using both metric and customary units. In this way, they learn that centimeters are smaller than inches. This reinforces the understanding that, when measuring with a smaller unit, more iterations of that unit are needed to measure the same object than when measuring with a larger unit (**2.MD.2**).

Finally, students compare different lengths using addition and subtraction in Lesson 19. They determine how much longer one object is than another, subtracting the smaller length from the larger one. Problems are solved in a variety of ways using the relationship between addition and subtraction (e.g., 25 in – 18 in = ____ in, or 18 in + _____ = 25 in), and the differences are expressed using standard length units (e.g., 7 in) (**2.MD.4**).

The work with measurement tools and various length units in Topic D lays the groundwork for problem solving in Topic E, as students use the more abstract tape diagram to relate addition and subtraction to length.

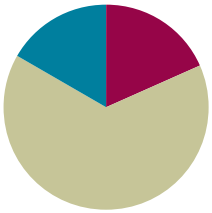
A Teaching Sequence Toward Mastery of Measuring and Estimating Length Using Customary and Metric Units	
Objective 1:	**Measure various objects using inch rulers and yardsticks. (Lesson 16)**
Objective 2:	**Develop estimation strategies by applying prior knowledge of length and using mental benchmarks. (Lesson 17)**
Objective 3:	**Measure an object twice using different length units and compare; relate measurement to unit size. (Lesson 18)**
Objective 4:	**Measure to compare the differences in lengths using inches, feet, and yards. (Lesson 19)**

Lesson 16

Objective: Measure various objects using inch rulers and yardsticks.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Concept Development	(39 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Sprint: Adding and Subtracting by 3 **2.OA.2** (9 minutes)
- Subtraction Fact Flash Cards **2.OA.2** (2 minutes)

Sprint: Adding and Subtracting by 3 (9 minutes)

Materials: (S) Adding and Subtracting by 3 Sprint

Note: Students practice adding and subtracting by 3 to gain mastery of the sums and differences within 20.

Subtraction Fact Flash Cards (2 minutes)

Materials: (T) Subtraction fact flash cards set 2 (Lesson 14 Fluency Template)

Note: This is a teacher-directed, whole-class activity. By practicing subtraction facts, students gain mastery of differences within 20.

Concept Development (39 minutes)

Materials: (S) 12-inch ruler, yardstick, Recording Sheets

Note: In this lesson, the Recording Sheets serve as the Problem Set. Students need to refer to these Recording Sheets in Lesson 17.

This Concept Development is designed for students to work in centers, rotating approximately every six minutes. Each group should have roughly five students. To prepare for the lesson, make one copy of the Recording Sheet set per student. Print the Recording Sheets single-sided so that students can work on the back if necessary. Post the directions at each center.

Note that the Application Problem has been omitted from this lesson. Instead, four out of five centers include a word problem related to the measurement task. Students may not have time to solve the word problem at every center, but they should complete at least two out of the four.

Center 1: Measure and Compare Shin Lengths

Materials: (S) 12-inch rulers, yardsticks, Center 1 Recording Sheet

Students measure the length of group members' shins and record the measurements on a table. Observe how students go about this task. Do they use the most efficient measuring tool? Do they consistently measure from the same points on each person (the top of the foot to the bottom of the knee)?

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Introduce English language learners to all the centers that have been created so that they know what is expected of them at each center. Clarify what they are being asked to measure (e.g., *shin*), and clarify the measuring units they use at each center (e.g., inches, feet, and yards).

Center 2: Compare Lengths to a Yardstick

Materials: (S) Book, yardstick, Center 2 Recording Sheet

Note: This center is best located near a desk and classroom door since students will be measuring these objects.

Students first estimate how three classroom objects compare to a yardstick and then use a yardstick to measure the objects. The yardstick can be used to measure in different units: inches, feet, or yards. Keep a watchful eye to support students as they navigate the choice of units.

Center 3: Choose the Units to Measure Objects

Materials: (S) 12-inch ruler, yardstick, Center 3 Recording Sheet

MP.5

At this center, students select the most appropriate unit to measure an object. Encourage students to choose objects with significantly different lengths so that they can gain experience measuring in inches, feet, and yards. Observe how students measure. Are they using a measuring tool that fits with their chosen objects? Is it the most efficient measuring unit for the object?

Center 4: Find Benchmarks

Materials: (S) 12-inch ruler, yardstick, Center 4 Recording Sheet

Students identify objects for each of three benchmark lengths: inch, foot, and yard. Through a trial and error process, students develop a more precise understanding of the benchmark length.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge students working above grade level by asking them to help write measurement word problems to exchange with other students and solve. This extends their learning of the content and also assesses their content learning.

Center 5: Choose a Tool to Measure

Materials: (S) 12-inch ruler, yardstick, Center 5 Recording Sheet, textbook, pencil, pink eraser

Note: This center is best located near a rug and chalkboard or white board.

Students practice selecting the most efficient measuring tool for a given object. Help students remember that every length of the yardstick measures 3 feet when they calculate the length of the rug and chalkboard. (A common misconception is to count each iteration of the yardstick as 1 unit when measuring in feet.)

Student Debrief (10 minutes)

Lesson Objective: Measure various objects using inch rulers and yardsticks.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Recording Sheet. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Recording Sheet and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- When you used the 12-inch ruler, how did you label your measurement? (1 foot 3 inches.) When you used the yardstick, did you have to use two unit labels? Explain why or why not.
- Choose one of the word problems you completed during the centers. Explain your solution path to your partner.
- At Center 4, were the objects you chose close to the benchmark lengths? Were the things you chose for a foot 12 inches long? For the yard, 3 feet long?
- If you didn't have a 12-inch ruler or a yardstick, could you think of a way to measure an object? Would you know about how many inches or feet that object was? Talk to your partner.
- How do you decide which unit to use when measuring?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Adding and Subtracting by 3

1.	0 + 3 =	
2.	3 + 3 =	
3.	6 + 3 =	
4.	9 + 3 =	
5.	12 + 3 =	
6.	15 + 3 =	
7.	18 + 3 =	
8.	21 + 3 =	
9.	24 + 3 =	
10.	27 + 3 =	
11.	30 – 3 =	
12.	27 – 3 =	
13.	24 – 3 =	
14.	21 – 3 =	
15.	18 – 3 =	
16.	15 – 3 =	
17.	12 – 3 =	
18.	9 – 3 =	
19.	6 – 3 =	
20.	3 – 3 =	
21.	3 + 0 =	
22.	3 + 3 =	

23.	6 + 3 =	
24.	9 + 3 =	
25.	12 + 3 =	
26.	15 + 3 =	
27.	18 + 3 =	
28.	21 + 3 =	
29.	24 + 3 =	
30.	27 + 3 =	
31.	0 + 33 =	
32.	33 + 33 =	
33.	66 + 33 =	
34.	33 + 66 =	
35.	99 – 33 =	
36.	66 – 33 =	
37.	999 – 333 =	
38.	33 – 33 =	
39.	33 + 0 =	
40.	30 + 3 =	
41.	33 + 3 =	
42.	36 + 3 =	
43.	63 + 33 =	
44.	63 + 36 =	

B

Number Correct: _____

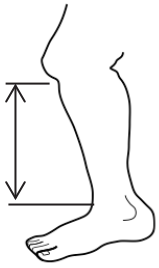
Improvement: _____

Adding and Subtracting by 3

1.	3 + 0 =	
2.	3 + 3 =	
3.	3 + 6 =	
4.	3 + 9 =	
5.	3 + 12 =	
6.	3 + 15 =	
7.	3 + 18 =	
8.	3 + 21 =	
9.	3 + 24 =	
10.	3 + 27 =	
11.	30 – 3 =	
12.	27 – 3 =	
13.	24 – 3 =	
14.	21 – 3 =	
15.	18 – 3 =	
16.	15 – 3 =	
17.	12 – 3 =	
18.	9 – 3 =	
19.	6 – 3 =	
20.	3 – 3 =	
21.	0 + 3 =	
22.	3 + 3 =	

23.	6 + 3 =	
24.	9 + 3 =	
25.	12 + 3 =	
26.	15 + 3 =	
27.	18 + 3 =	
28.	21 + 3 =	
29.	24 + 3 =	
30.	27 + 3 =	
31.	0 + 33 =	
32.	33 + 33 =	
33.	33 + 66 =	
34.	66 + 33 =	
35.	99 – 33 =	
36.	66 – 33 =	
37.	999 – 333 =	
38.	33 – 33 =	
39.	33 + 0 =	
40.	30 + 3 =	
41.	33 + 3 =	
42.	36 + 3 =	
43.	36 + 33 =	
44.	36 + 63 =	

Center 1: Measure and Compare Shin Lengths



Choose a measuring unit to measure the shins of everyone in your group. Measure from the top of the foot to the bottom of the knee.

I chose to measure using _____.
Record the results in the table below. Include the units.

Name	Length of Shin

What is the difference in length between the longest and shortest shins? Write a number sentence and statement to show the difference between the two lengths.

Center 2: Compare Lengths to a Yardstick

Fill in your estimate for each object using the words *more than*, *less than*, or *about the same length as*. Then, measure each object with a yardstick, and record the measurement on the chart.

1. The length of a book is _____ the yardstick.
2. The height of the door is _____ the yardstick.
3. The length of a student desk is _____ the yardstick.

Object	Measurement
Length of book	
Height of door	
Length of student desk	

What is the length of 4 student desks pushed together with no gaps in between? Use the RDW process to solve on the back of this paper.

Center 3: Choose the Units to Measure Objects

Name 4 objects in the classroom. Circle which unit you would use to measure each item, and record the measurement in the chart.

Object	Length of the Object
	inches/feet/yards
	inches/feet/yards
	inches/feet/yards
	inches/feet/yards

Billy measures his pencil. He tells his teacher it is 7 feet long. Use the back of this paper to explain how you know that Billy is incorrect and how he can change his answer to be correct.

Center 4: Find Benchmarks

Look around the room to find 2 or 3 objects for each benchmark length. Write each object in the chart, and record the exact length.

Objects That Are About an **Inch**	Objects That Are About a **Foot**	Objects That Are About a **Yard**
1. _____ inches	1. _____ inches	1. _____ inches
2. _____ inches	2. _____ inches	2. _____ inches
3. _____ inches	3. _____ inches	3. _____ inches

Center 5: Choose a Tool to Measure

Circle the tool used to measure each object. Then, measure and record the length in the chart. Circle the unit.

Object	Measurement Tool	Measurement
Length of the rug	12-inch ruler / yardstick	_____ inches/feet
Textbook	12-inch ruler / yardstick	_____ inches/feet
Pencil	12-inch ruler / yardstick	_____ inches/feet
Length of the chalkboard	12-inch ruler / yardstick	_____ inches/feet
Pink eraser	12-inch ruler / yardstick	_____ inches/feet

Sera's jump rope is the length of 6 textbooks. On the back of this paper, make a tape diagram to show the length of Sera's jump rope. Then, write a repeated addition sentence using the textbook measurement from the chart to find the length of Sera's jump rope.

Name _____ Date _____

Circle the unit that would best measure each object.

Marker	inch / foot / yard
Height of a car	inch / foot / yard
Birthday card	inch / foot / yard
Soccer field	inch / foot / yard
Length of a computer screen	inch / foot / yard
Height of a bunk bed	inch / foot / yard

Name _____ Date _____

1. Circle the unit that would best measure each object.

Height of a door	inch / foot / yard
Textbook	inch / foot / yard
Pencil	inch / foot / yard
Length of a car	inch / foot / yard
Length of your street	inch / foot / yard
Paint brush	inch / foot / yard

2. Circle the correct estimate for each object.

   a. The height of a flagpole is more than / less than / about the same as the length of a yardstick.

   b. The width of a door is more than / less than / about the same as the length of a yardstick.

   c. The length of a laptop computer is more than / less than / about the same as the length of a 12-inch ruler.

   d. The length of a cell phone is more than / less than / about the same as the length of a 12-inch ruler.

3. Name 3 objects in your classroom. Decide which unit you would use to measure that object. Record it in the chart in a full statement.

Object	Unit
a.	I would use _____ to measure the length of _____.
b.	
c.	

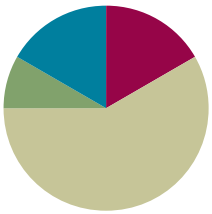
4. Name 3 objects in your home. Decide which unit you would use to measure that object. Record it in the chart in a full statement.

Object	Unit
a.	I would use _____ to measure the length of _____.
b.	
c.	

Lesson 17

Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

Suggested Lesson Structure



Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Fluency Practice (10 minutes)

- Subtraction Fact Flash Cards **2.OA.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Subtraction Fact Flash Cards (5 minutes)

Materials: (T) Subtraction fact flash cards set 2 (Lesson 14 Fluency Template)

Note: This is a teacher-directed, whole-class activity. By practicing subtraction facts, students gain mastery of differences within 20 through regular, motivating practice.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

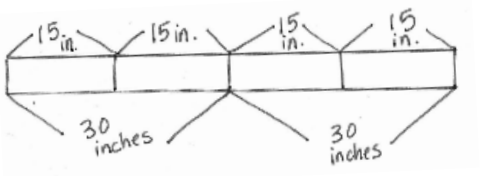
Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic D and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (5 minutes)

Benjamin measures his forearm and records the length as 15 inches. Then, he measures his upper arm and realizes it's the same!

a. How long is one of Benjamin's arms?
b. What is the total length of both of Benjamin's arms together?



a. 15 + 15 = 30
One of Benjamin's arms is 30 inches.
b. 30 + 30 = 60
The total length of both Benjamin's arms is 60 inches.

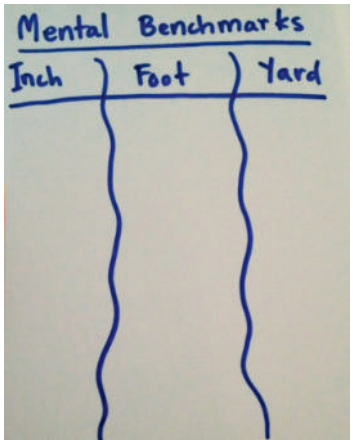
Note: This Application Problem provides practice of the previous day's concepts. Provide support when needed, but encourage students to solve independently as much as possible.

Concept Development (35 minutes)

Materials: (T) 2 charts (pictured below), dry erase marker (S) Lesson 16 Recording Sheets, new unused pink eraser, 12-inch ruler, 1 yard stick per pair

The beginning of this Concept Development provides a structure for students to develop a class list of mental benchmarks. Choose a mental benchmark for each length unit that is meaningful for each individual class.

Part 1: Identify mental benchmarks.



T: Look back at your Recording Sheets from yesterday's centers. Let's make a list of things we measured that were about the size of a foot. (Record the ideas on the chart as students say them.)

S: My math journal was about a foot. It was just a little bit shorter. → The construction paper was exactly a foot. → The Homework sheet was a little less than a foot long.

T: What on our list could remind us about the length of a foot?

S: The paper!

T: The length of the paper or the 12-inch ruler can be a mental benchmark for the length of a foot or 12 inches.

T: How about a mental benchmark for a yard? (Chart as students share.)

S: My arms are a yard when I hold them open like this. → I measured my brother's bike at home, and it was 3 feet, which is a yard! → The width of our classroom door was exactly a yard!

T: Which item on our list should be our class benchmark for the yard?

S: The width of the door!

T: Look at your Recording Sheet. Did anyone find something that could be our mental benchmark for an inch?

S: The middle part of my finger is an inch! → I measured a quarter, and it was an inch long.

T: Which one should be our benchmark for an inch?

S: The quarter!

T: Talk to your partner about how it is helpful to understand mental benchmarks when people say things such as "Your new teacher is about 6 feet tall," "Draw a line about 6 inches long," or "The room is about 10 yards long."

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Explain the idea of a mental benchmark by showing a few examples. For instance, demonstrate that the width of a paper clip is about a centimeter. Explain that having the mental benchmark helps in estimating the length of objects.

S: Then, you will know better who might be your new teacher. → Then, you will know about how long to draw the line. → Then, you can understand the size of the room. → If you understand benchmarks, you can understand what people are talking about better.

Part 2: Use mental benchmarks to estimate lengths and check estimations with measurement tools.

T: The width of a quarter is a benchmark for…?

S: An inch.

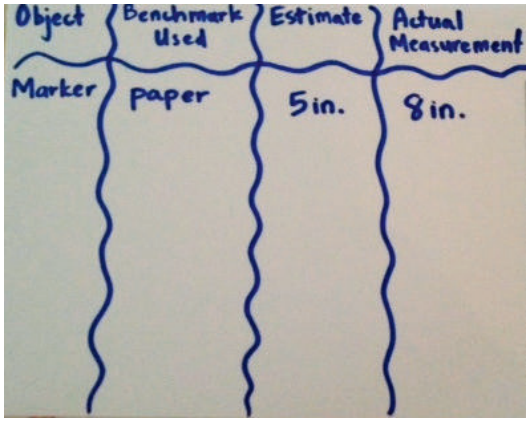
T: The length of a paper is a benchmark for…?

S: A foot.

T: The width of a door is a benchmark for…?

S: A yard!

T: Let's use mental benchmarks to estimate measurements.



T: Step 1: Use a mental benchmark to think how long something is. Look at this dry erase marker. Turn and talk: How long do you think it is?

S: Shorter than the paper. Maybe 7 inches? → It's longer than a quarter—maybe 5 inches or so.

T: (Record the estimates.)

T: Step 2: Let's measure and see how close our estimates are! Which unit should we use?

S: Inches!

T: (Have a student measure and record the length on the chart.)

S: The actual length of the marker is 8 inches.

MP.6

T: Were our estimates close to the actual length?

S: Yes! → Mine wasn't that close. → Some were.

T: What strategies can we use so that our estimates are close to the actual length?

S: Think about which benchmark is closest in length to what we are measuring, and compare. Is it a little more or a little less, a lot more or a lot less? → Visualize how many times a benchmark makes the same length as the thing you're measuring.

T: Step 1 is…?

S: Choose a mental benchmark and estimate.

T: Step 2 is…?

S: Measure to see how close we are.

Repeat the above process with two or three more objects around the room before moving on to the Problem Set.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Before this lesson, find some time to practice estimating and measuring different objects with students working below grade level. This practice allows them to participate in the lesson in a more meaningful way and perhaps take the lead in group discussions.

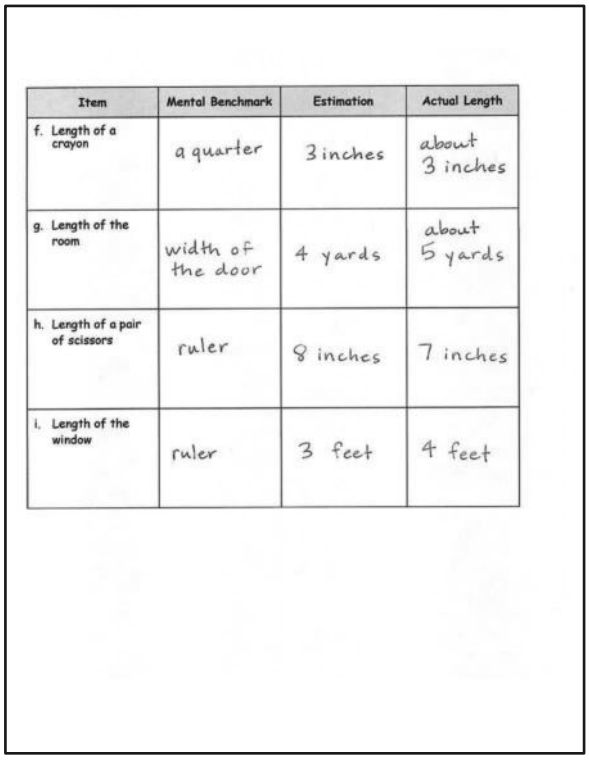
Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Name Henry Date

Estimate the length of each item by using a mental benchmark. Then measure the item using feet, inches, or yards.

Item	Mental Benchmark	Estimation	Actual Length
a. Width of the door	width of the door!	1 yard	about 1 yard
b. Width of the white board or chalkboard	width of the door	2 yards	2 yards
c. Height of a desk	width of the door	1 yard	about 1 yard
d. Length of a desk	piece of paper	2 feet	2 feet
e. Length of a reading book	piece of paper	10 inches	8 inches



Item	Mental Benchmark	Estimation	Actual Length
f. Length of a crayon	a quarter	3 inches	about 3 inches
g. Length of the room	width of the door	4 yards	about 5 yards
h. Length of a pair of scissors	ruler	8 inches	7 inches
i. Length of the window	ruler	3 feet	4 feet

Student Debrief (10 minutes)

Lesson Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at your Problem Set. With a partner, figure out the difference between your estimate of the height of a desk and the actual measure of the height of a desk. Did you include the unit?
- Look at your Problem Set. Were there some estimates and actual length measures that were exactly the same? Why do you think that you were able to guess the right measurement for some items?
- How do mental benchmarks, objects that are about the same length as standard forms of measure like the 12-inch ruler, help when we are comparing length?
- Talk to your partner about why getting good at estimating length could be helpful.

- Sometimes when we measure things, they are not exactly a foot or a yard long. How do we record things that are a foot and a little bit more or a yard and a foot more?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Estimate the length of each item by using a mental benchmark. Then, measure the item using feet, inches, or yards.

Item	Mental Benchmark	Estimation	Actual Length
a. Width of the door			
b. Width of the white board or chalkboard			
c. Height of a desk			
d. Length of a desk			
e. Length of a reading book			

Item	Mental Benchmark	Estimation	Actual Length
f. Length of a crayon			
g. Length of the room			
h. Length of a pair of scissors			
i. Length of the window			

Name _____ Date _____

Estimate the length of each item by using a mental benchmark. Then, measure the item using feet, inches, or yards.

Item	Mental Benchmark	Estimation	Actual Length
a. Length of an eraser			
b. Width of this paper			

Name _____ Date _____

Estimate the length of each item by using a mental benchmark. Then, measure the item using feet, inches, or yards.

Item	Mental Benchmark	Estimation	Actual Length
a. Length of a bed			
b. Width of a bed			
c. Height of a table			
d. Length of a table			
e. Length of a book			

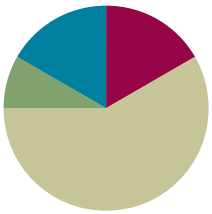
Item	Mental Benchmark	Estimation	Actual Length
f. Length of your pencil			
g. Length of a refrigerator			
h. Height of a refrigerator			
i. Length of a sofa			

Lesson 18

Objective: Measure an object twice using different length units and compare; relate measurement to unit size.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Decomposition Tree **2.OA.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Decomposition Tree (5 minutes)

Materials: (S) Decomposition Tree (Lesson 6 Fluency Template)

Note: Students are given 90 seconds to decompose 20 inches. Students apply knowledge of sums and differences within 20 to length.

T: (Distribute the decomposition tree template.)

T: You are going to break apart 20 inches on your decomposition tree for 90 seconds. Make as many pairs as you can. Go!

S: (Work for 90 seconds.)

T: Now, exchange your tree with your partner, and check each other's work. (Allow students 30–45 seconds to check.)

T: Return each other's papers. Did you see another way to make 20 inches on your partner's paper? (Allow students to share for another 30 seconds.)

T: Turn your paper over. Let's break apart 20 inches for another minute.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

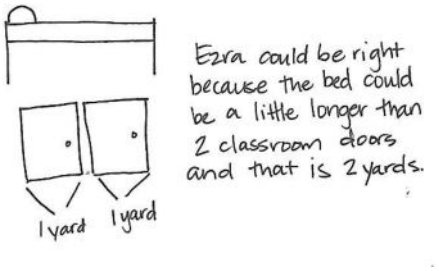
Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic D and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (5 minutes)

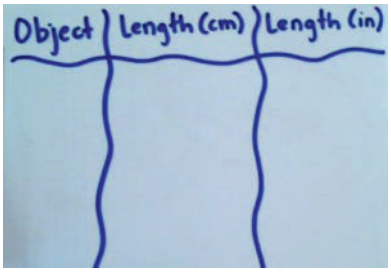
Ezra is measuring things in his bedroom. He thinks his bed is about 2 yards long. Is this a reasonable estimate? Explain your answer using pictures, words, or numbers.

Note: This Application Problem provides practice using benchmarks to estimate measurement. When students finish, invite them to share their reasoning with either the whole group or with partners.



Concept Development (35 minutes)

Materials: (T) Chart for recording measurements as pictured below
(S) Centimeter ruler; inch ruler; 1 plain sheet of white paper; bag with an unsharpened pencil, a new crayon, and a new unused pink eraser



Part 1: Compare centimeters and inches.

Assign Partners A and B.

T: Partner A, measure the pencil using the inch ruler. Partner B, measure the pencil using the centimeter ruler.
T: Partner A, how long is the pencil?
S: About 7 inches!
T: (Record the answer.) Partner B, how long is the pencil?
S: About 18 centimeters!
MP.2
T: (Record the answer.) Hmm. Why do you think the measurements are so different? Turn and talk.
S: We used different units to measure. → He measured with an inch ruler, and I used a centimeter ruler.
T: Are both measurements correct?
S: Yes!

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Scaffold the lesson for English language learners by pointing to the inch ruler and the centimeter ruler while giving directions. Point out the different units on the rulers while asking students which unit is bigger, the inch or the centimeter.

T: Let's check and see. Partner A, this time measure the pencil with the centimeter ruler. Partner B, measure the pencil with the inch ruler.

MP.2 S: (Measure.)

T: Are your measurements the same as your partner's when using the different rulers?

S: Yes!

T: Which is longer, a unit of one centimeter or one inch?

S: An inch!

T: That means 7 inches is about the same length as 18 centimeters. Did we use more centimeters or more inches to measure the pencil?

S: More centimeters.

T: Why did we need more centimeters to measure the pencil?

S: Centimeters are smaller, so it takes more of them to cover the length of the pencil.

T: Talk to your partner about why the measurements are different for the same object.

S: Centimeters are smaller than inches. → It takes fewer inches to measure because inches are bigger. → The smaller the unit, the more units it takes to measure the same thing.

Part 2: Measure using centimeters and inches.

Give students time to measure the objects in their bags and the sides of the white paper using both inches and centimeters. They should stop to record the measurements on the plain paper as they go. Encourage students to replicate the chart on the previous page to organize their work.

T: What pattern do you see in your measurements using the different rulers?

S: The number of inches is always smaller. → The number of centimeters is always bigger because a centimeter unit is smaller than an inch unit, and it takes more of them when we are measuring.

T: Does this remind you of the time we measured straws with two different-size paper clips?

S: Yes!

T: Turn and talk: What do you know about measurement and unit size?

S: The smaller the unit means it takes more of those units when measuring something. → The bigger the unit means you use less of them.

T: Using your rulers, draw two lines on your white paper. Make one line 5 inches and the other 5 centimeters.

T: Before you begin, tell your partner which line will be longer.

S: The 5-inch line!

T: Tell your partner how you know.

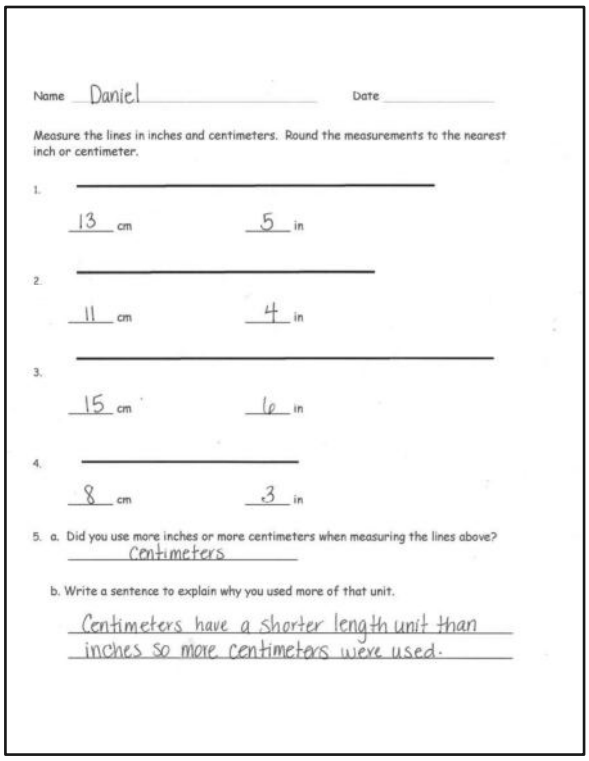
S: One inch is longer than 1 centimeter, so 5 inches will be longer than 5 centimeters. → Inches are longer, so the line will be longer, too.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Support students performing below grade level by repeating the activity with different lengths. Ask them to draw lines that are 6 centimeters long and 6 inches long. Repeat until students are sure that the inch line is longer than the centimeter line and can explain the following:

- The same number of units makes a longer line when using inches rather than centimeters.
- When measuring an item, it takes more centimeters than inches to measure that item.

T: (Allow students time to draw the two lines.)
T: Were we right? Is the 5-inch line longer than the 5-centimeter line?
S: Yes!
T: Look at your lines. How many centimeters do you think it would take to equal 5 inches? Use your centimeter ruler to check your estimate.
S: (Allow students time to check their estimates.) Thirteen centimeters is about 5 inches.
T: Measure to see about how many inches 5 centimeters is.
S: About 2 inches!
T: How many centimeters would it take to be longer than 5 inches? Would you have to measure again, or could you figure it out another way?
S: We wouldn't have to measure again because we know that 13 centimeters is about 5 inches, so to be longer than 5 inches, it can be any number of centimeters more than 13.



Name Daniel Date

Measure the lines in inches and centimeters. Round the measurements to the nearest inch or centimeter.

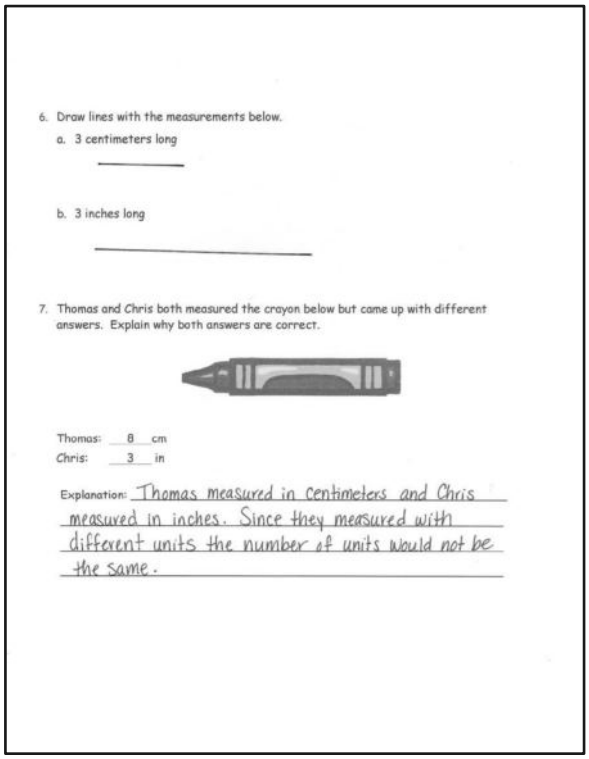
1. 13 cm 5 in
2. 11 cm 4 in
3. 15 cm 6 in
4. 8 cm 3 in

5. a. Did you use more inches or more centimeters when measuring the lines above?
Centimeters

b. Write a sentence to explain why you used more of that unit.
Centimeters have a shorter length unit than inches so more centimeters were used.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



6. Draw lines with the measurements below.
a. 3 centimeters long

b. 3 inches long

7. Thomas and Chris both measured the crayon below but came up with different answers. Explain why both answers are correct.

Thomas: 8 cm
Chris: 3 in

Explanation: Thomas measured in centimeters and Chris measured in inches. Since they measured with different units the number of units would not be the same.

Student Debrief (10 minutes)

Lesson Objective: Measure an object twice using different length units and compare; relate measurement to unit size.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for

misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the lines you measured on your Problem Set. Talk to your partner about why it is important to label the length with your chosen unit. Why is it important to label our numbers in math in general?
- Look at Problem 6 on your Problem Set. Are the lines you drew equal in length? Why might somebody think that the lines should be equal?
- Can you think of other times when we have used different units in math?
- When you measured in centimeters and inches, what did you do when your measurement wasn't exact? What language do we use to describe measurements that are not exact?
- Talk to your partner about why the unit size matters when we are measuring things.
- Why do we measure using different units? When would you want to measure using a small unit? A large unit?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Measure the lines in inches and centimeters. Round the measurements to the nearest inch or centimeter.

1.

_____ cm _____ in

2.

_____ cm _____ in

3.

_____ cm _____ in

4.

_____ cm _____ in

5. a. Did you use more inches or more centimeters when measuring the lines above?

_____

b. Write a sentence to explain why you used more of that unit.

_____

_____

6. Draw lines with the measurements below.

   a. 3 centimeters long

   b. 3 inches long

7. Thomas and Chris both measured the crayon below but came up with different answers. Explain why both answers are correct.

Thomas: 8 cm

Chris: 3 in

Explanation: _____

_____

_____

_____

Name _____ Date _____

Measure the lines in inches and centimeters. Round the measurements to the nearest inch or centimeter.

1. _____

_____ cm _____ in

2. _____

_____ cm _____ in

Name _____ Date _____

Measure the lines in inches and centimeters. Round the measurements to the nearest inch or centimeter.

1. _____

_____ cm _____ in

2. _____

_____ cm _____ in

3. _____

_____ cm _____ in

4. _____

_____ cm _____ in

5. a. Draw a line that is 5 centimeters in length.

   b. Draw a line that is 5 inches in length.

6. a. Draw a line that is 7 inches in length.

   b. Draw a line that is 7 centimeters in length.

7. Takeesha drew a line 9 centimeters long. Damani drew a line 4 inches long. Takeesha says her line is longer than Damani's because 9 is greater than 4. Explain why Takeesha might be wrong.

   _____

   _____

   _____

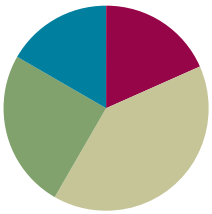
8. Draw a line that is 9 centimeters long and a line that is 4 inches long to prove that Takeesha is wrong.

Lesson 19

Objective: Measure to compare the differences in lengths using inches, feet, and yards.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Concept Development	(24 minutes)
Application Problem	(15 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Subtraction from Tens **2.NBT.5** (2 minutes)
- Sprint: Subtraction Patterns **2.OA.2, 2.NBT.5** (9 minutes)

Subtraction from Tens (2 minutes)

Note: This fluency activity reviews mental math strategies within 100 and subtraction of 9 or 8 from any number.

T: When I say a basic fact, you add 10 to the whole and continue until I say to stop. So, after 11 – 9, you would solve 21 – 9 and then…?

S: 31 – 9, 41 – 9, 51 – 9.

T: Yes. Solve as many as you can on your personal white board before I give the signal to stop. Let's begin. 11 – 9.

When every student has completed at least two problems, stop the class, and give the next expression.

Continue with the following possible sequence: 12 – 8, 11 – 8, and 13 – 9.

Sprint: Subtraction Patterns (9 minutes)

Materials: (S) Subtraction Patterns Sprint

Note: Students practice subtraction to gain mastery of the sums and differences within 20 and see relationships with higher numbers.

Concept Development (24 minutes)

Materials: (T) Piece of butcher paper (30 inches × 18 inches), 1 student desk (18 inches × 24 inches), 12-inch ruler, yardstick, piece of string (7 feet long) (S) Personal white board

Note: The dialogue below uses hypothetical measurements. The length of the string should be about 10 to 15 feet shorter than the length of the classroom wall. The Application Problem should be completed before sending students off to work on the Problem Set. (The Problem Set time has been added to the Application Problem.)

T: I want to cover this desk in paper. I need to know if the paper is long enough. I need a few extra inches on each side to tape it down. Let's figure out if I have enough paper.

T: What do we need to do to see if the paper is the right size?

S: Measure both the desktop and the paper. → Put the paper on the desk to make sure the paper is longer than the desk. → Use a ruler or a yardstick to measure both lengths.

T: Good ideas! Let's measure the desktop and the paper. (Call a student volunteer to measure the paper and another to measure the table.)

T: What measurement tool do you think they should use to measure the paper and the desk? Why? Talk to your partner.

S: A yardstick because I can see that the paper and the desk are both longer than a 12-inch ruler. → We won't have to measure and advance so many times if we use a yardstick. → We can use the yardstick but use inches to actually measure.

MP.5

T: If we use the yardstick, why don't we have to measure in yards? Talk to your partner.

S: We can choose inches, feet, or yards. → We can do what we want. It just depends on what we are measuring. → The yardstick can be used to measure yards, but we only need inches for the desk.

S: (Volunteers measure the paper and the desktop with a yardstick.)

T: How long is the desktop?

S: 24 inches.

T: (Record the measurement.) How long is the paper?

S: 30 inches.

T: (Record the measurement.) Which is longer?

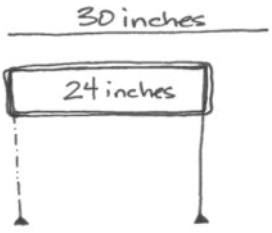
S: The paper!

T: Turn and talk. How much longer is the paper, and how do you know?

S: The paper is 6 inches longer because 30 – 24 is 6. → It's 6 inches longer because 24 + 6 = 30.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Support the oral practice of English language learners by providing them with sentence frames to help in turn-and-talk with partners: "The ____ is _____ longer/shorter than the _____ because _____." Post the sentence starters so that they can easily refer to them.



$30 - 24 = \square$

$24 + \square = 30$

T: (Record the difference in the two lengths as a number sentence.) Do we have enough paper to cover the desktop?

S: Yes!

Invite students to measure and compare the lengths of objects around the classroom, such as: journal and pencil, crayon and pink eraser, and marker and scissors. Have them record each length and the difference in lengths as they go. Each time, they should compare the two lengths and describe the difference using a number sentence.

T: Can you help me with one more thing? I would like to use this string to hang our work along the wall. How can we figure out if we have enough string?

S: Measure the string and the wall.

T: Which measurement tool should we use?

S: The yardstick!

T: We know we don't have to measure in yards. What unit should we use this time?

S: Inches! → Feet! → Yards!

T: First, let's measure both lengths in feet so we can be more precise than we could be using yards. The number of inches would be too much! Let's say there is a measurement between 4 and 5 feet. Do you remember what to do if our measurement falls in between the foot hash marks?

S: If it is more than halfway, we say it is about 5 feet. If it is less than halfway, we say it is about 4 feet.

T: Good! (Call on a few student volunteers to measure the length of the wall and the length of the string.) While these students are measuring silently, it is everyone's job to tally the number of feet as they go.

T: (Allow students time to measure the string.) How long is the string?

S: 17 feet.

T: (Record the measurement.)

T: (Allow students time to measure the wall.) How long is the wall?

S: 32 feet.

T: (Record the measurement.)

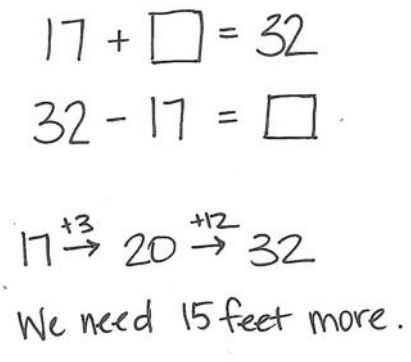
T: Uh-oh. We need more string. Turn and talk: How can we figure out how much more string we need?

S: Subtract! → Add on from 17 to get to 32.

T: (Write the number sentences on the board as shown to the right.)

T: Count on from 17 to figure out how much more string we need.

S: Seventeen plus 3 is 20, plus 12 more is 32. We need 15 more feet.



Repeat this activity, this time measuring the string and the wall using yards. Students should again compare the two lengths and describe the difference using a number sentence.

T: What was the difference between the length of the string and the length of the wall when we measured in feet?

S: 15 feet.

T: What was the difference between the length of the string and the length of the wall when we measured in yards?

S: 5 yards.

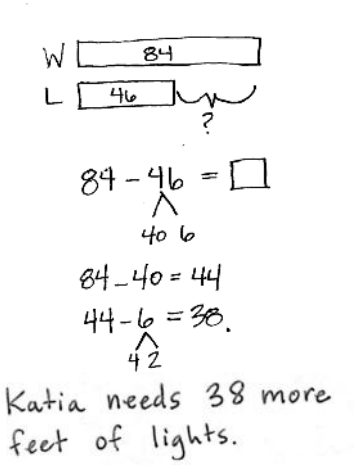
T: Did the length of the string or the wall change? Why are the differences so different?

S: No! Feet and yards are different. → We used a different unit each time. → Feet are smaller than yards, so we need more of them to cover the same distance.

Application Problem (15 minutes)

Katia is hanging decorative lights. The strand of lights is 46 feet long. The building wall is 84 feet long. How many more feet of lights does Katia need to buy to equal the length of the wall?

Note: This Application Problem provides practice with comparing the difference between measurements without making the measurement. When students finish, invite them to share their reasoning with either the whole group or with partners.



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Challenge students working above grade level by asking them what would happen if Katia is asked to hang two strings of lights on the building wall. How many more yards of lights will she have to buy? Ask students to explain what strategies they used to find the answer.

Student Debrief (10 minutes)

Lesson Objective: Measure to compare the differences in lengths using inches, feet, and yards.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

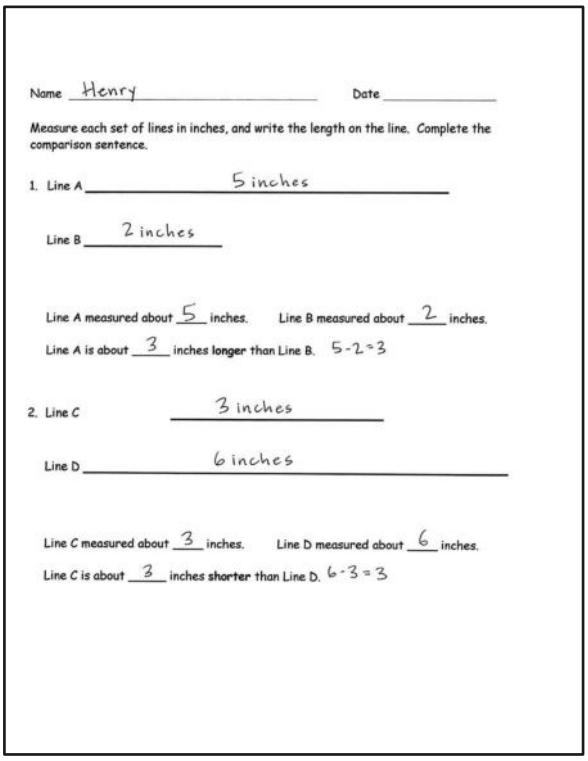
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- When you measured the lines on your Problem Set, did the endpoint fall exactly on an inch hash mark? Talk to your partner about what you did if the endpoints of the lines fell between inch hash marks.
- Look at Problem 4 on your Problem Set. Tell your partner how long Martha's fence is. Did anyone have a measurement smaller than 54 yards? Without doing any calculations, how do you know that this is incorrect?
- Today in the lesson when we were measuring and comparing lengths, how did you decide which tool to use? Talk to your partner about when and why you would choose a 12-inch ruler instead of a yardstick, or a yardstick instead of a 12-inch ruler.
- Sometimes we choose to measure in yards, other times in feet, and yet others in inches or centimeters. Talk to your partner about when you might measure using each of these units. (I would use yards for a football field, feet for a wall, inches for a book, and centimeters for a bean.)
- What strategies did you use to solve the Application Problem? How many more yards of lights does Katia need?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



Name Henry Date

Measure each set of lines in inches, and write the length on the line. Complete the comparison sentence.

1. Line A 5 inches

Line B 2 inches

Line A measured about 5 inches. Line B measured about 2 inches.

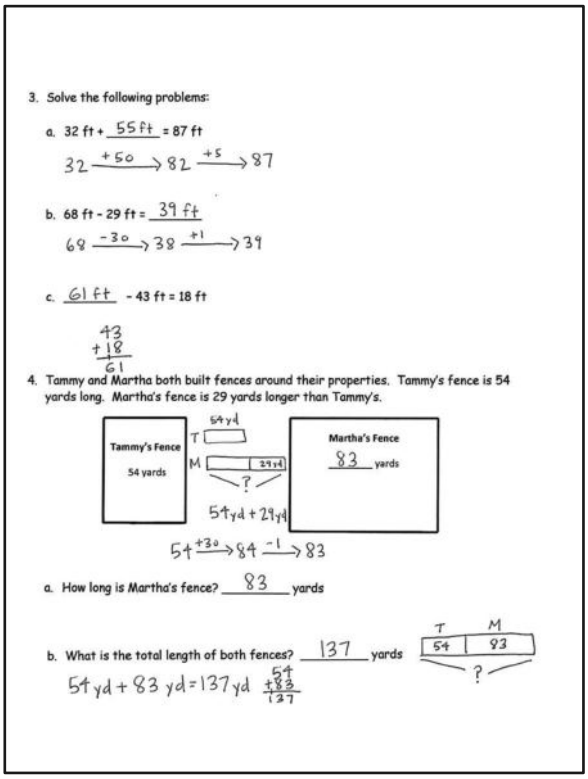
Line A is about 3 inches longer than Line B. 5-2=3

2. Line C 3 inches

Line D 6 inches

Line C measured about 3 inches. Line D measured about 6 inches.

Line C is about 3 inches shorter than Line D. 6-3=3



3. Solve the following problems:

a. 32 ft + 55 ft = 87 ft

32 +50→ 82 +5→ 87

b. 68 ft - 29 ft = 39 ft

68 -30→ 38 +1→ 39

c. 61 ft - 43 ft = 18 ft

43 + 18 = 61

4. Tammy and Martha both built fences around their properties. Tammy's fence is 54 yards long. Martha's fence is 29 yards longer than Tammy's.

Tammy's Fence 54 yards

T 54 yd

M 29 yd ?

Martha's Fence 83 yards

54 yd + 29 yd

54 +30→ 84 -1→ 83

a. How long is Martha's fence? 83 yards

b. What is the total length of both fences? 137 yards

54 yd + 83 yd = 137 yd 54 + 83 = 137

T 54 M 83 ?

A

Number Correct: _____

Subtraction Patterns

1.	10 – 1 =	
2.	10 – 2 =	
3.	20 – 2 =	
4.	40 – 2 =	
5.	10 – 2 =	
6.	11 – 2 =	
7.	21 – 2 =	
8.	51 – 2 =	
9.	10 – 3 =	
10.	11 – 3 =	
11.	21 – 3 =	
12.	61 – 3 =	
13.	10 – 4 =	
14.	11 – 4 =	
15.	21 – 4 =	
16.	71 – 4 =	
17.	10 – 5 =	
18.	11 – 5 =	
19.	21 – 5 =	
20.	81 – 5 =	
21.	10 – 6 =	
22.	11 – 6 =	

23.	21 – 6 =	
24.	91 – 6 =	
25.	10 – 7 =	
26.	11 – 7 =	
27.	31 – 7 =	
28.	10 – 8 =	
29.	11 – 8 =	
30.	41 – 8 =	
31.	10 – 9 =	
32.	11 – 9 =	
33.	51 – 9 =	
34.	12 – 3 =	
35.	82 – 3 =	
36.	13 – 5 =	
37.	73 – 5 =	
38.	14 – 6 =	
39.	84 – 6 =	
40.	15 – 8 =	
41.	95 – 8 =	
42.	16 – 7 =	
43.	46 – 7 =	
44.	68 – 9 =	

B

Number Correct: _____

Improvement: _____

Subtraction Patterns

1.	10 – 2 =	
2.	20 – 2 =	
3.	30 – 2 =	
4.	50 – 2 =	
5.	10 – 2 =	
6.	11 – 2 =	
7.	21 – 2 =	
8.	61 – 2 =	
9.	10 – 3 =	
10.	11 – 3 =	
11.	21 – 3 =	
12.	71 – 3 =	
13.	10 – 4 =	
14.	11 – 4 =	
15.	21 – 4 =	
16.	81 – 4 =	
17.	10 – 5 =	
18.	11 – 5 =	
19.	21 – 5 =	
20.	91 – 5 =	
21.	10 – 6 =	
22.	11 – 6 =	

23.	21 – 6 =	
24.	41 – 6 =	
25.	10 – 7 =	
26.	11 – 7 =	
27.	51 – 7 =	
28.	10 – 8 =	
29.	11 – 8 =	
30.	61 – 8 =	
31.	10 – 9 =	
32.	11 – 9 =	
33.	31 – 9 =	
34.	12 – 3 =	
35.	92 – 3 =	
36.	13 – 5 =	
37.	43 – 5 =	
38.	14 – 6 =	
39.	64 – 6 =	
40.	15 – 8 =	
41.	85 – 8 =	
42.	16 – 7 =	
43.	76 – 7 =	
44.	58 – 9 =	

Name _____ Date _____

Measure each set of lines in inches, and write the length on the line. Complete the comparison sentence.

1. Line A _____

   Line B _____

   Line A measured about _____ inches. Line B measured about _____ inches.

   Line A is about _____ inches **longer** than Line B.

2. Line C _____

   Line D _____

   Line C measured about _____ inches. Line D measured about _____ inches.

   Line C is about _____ inches **shorter** than Line D.

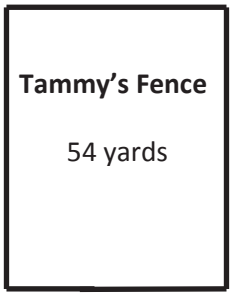
3. Solve the following problems:

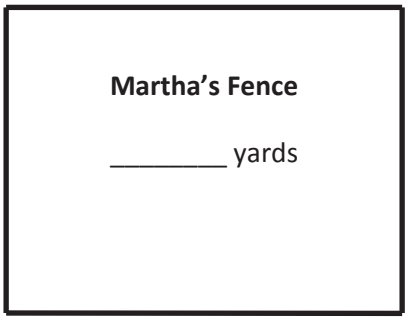
   a. 32 ft + _____ = 87 ft

   b. 68 ft – 29 ft = _____

   c. _____ – 43 ft = 18 ft

4. Tammy and Martha both built fences around their properties. Tammy's fence is 54 yards long. Martha's fence is 29 yards longer than Tammy's.





   a. How long is Martha's fence? _____ yards

   b. What is the total length of both fences? _____ yards

Name _____ Date _____

Measure the set of lines in inches, and write the length on the line. Complete the comparison sentence.

Line A _____

Line B _____

Line A measured about _____ inches. Line B measured about _____ inches.

Line A is about _____ inches **longer/shorter** than Line B.

Name _____ Date _____

Measure each set of lines in inches, and write the length on the line. Complete the comparison sentence.

1. Line A _____

   Line B _____

   Line A measured about _____ inches. Line B measured about _____ inches.

   Line A is about _____ inches **longer** than Line B.

2. Line C _____

   Line D _____

   Line C measured about _____ inches. Line D measured about _____ inches.

   Line D is about _____ inches **shorter** than Line C.

3. Solve. Check your answers with a related addition or subtraction sentence.

   a. 8 inches – 5 inches = _____ inches

      _____ inches + 5 inches = 8 inches

b. 8 centimeters + _____ centimeters = 19 centimeters

c. 17 centimeters – 8 centimeters = _____ centimeters

d. _____ centimeters + 6 centimeters = 18 centimeters

e. 2 inches + _____ inches = 7 inches

f. 12 inches - _____ = 8 inches

Topic E

Problem Solving with Customary and Metric Units

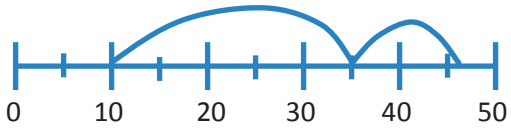
2.MD.5, **2.MD.6,** 2.NBT.2, 2.NBT.4, 2.NBT.5

Focus Standards:		2.MD.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
		2.MD.6	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.
Instructional Days:		3	
Coherence	**-Links from:**	G2–M2	Addition and Subtraction of Length Units
		G2–M3	Place Value, Counting, and Comparison of Numbers to 1,000
	-Links to:	G3–M2	Place Value and Problem Solving with Units of Measure

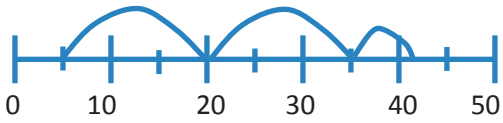
In Topic E Lesson 20, students use drawings to compare lengths and write equations with an unknown to represent problems, just as they did in Module 2 (**2.MD.5**). In this lesson, however, students solve *two-digit* addition and subtraction measurement problems using customary *or* metric units, composing or decomposing a ten, if necessary. Just as they made comparisons and found differences using bar graphs in Topic A, students now compare lengths using the tape diagram, essentially a horizontal bar, to solve two-step problems. For example, "Frankie has a 54-inch piece of rope and another piece that is 18 inches shorter than the first. What is the total length of both ropes?" Students also solve problems in the context of geometry to find the missing lengths of a rectangle or triangle.

Building upon their understanding of length, students represent whole numbers as lengths on a number line (**2.MD.6**) in Lesson 21. Students identify unknown numbers by using mental benchmarks or reference points (e.g., 5, 10, 25, 50) and intervals of 1, 5, or 10. For example, on a number line with 6 equally spaced segments and endpoints 20 and 50, a student marks the middle segment as 35, realizing that 20 to 35 and 35 to 50 are the same distance, or length. Problems increase in complexity as students use their understanding of place value and the distance between positions to label points. For example, they label 340 as one endpoint when 350 is the midpoint and 360 is the other endpoint.

In Lesson 22, students represent two-digit sums and differences on a number line (**2.MD.6**) and write a number sentence to represent the addition or subtraction situation. For example, they solve the following problems using a number line marked with endpoints 0 and 50, marked intervals of 10 yards, and unmarked intervals of 5. "On a football field, Pepe starts running at the 10-yard line. He runs 25 yards, pauses, and runs 11 more yards. Which yard line is Pepe on now? How far has he run?" In comparison, "Marcel starts running at the 5-yard line. He runs 15 yards, pauses, runs 15 more yards, stumbles, and runs 6 more yards. Which yard line is Marcel on now? How far has he run?" Students show how they solve these problems on the number line with different starting points, and they consider how two different measurement situations can result in the same total and are thus equal to each other (e.g., 25 + 11 = 15 + 15 + 6), as shown below.



25 + 11 = 36



15 + 15 + 6 = 36

A Teaching Sequence Toward Mastery of Problem Solving with Customary and Metric Units

Objective 1: **Solve two-digit addition and subtraction word problems involving length by using tape diagrams and writing equations to represent the problem. (Lesson 20)**

Objective 2: **Identify unknown numbers on a number line diagram by using the distance between numbers and reference points. (Lesson 21)**

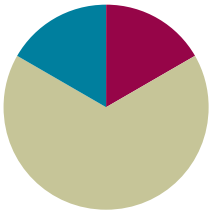
Objective 3: **Represent two-digit sums and differences involving length by using the ruler as a number line. (Lesson 22)**

Lesson 20

Objective: Solve two-digit addition and subtraction word problems involving length by using tape diagrams and writing equations to represent the problem.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Concept Development	(40 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



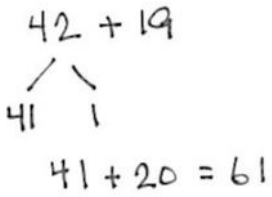
Fluency Practice (10 minutes)

- Compensation **2.NBT.5** (2 minutes)
- Sprint: Subtraction Patterns **2.OA.2, 2.NBT.5** (8 minutes)

Compensation (2 minutes)

Note: This fluency activity reviews the mental math strategy of compensation. By making a multiple of 10, students solve a much simpler addition problem. Draw a number bond for the first problem on the board to help students visualize the decomposition.

T: (Write 42 + 19 = _____.) Let's use a mental math strategy to add.
T: How much more does 19 need to make the next ten?
S: 1 more.
T: Where can 19 get 1 more from?
S: From the 42.
T: Take 1 from 42, and give it to 19. Say the new number sentence with the answer.
S: 41 + 20 = 61.
T: 37 + 19.
S: 36 + 20 = 56.



Continue with the following possible sequence: 29 + 23, 38 + 19, 32 + 19, 24 + 18, and 34 + 18.

Sprint: Subtraction Patterns (8 minutes)

Materials: (S) Subtraction Patterns Sprint

Note: Students practice subtraction to gain mastery of the sums and differences within 20 and identify relationships with higher numbers.

Concept Development (40 minutes)

Materials: (S) Personal white board, Problem Set

Note: For today's lesson, the Application Problem and the Problem Set are embedded in the Concept Development. The Problem Set is designed so that there is a "we do" and a "you do" portion.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Scaffold the lesson for students who are working below grade level by using adding machine tape or sentence strips to measure, cut, and compare actual lengths. Students can then measure the difference between how long Mr. Ramos wants his scarf to be and the length of what he has knit so far (19 in). Make sure that students line up the zero point as they compare the two lengths.

Part 1: Solve a *difference unknown* type problem.

Mr. Ramos has knitted 19 inches of a scarf he wants to be 1 yard long. How many more inches of scarf does he need to knit? (This is Problem 1 on the Problem Set.)

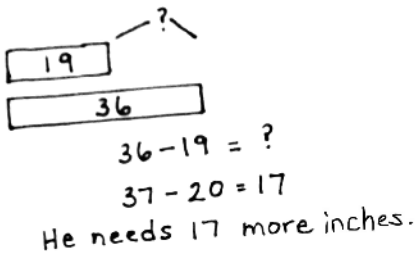
T: Let's read through Problem 1 together.

T/S: (Read aloud.)

T: What can we draw?

S: The scarf now and when he is done. → A tape diagram.

T: Great! I'll give you a minute to draw quietly. When I give the signal, talk to your partner about how your drawing matches the story (as shown on the right).



T: Turn and talk: Look at your drawing. What are you trying to find? Put a question mark to show the part we are trying to figure out.

MP.1

S: (Work.)

T: Why did you put 36 in the tape showing the finished scarf?

S: Because 1 yard is 36 inches. → To find the answer, we have to change 1 yard to 36 inches.

T: Yes! We can compare these lengths just like we compared data using bars in our graphs. (Draw the tape diagram on the board.)

T: Now, write a number sentence and statement to match your work. (Pause while students work.) Explain to your partner how you solved the problem.

S: I wrote 19 + ____ = 36. I counted up 1 to make 20 and then added 16 more to reach 36, and 1 and 16 is 17. → I wrote 36 – 19 = ? I added 1 to both numbers so I wouldn't have to rename. And 37 – 20 = 17.

T: Tell your partner the answer in a statement.

MP.1

S: He needs to knit 17 more inches.

T: Use what we have practiced to complete Problem 2 on your Problem Set by yourself.

Let students work independently on the next problem. Have them compare with a partner when they are finished. Circulate to give support to those students who need it.

Part 2: Solve a two-step problem with a *compare with smaller unknown* type problem as one step.

Frankie has a 64-inch piece of rope and another piece that is 18 inches shorter than the first. What is the total length of both ropes? (This is Problem 3 on the Problem Set.)

T: Let's read this problem together.

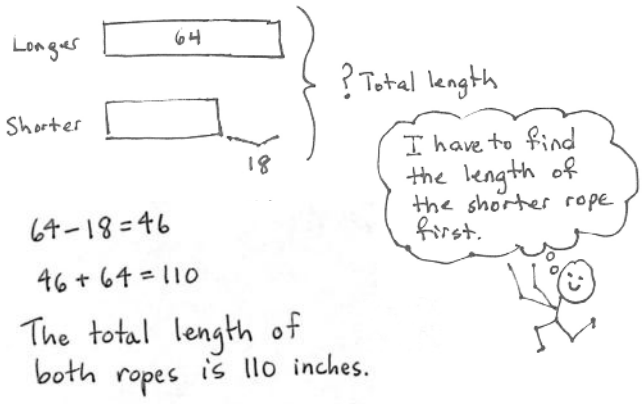
T: Do we know how long each rope is?

S: No. → We know how long one of the ropes is, 64 inches. → We don't know how long the shorter rope is.

T: That's right. Our first step is to find out the length of the shorter rope to answer the question. Then, we can answer the question.

T: What can we draw?

S: The ropes. → A tape diagram.



T: Yes. Let's do this one together. First, let's draw a tape diagram that shows how to find the length of the shorter rope. Remember to put a question mark to show what is missing.

Circulate and guide students to understand that 18 inches is not the length of the shorter rope; rather, it is the difference. Also, guide students to place the question mark not within the tape of the shorter rope but where it shows the total length of both ropes.

T: Turn and talk: How did you label your drawing? Where did you write the 18? Where did you write your question mark?

S: (Share.)

T: Find the length of the shorter rope by writing an equation and telling the answer to your partner in a statement.

S: (Solve using a subtraction strategy, and check the answer with a partner.)

T: What is the length of the shorter rope?

S: 46 inches!

T: Did the problem ask how long the shorter rope is?

S: No.

T: Write a number sentence and statement to answer the question. (Have students share their number sentences and statements once they are finished working.)

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

English language learners might get confused about the difference between *short* and *shorter*. To compare the two words, use sets of objects to illustrate the difference. Have students practice saying the words as they pick out the shorter objects until they are successful.

T: Excellent. The next problem also has two steps. Work on Problem 4 by yourself. When you are done, explain your solution path to your partner.

Let students work independently on the next problem. Have them compare with a partner when they are finished. Circulate to give support to those students who need it.

Part 3: Solve a *put together* problem involving geometry.

The total length of all three sides of a triangle is 96 feet. The triangle has two sides that are the same length. One of the equal sides measures 40 feet. What is the length of the side that is not equal? (This is Problem 5 on the Problem Set.)

T: Let's read this problem together.

T/S: (Read aloud.)

T: Hmm. This is a lot of information.

T: What can we draw?

S: A triangle!

T: What do we know about this triangle?

S: Two sides are the same length!

T: (Draw a triangle with three very unequal sides.) Did I draw it right?

Isosceles Triangle

S: No!

T: Why?

S: It has to have two sides that are equal!

T: Is this better? (Draw an isosceles triangle.)

S: Yes.

T: Draw a triangle with two sides that are the same length on your personal white board.

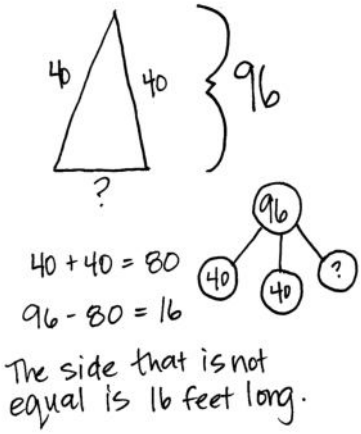
S: (Draw.)

T: Now, let's go back and read the problem and put the information it gives us on our triangle.

T: What does the first part say?

S: All three sides of the triangle put together are 96 feet.

T: Label your drawing to show that the total length of the sides of the triangle is 96 feet. Let's not write the units on our drawing for today. Just label it simply as 96.



S: (Work.)

T: Good. What is the next piece of information?

S: We know the length of one of the equal sides, 40 feet.

T: Yes. Label 40 on your picture. Since we know the length of one equal side, can we add more information to our picture that wasn't written in the problem?

S: Yes! Since the two sides of the triangle are equal, that means their length is equal also, so the other equal side of the triangle is 40 feet, too!

T: Very nice reasoning skills. Sometimes we can figure out more information even if it is not written down in the problem.

T: The last piece of information we have to label on our picture is a question mark to label what we are trying to figure out. What are we trying to figure out?

S: The length of the side of the triangle that is not equal to the others.

T: Good. Do that now.

S: (Work.)

T: What is the length of the missing side of the triangle?

S: 16 feet!

T: What did you do to find that out? Talk to your partner.

S: I subtracted both of the sides we know the length of from 96. → I added the sides we know the length of and then subtracted it from the total 96. → I added the sides and then counted up to 96.

T: Good. All of the solutions I heard involved doing two steps.

T: It's time to try one on your own. Work on Problem 6 on your Problem Set.

Let students work independently on the next problem. Have them compare with a partner when they are finished. Circulate to give support to those students who need it.

Student Debrief (10 minutes)

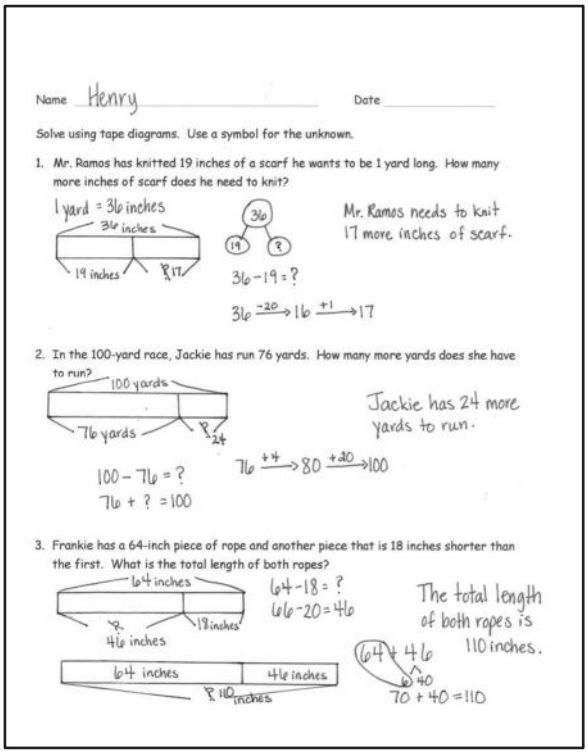
Lesson Objective: Solve two-digit addition and subtraction word problems involving length by using tape diagrams and writing equations to represent the problem.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

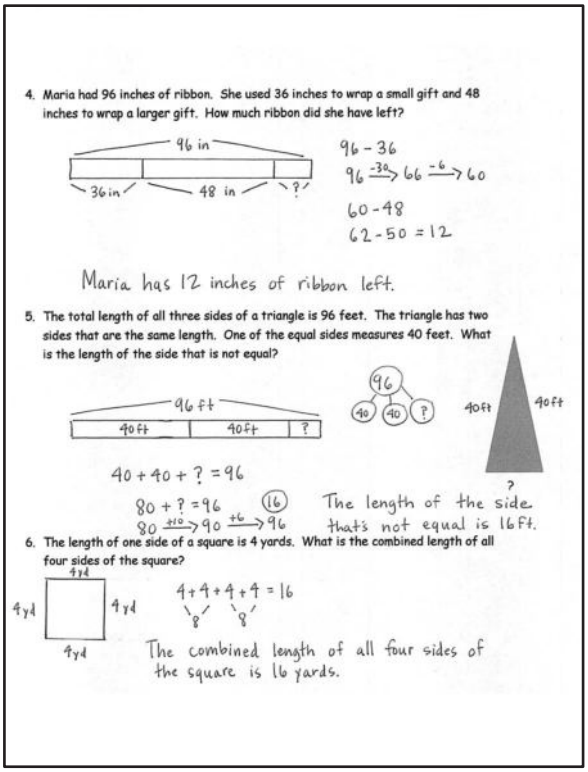
- Look at the first page of your Problem Set. How many number sentences did it take to solve Problem 1? How many number sentences did it take to solve Problems 2 and 3? Why is it important to reread the problem?



- Explain your solution path for Problem 4 to your partner. Did your partner do the same thing as you? Can you understand how your partner got his answer?
- Look at the triangle problem. Raise your hand if you used only addition. Raise your hand if you used addition and subtraction. (Discuss both solution paths. First, 40 + 40 = 80. Then, 80 +___ = 96 or 96 – 80 = ___.)
- Sometimes there is more than one part in our math problems. Tell your partner a math story with more than one part. Use your Problem Set to help you get started.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



A

Number Correct: _____

Subtraction Patterns

1.	8 – 1 =	
2.	18 – 1 =	
3.	8 – 2 =	
4.	18 – 2 =	
5.	8 – 5 =	
6.	18 – 5 =	
7.	28 – 5 =	
8.	58 – 5 =	
9.	58 – 7 =	
10.	10 – 2 =	
11.	11 – 2 =	
12.	21 – 2 =	
13.	61 – 2 =	
14.	61 – 3 =	
15.	61 – 5 =	
16.	10 – 5 =	
17.	20 – 5 =	
18.	30 – 5 =	
19.	70 – 5 =	
20.	72 – 5 =	
21.	4 – 2 =	
22.	40 – 20 =	

23.	41 – 20 =	
24.	46 – 20 =	
25.	7 – 5 =	
26.	70 – 50 =	
27.	71 – 50 =	
28.	78 – 50 =	
29.	80 – 40 =	
30.	84 – 40 =	
31.	90 – 60 =	
32.	97 – 60 =	
33.	70 – 40 =	
34.	72 – 40 =	
35.	56 – 4 =	
36.	52 – 4 =	
37.	50 – 4 =	
38.	60 – 30 =	
39.	90 – 70 =	
40.	80 – 60 =	
41.	96 – 40 =	
42.	63 – 40 =	
43.	79 – 30 =	
44.	76 – 9 =	

B

Number Correct: _____

Improvement: _____

Subtraction Patterns

1.	7 – 1 =	
2.	17 – 1 =	
3.	7 – 2 =	
4.	17 – 2 =	
5.	7 – 5 =	
6.	17 – 5 =	
7.	27 – 5 =	
8.	57 – 5 =	
9.	57 – 6 =	
10.	10 – 5 =	
11.	11 – 5 =	
12.	21 – 5 =	
13.	61 – 5 =	
14.	61 – 4 =	
15.	61 – 2 =	
16.	10 – 2 =	
17.	20 – 2 =	
18.	30 – 2 =	
19.	70 – 2 =	
20.	71 – 2 =	
21.	5 – 2 =	
22.	50 – 20 =	

23.	51 – 20 =	
24.	56 – 20 =	
25.	8 – 5 =	
26.	80 – 50 =	
27.	81 – 50 =	
28.	87 – 50 =	
29.	60 – 30 =	
30.	64 – 30 =	
31.	80 – 60 =	
32.	85 – 60 =	
33.	70 – 30 =	
34.	72 – 30 =	
35.	76 – 4 =	
36.	72 – 4 =	
37.	70 – 4 =	
38.	80 – 40 =	
39.	90 – 60 =	
40.	60 – 40 =	
41.	93 – 40 =	
42.	67 – 40 =	
43.	78 – 30 =	
44.	56 – 9 =	

Name _____ Date _____

Solve using tape diagrams. Use a symbol for the unknown.

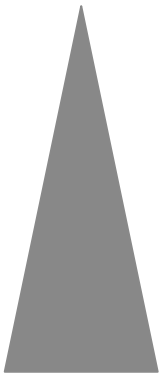
1. Mr. Ramos has knitted 19 inches of a scarf he wants to be 1 yard long. How many more inches of scarf does he need to knit?

2. In the 100-yard race, Jackie has run 76 yards. How many more yards does she have to run?

3. Frankie has a 64-inch piece of rope and another piece that is 18 inches shorter than the first. What is the total length of both ropes?

4. Maria had 96 inches of ribbon. She used 36 inches to wrap a small gift and 48 inches to wrap a larger gift. How much ribbon did she have left?

5. The total length of all three sides of a triangle is 96 feet. The triangle has two sides that are the same length. One of the equal sides measures 40 feet. What is the length of the side that is not equal?



6. The length of one side of a square is 4 yards. What is the combined length of all four sides of the square?

Name _____ Date _____

Solve using a tape diagram. Use a symbol for the unknown.

Jasmine has a jump rope that is 84 inches long. Marie's is 13 inches shorter than Jasmine's. What is the length of Marie's jump rope?

Name _____ Date _____

Solve using tape diagrams. Use a symbol for the unknown.

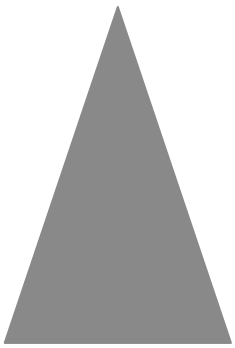
1. Luann has a piece of ribbon that is 1 yard long. She cuts off 33 inches to tie a gift box. How many inches of ribbon are not used?

2. Elijah runs 68 yards in a 100-yard race. How many more yards does he have to run?

3. Chris has a 57-inch piece of string and another piece that is 15 inches longer than the first. What is the total length of both strings?

4. Janine knitted 12 inches of a scarf on Friday and 36 inches on Saturday. She wants the scarf to be 72 inches long. How many more inches does she need to knit?

5. The total length of all three sides of a triangle is 120 feet. Two sides of the triangle are the same length. One of the equal sides measures 50 feet. What is the length of the side that is not equal?



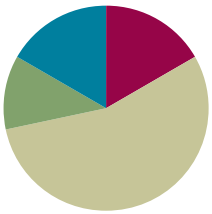
?

6. The length of one side of a square is 3 yards. What is the combined length of all four sides of the square?

Lesson 21

Objective: Identify unknown numbers on a number line diagram by using the distance between numbers and reference points.

Suggested Lesson Structure



Fluency Practice	(10 minutes)
Application Problem	(7 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Fluency Practice (10 minutes)

- Roll and Follow the Rule **2.OA.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Roll and Follow the Rule (5 minutes)

Materials: (S) 1 die per student or pair, math journal or notebook

Note: Give students a base number such as 9. They roll their die to find the "rule." For example, if they roll a 5, they add 5 repeatedly: 9 + 5 = 14, 14 + 5 = 19, 19 + 5 = 24. Students track their number sentences in their notebooks and count the total of number sentences they have written after 30 seconds. Continue the process with a different base number and/or operation.

Base numbers for addition: 38, 156, 291. Base numbers for subtraction: 40, 100.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

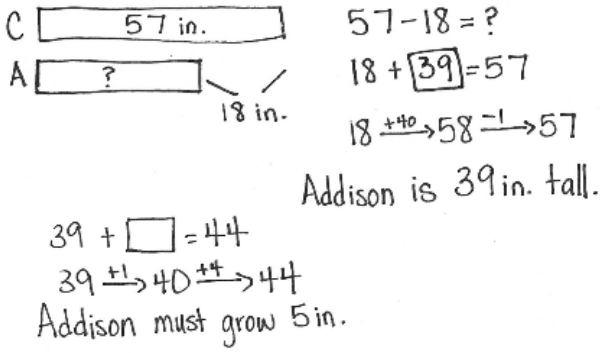
Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic E and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (7 minutes)

To ride the Mega Mountain roller coaster, riders must be at least 44 inches tall. Caroline is 57 inches tall. She is 18 inches taller than Addison. How tall is Addison? How many more inches must Addison grow to ride the roller coaster?

Note: This two-step word problem involving length, bridges the work done in the previous lesson with the number line work to follow. Encourage students to use the RDW process to solve and to write equations to represent the problem.



Concept Development (33 minutes)

Materials: (T) Meter strip (Template), ruler (S) Meter strip (Template), ruler, personal white board

Distribute the meter strip template and ruler to students.

Problem 1: Identify missing points on a number line with endpoints 30 and 50 and units of 5.

- T: What are the endpoints of your meter strip?
- S: Zero and 1 meter!
- T: 1 meter is how many centimeters?
- S: 100 centimeters!
- T: Let's change the endpoints. Partner A, put your finger on 30 centimeters. Partner B, put your finger on 50 centimeters.
- T: Let's draw a number line to represent this part of the meter strip.
- T: Use your meter strip as a ruler to make hash marks at 30 and 50 centimeters on your personal white boards.
- S: (Draw the hash marks.)
- T: Now, take away your meter strip, and use your ruler to connect your hash marks with a line.
- S: (Draw.)
- T: Label the hash mark on the left 30 and the hash mark on the right 50.
- T: We have used our meter strip to draw part of a number line. What are the endpoints of our number line? Let's just work with the numbers rather than continue to call the numbers centimeters.
- S: 30 and 50.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

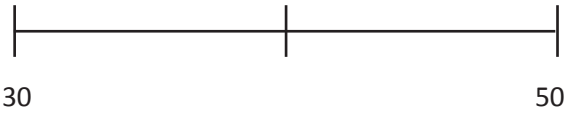
Students who are struggling can continue to use measuring tape for support, marking the intervals with additional paper clips or sliding their fingers along the tape while skip-counting. The continued use of the measuring tape helps students to focus more on the conceptual understanding of the activity.

T: Our left endpoint is often 0. Turn and talk: Where has 0 gone?

S: It didn't disappear; we just aren't using that part of the number line. → If I put my meter strip back, it's about over here.

T: It's like zooming in on a piece of the number line; the numbers to the left and right are not written down, but we could extend this out and see them if we needed or wanted to.

T: Watch as I draw a hash mark in the middle, equal distances from both endpoints. (Draw the hash mark.) The length between hash marks is a unit. Let's count the units together. (Use a finger to slide on the number line to show two equal units.)



S: (Chorally count.) 1, 2.

T: What number comes right in the middle of 30 and 50?

S: 40.

T: Label the middle hash mark 40 on your number line.

T: Watch as I make more equal units on my number line by drawing hash marks in the middle between 30 and 40 and between 40 and 50. (Draw two more hash marks. Label them A and B as shown below.) Make more equal units on your number line. (Allow students time to work.)

T: How many hash marks are on our number line?

S: Five!

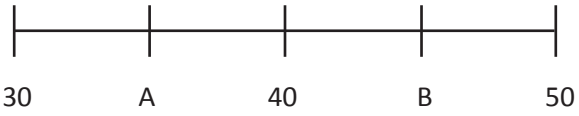
T: How many units do we have on our number line now?

S: Four! → Five!

T: The units are the lengths. Put your finger on 30, and let's slide straight from 30 to the next hash mark to count the units. We say "one" after we have gone the length from 30 to the next hash mark.

S: (Count the slides with fingers.) There are 4 units!

T: Good. Turn and talk: What are the values of Point A and Point B? How do you know? Label them.



MP.2

S: If the distance from 30 to 40 is 10, then Point A has to be 35 because it's in the middle. → I figured out that the distance from one hash mark to the next one is 5, so I counted by fives: 30, 35, 40, 45, 50. → Since 40 to 50 has a length of 10, Point B cuts the length in half, so each smaller distance has to be 5.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Support English language learners by posting the words *thirty, forty,* and *fifty* with their corresponding numerals. English language learners can easily confuse *thirty, forty,* and *fifty* with the pronunciation of *thirteen, fourteen,* and *fifteen*. Posting and referring to the visual clarifies any confusion that might arise.

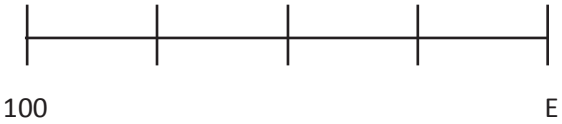
T: What is the length of each unit?

S: 5.

MP.2 T: What happens when we add the lengths of the units together on this part of the meter strip?

S: We get the total distance from 30 to 50. → 5 + 5 + 5 + 5 = 20, which is the total length. → I counted up: 5, 10, 15, 20.

Problem 2: Use the unit length to count up or down to figure out endpoints.



T: (Draw the number line above on the board.) Look at this number line. How many units are there?

S: Four!

T: If you know each equal unit length is 10, can you figure out the other endpoint, E?

S: Yes. Since we know the beginning endpoint is 100, we can count by tens until we get to E.

T: Good! What is the value of E?

S: 140.

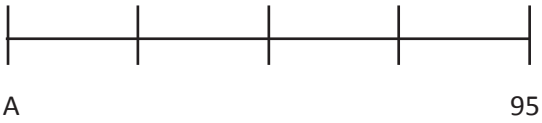
T: Yes. Let me label that on my number line. What is the difference in length between endpoints? Tell your partner how you can figure this out.

S: The difference is 40. I counted up by tens for 4 units. → The difference is 40. I subtracted the shorter endpoint from the longer endpoint, 140 – 100 = 40.

T: Good. I'm going to write the difference between endpoints on the side of my number line. (Don't erase from the board because it is needed to compare with the next number line.)

Problem 3: Vary the position of the unknown on the number line.

T: Now, draw a number line that is just the same as your other one on your personal white board with 4 units (5 hash marks) and a right endpoint of 95. Label the left endpoint with an A. Look at the number line on the board if you need help.



T: (As students draw, assist as necessary.)

T: If each equal unit length is 10, figure out the starting point, A.

S: (Count backward from 95 by tens to determine the value of A.)

T: What did you label Point A?

S: 55.

T: Good. Now that we know both endpoints, use one of the strategies we just talked about to find the difference in length between the endpoints on your number line, and then tell your partner.

T: What was the difference on this number line?

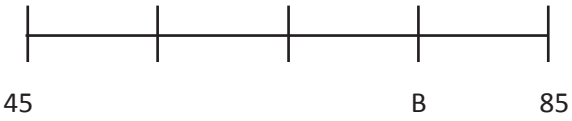
S: 40.

T: Now, look at your number line and the one that's on the board. Talk to your partner about what is the same and what is different.

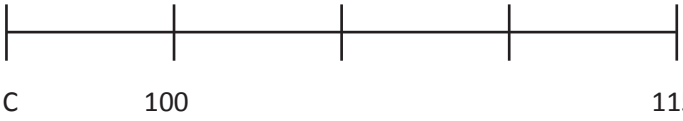
S: The endpoints are different. → Each number line has the same number of units. → Each unit was 10 on both number lines. → The difference between endpoints was the same.

Continue the work using a sequence of problems such as the following to prepare students for the Problem Set:

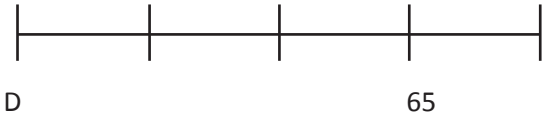
1. Find the value of Point B on the number line.



2. Find the value of Point C on the number line. What is the difference between the two endpoints?



3. Find the value of Point D on the number line. Each hash mark represents a value of 10. What is the distance between the two endpoints?



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

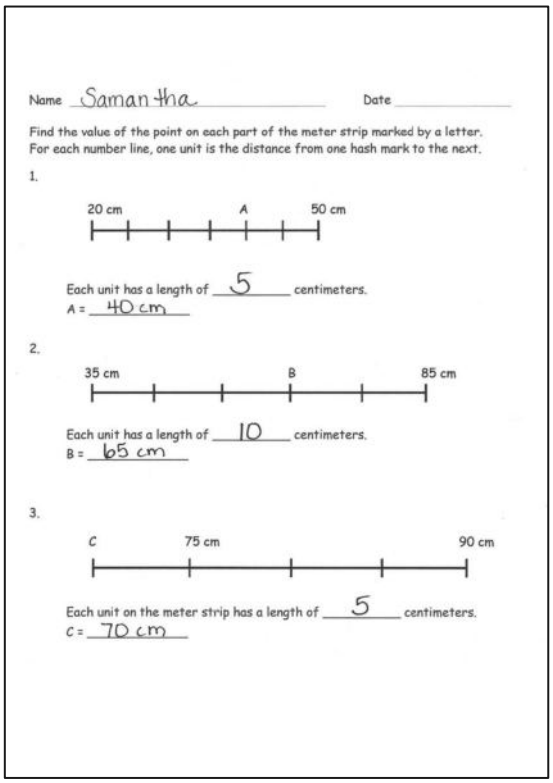
Lesson Objective: Identify unknown numbers on a number line diagram by using the distance between numbers and reference points.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the first number line on your Problem Set. Count the hash marks. (7.) Count the units. (6.) What do you notice? Look at the second number line, and compare how many hash marks to how many units. What do you notice?
- What do we count when we are counting units? (We count the spaces between the hash marks.) What do the hash marks do on a number line? (Separate the units and tell us where to write the reference points.)
- If you know the value of one unit on a number line, do you know the value of all of them?
- Look at the second number line on your Problem Set. Explain to your partner the strategy you used to find the value of each unit.
- Look at Problem 4 on your Problem Set. Explain to your partner how you found the difference between endpoints.
- On a yardstick, can you find two different sections that have the same difference between endpoints?



Name Samantha Date

Find the value of the point on each part of the meter strip marked by a letter. For each number line, one unit is the distance from one hash mark to the next.

1.

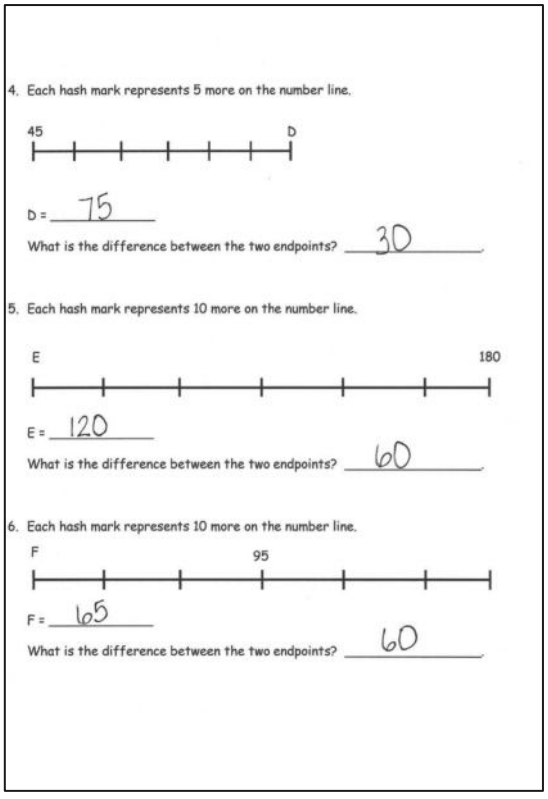
Each unit has a length of 5 centimeters.
A = 40 cm

2.

Each unit has a length of 10 centimeters.
B = 65 cm

3.

Each unit on the meter strip has a length of 5 centimeters.
C = 70 cm



4. Each hash mark represents 5 more on the number line.

D = 75

What is the difference between the two endpoints? 30

5. Each hash mark represents 10 more on the number line.

E = 120

What is the difference between the two endpoints? 60

6. Each hash mark represents 10 more on the number line.

F = 65

What is the difference between the two endpoints? 60

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

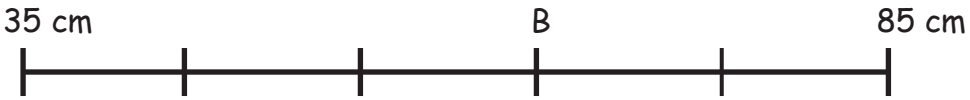
Find the value of the point on each part of the meter strip marked by a letter. For each number line, one unit is the distance from one hash mark to the next.

1.

Each unit has a length of _____ centimeters.

A = _____

2.



Each unit has a length of _____ centimeters.

B = _____

3.

Each unit on the meter strip has a length of _____ centimeters.

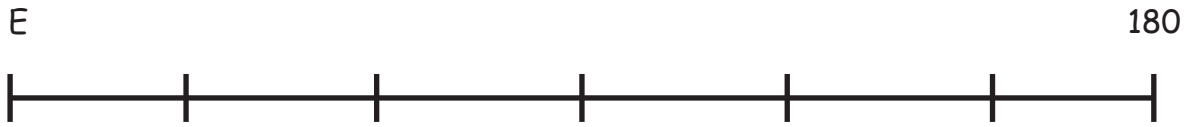
C = _____

4. Each hash mark represents 5 more on the number line.

D = _____

What is the difference between the two endpoints? _____.

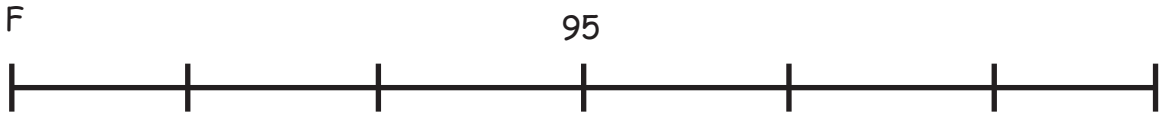
5. Each hash mark represents 10 more on the number line.



E = _____

What is the difference between the two endpoints? _____.

6. Each hash mark represents 10 more on the number line.



F = _____

What is the difference between the two endpoints? _____.

Name _____ Date _____

Find the value of the point on each number line marked by a letter.

1. Each unit has a length of _____ centimeters.

   A = _____

2. What is the difference between the two endpoints? _____.

   B = _____

Name _____ Date _____

Find the value of the point on each part of the meter strip marked by a letter. For each number line, one unit is the distance from one hash mark to the next.

1.

Each unit has a length of _____ centimeters.

A = _____

Each unit has a length of _____ centimeters.

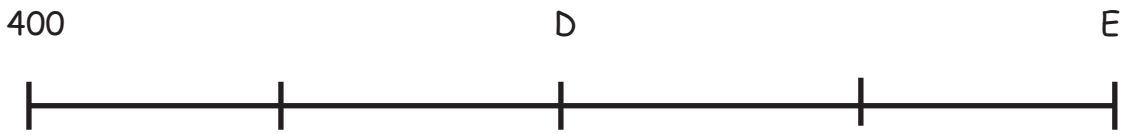
B = _____

2.

Each unit has a length of _____ centimeters.

C = _____

3. Each hash mark represents 5 more on the number line.



What is the difference between D and E? _____.

D = _____

E = _____

4. Each hash mark represents 10 more on the number line.

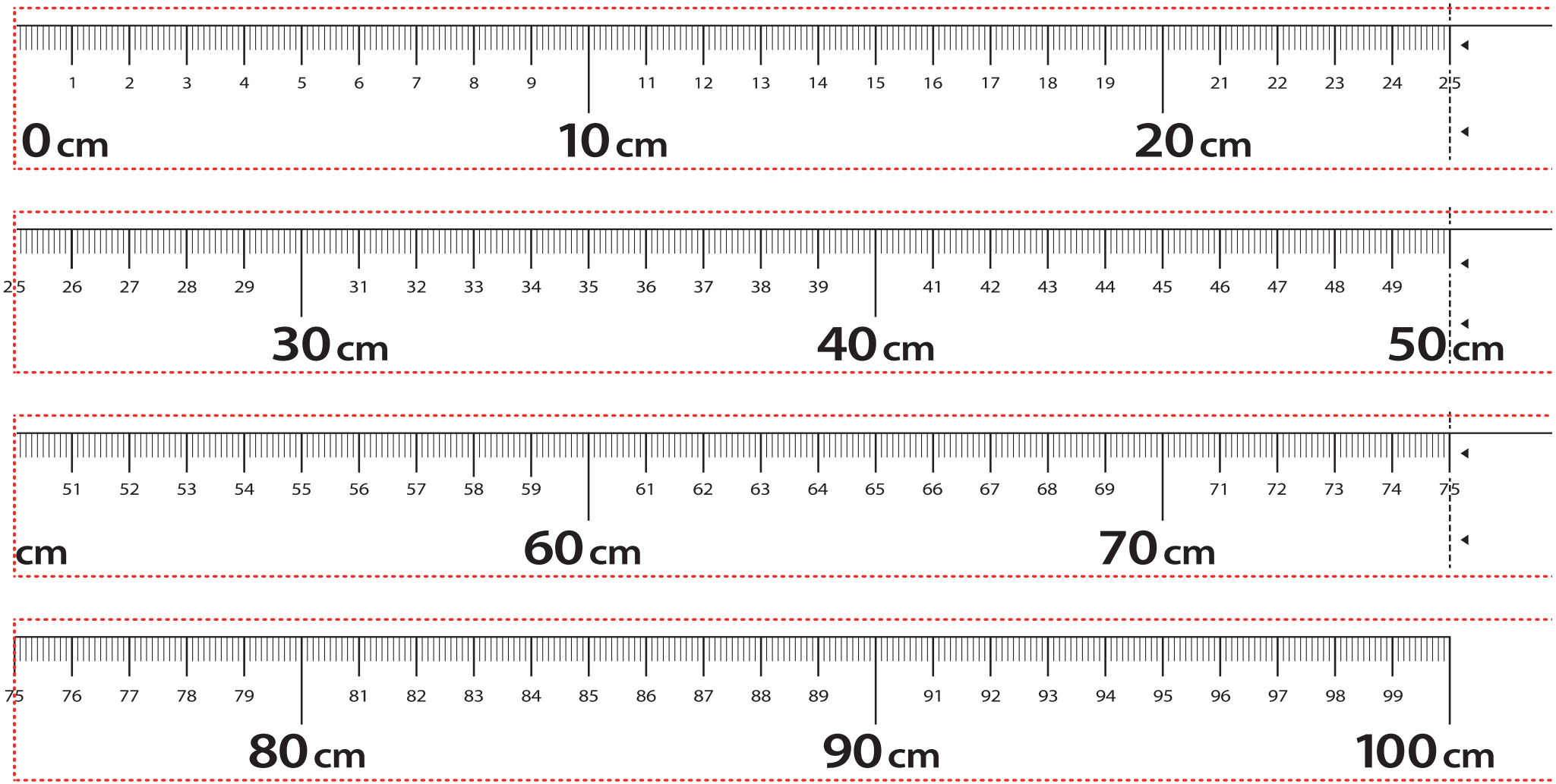
What is the difference between the two endpoints? _____.

F = _____

5. Each hash mark represents 10 more on the number line.

What is the difference between the two endpoints? _____.

G = _____



LEGEND ------ CUT – – – – ALIGN EDGE

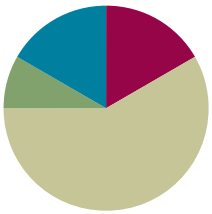
meter strip

Lesson 22

Objective: Represent two-digit sums and differences involving length by using the ruler as a number line.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(5 minutes)
Concept Development	(35 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Compensation **2.NBT.5, 2.NBT.7** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Compensation (5 minutes)

Note: This fluency drill reviews the mental math strategy of compensation. By making a multiple of 100, students solve a much simpler addition problem. Draw a number bond for the first problem on the board to help students visualize the decomposition.

T: (Write 420 + 190 = _____.) Let's use a mental math strategy to add. How much more does 190 need to make the next hundred?
S: 10 more.
T: Where can 190 get 10 more from?
S: From the 420.
T: Take 10 from 420 and give it to 190. Say the new number sentence with the answer.
S: 410 + 200 = 610.
T: 370 + 190.
S: 360 + 200 = 560.

Continue with the following possible sequence: 290 + 230, 380 + 190, 320 + 190, 240 + 180, and 340 + 180.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

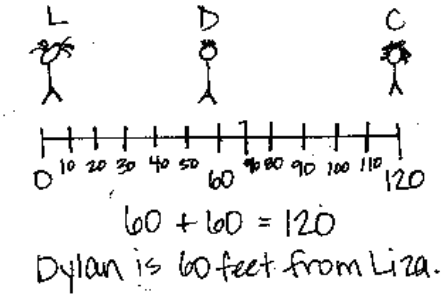
Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic E and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (5 minutes)

Liza, Cecilia, and Dylan are playing soccer. Liza and Cecilia are 120 feet apart. Dylan is in between them. If Dylan is standing the same distance from both girls, how many feet is Dylan from Liza?

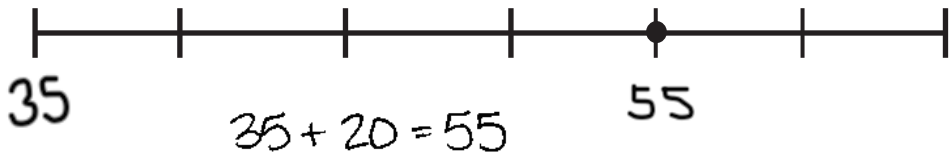
Note: In this problem, students synthesize their understanding of length by finding the middle point on a number line and realizing that the length from 0 to 60 feet is equal to the length from 60 to 120 feet. For example, students might draw a number line and count by tens and then estimate or use trial and error to find the midpoint. They might also simply think of 120 as 12 tens, so 6 tens is the middle point.



Concept Development (35 minutes)

Materials: (S) Number lines A and B (Template), personal white board, 1 new pencil

Draw a large number line segment on the board (as shown below). Distribute the number lines A and B template for use in Parts 1 and 2. Instruct students to slide the template into their personal white boards.



Problem 1: Relate more length on the number line to addition.

T: How can we use the number line to show 20 yards more than 35 yards? Talk to your partner.

S: We can label the left endpoint 35 and then slide 20 more yards counting by fives. → We could count by tens, too.

T: For now, let's say that each unit has a length of 5 yards.

T: Student A, come up and label the endpoint, and show us how you slide 20 more yards when each hash mark is a length of 5 yards. Everyone else, use the number line in your personal white boards to do the same. (Allow students time to work.)

T: So, did we end up at 20 yards?

S: No, because we went more than 35 yards. → No. We counted up 20 more than 35. → Twenty yards was the distance we traveled.

T: Hmm. Let's put a dot where we ended to show 20 more than 35 yards. What do we need to do to figure out the value of that point?

S: We can skip-count by fives starting at 35 but stop counting when we get to the mark we made, so we only go 20 more yards. → We can add 20 yards to 35 yards.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Support English language learners by pointing to the number line segment on the board while speaking. While asking what the distance is between each labeled interval, sweep a finger from 0 to 10, 10 to 20, and 20 to 30. Do the same for the smaller intervals.

T: That's a good idea. Write an addition sentence on your personal white board that matches 20 more than 35 on the number line.

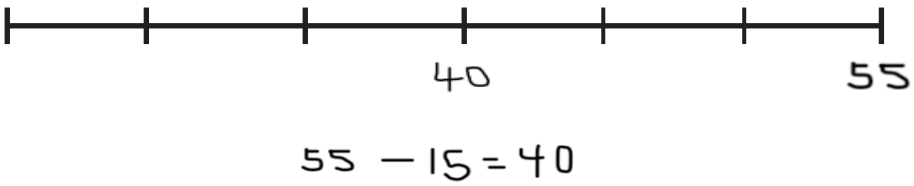
S: (Write 35 + 20 = 55.) We are at 55 yards.

T: Label the number line.

Continue giving examples with different units and endpoints (on the left) until students readily write an addition sentence corresponding to more length. Consider using the following suggestions:

- Show 15 more than 45.
- Show 50 more than 60 using units of 10.
- Show 30 more than 85 using units of 5.

Problem 2: Relate less length on the number line to subtraction.



T: How can we use the number line to show 15 feet less than 55 feet? Talk to your partner.

S: We can label the right endpoint 55 and then slide 15 less feet going back. → We could label the left endpoint 55 and then count back as we slide to the right.

MP.6 T: Both methods are fine, but we just did addition moving to the right. (Demonstrate.) So, now let's do the opposite and move to the left to show subtraction.

T: Work on your personal white boards to show 15 less than 55. (Allow students time to work.)

T: Where did you end up?

S: At 40.

MP.6

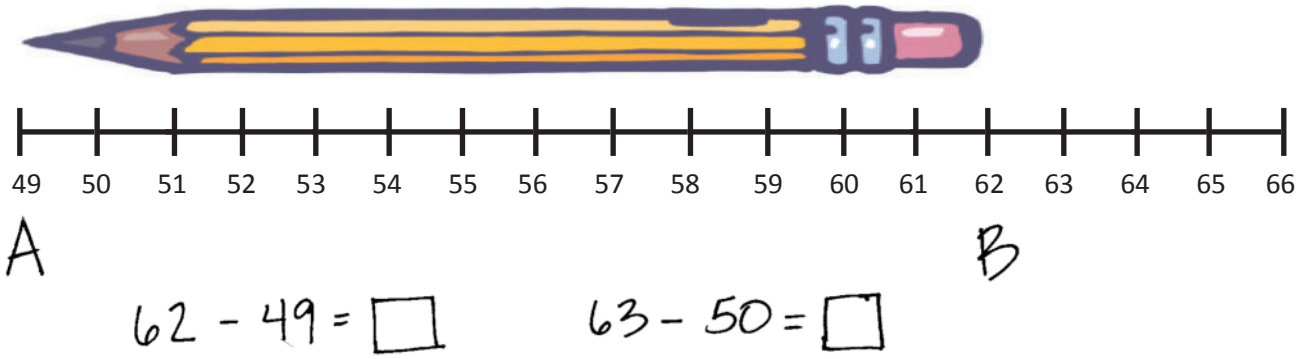
T: Label the number line, and write a subtraction sentence on your board that matches 15 less than 55 on the number line.

Continue giving examples with different units and endpoints (on the right) until students readily write a subtraction sentence corresponding to less length. Consider using the following suggestions:

- Show 15 less than 45.
- Show 20 less than 90 using units of 10.
- Show 30 less than 115 using units of 5.

Problem 3: Relate the length of an object on the number line to subtraction. Use compensation to simplify calculation.

T: Look at number line B template. This was part of a whole meter strip, but it got cut at 49 and 66. These are our endpoints.



T: Place the end of your pencil at the endpoint of the number line where it says 49.

T: How can we figure out the length of the pencil?

S: We can count the units from the beginning of the pencil to the end. → We can write a subtraction sentence to find the difference.

T: Let's mark the endpoints of our pencil on the number line. Mark the point on the left A and the point on the right B.

S: (Work.)

T: The length from A to B is the same as the length of the…?

S: Pencil.

T: How can we find the length of the pencil?

S: We can count up from A to B. → We can subtract.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Help students who are performing below grade level by demonstrating, one step at a time, how to understand 62 – 49 = 63 – 50 by having them solve each side of the equation. Have students express what 62 – 49 is, and then ask them what 63 – 50 is. Have students write the difference after each step and rewrite the whole equation (13 = 13). Ask them to express in their own words what they think the equal sign meant in the original equation.

T: On your personal white boards, under the number line, write and solve a subtraction sentence that will tell us the length of the pencil. Don't solve yet. Just leave a blank for the unknown length of the pencil.

S: (Write 62 – 49 = ___.)

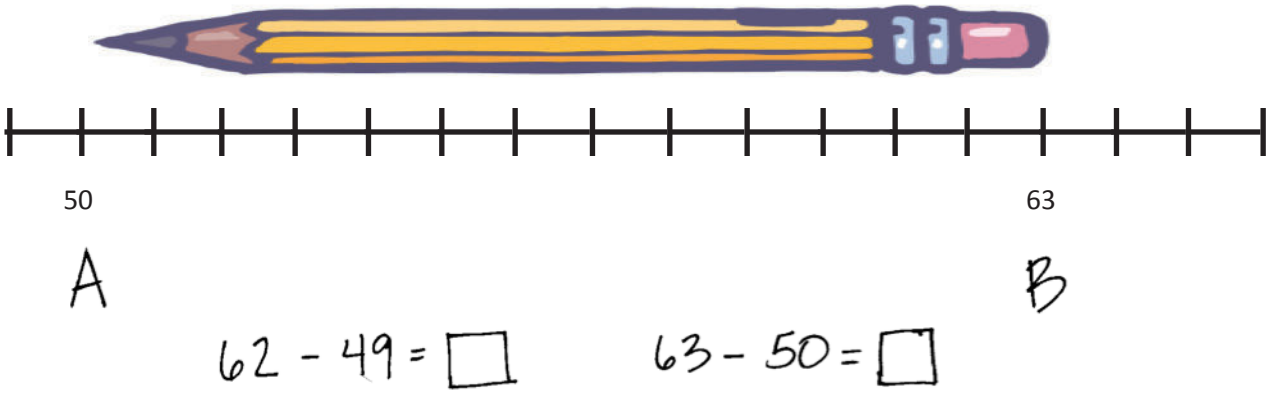
T: Hmm. Will the pencil length change if I move it on the number line?

S: No!

T: Could I move the pencil on the number line so that I can write a subtraction sentence that is simpler to solve?

S: Yes! If you move the pencil 1 unit to the right so that the end of the pencil is at the 50 hash mark, your number sentence would be 63 – 50 = ____.

T: Move your pencil, and write the new number sentence. Solve both equations. Count the length units to check and see if the length of the pencil is the same as the answers to your equations.



S: Both equations equaled 13. When I counted the length units, there were 13. That means the pencil is 13 units long.

T: (Write 62 – 49 = 63 – 50 on the board.) Talk to your partner about what I wrote on the board. Is this true? Why or why not?

T: Great job. Let's practice some more problems like the ones we have done today on our Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

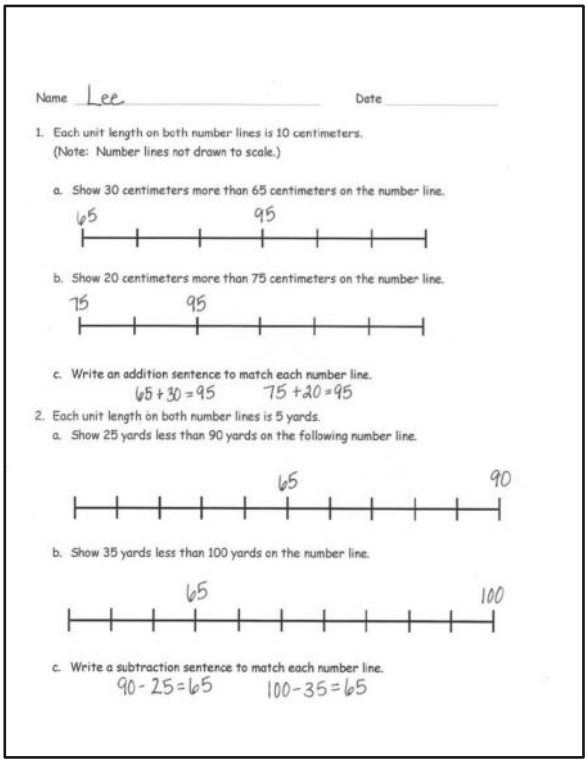
Lesson Objective: Represent two-digit sums and differences involving length by using the ruler as a number line.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at Problem 1 on your Problem Set. Using your finger and skip-counting, show your partner how you represented 30 more than 65 centimeters on the number line.
- Talk to your partner about how Problem 3 on your Problem Set can help you solve Problem 4. (I know the length of each flute will stay the same if I move each flute 1 centimeter to the right, and in doing so, I make a much easier subtraction problem for me to solve. Instead of 71 – 29, I can think 72 – 30.)
- Sometimes we count the units on a ruler or number line to figure out the length of an object. What are some things we have to think about when we use this strategy? (We have to be aware of the length of each unit so we can skip-count if necessary, and we have to be careful to count the jumps and not the hash marks.)
- If you knew the endpoints of an object, could you figure out the length of the object without using a number line or ruler? How?



Name Lee Date

1. Each unit length on both number lines is 10 centimeters. (Note: Number lines not drawn to scale.)

a. Show 30 centimeters more than 65 centimeters on the number line.

65 95

b. Show 20 centimeters more than 75 centimeters on the number line.

75 95

c. Write an addition sentence to match each number line.

65 + 30 = 95 75 + 20 = 95

2. Each unit length on both number lines is 5 yards.

a. Show 25 yards less than 90 yards on the following number line.

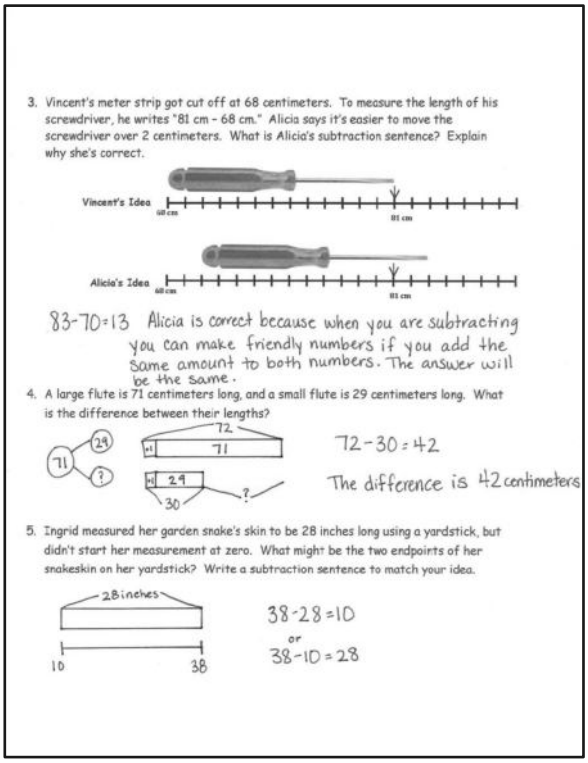
65 90

b. Show 35 yards less than 100 yards on the number line.

65 100

c. Write a subtraction sentence to match each number line.

90 - 25 = 65 100 - 35 = 65



3. Vincent's meter strip got cut off at 68 centimeters. To measure the length of his screwdriver, he writes "81 cm – 68 cm." Alicia says it's easier to move the screwdriver over 2 centimeters. What is Alicia's subtraction sentence? Explain why she's correct.

Vincent's Idea

Alicia's Idea

83 - 70 = 13 Alicia is correct because when you are subtracting you can make friendly numbers if you add the same amount to both numbers. The answer will be the same.

4. A large flute is 71 centimeters long, and a small flute is 29 centimeters long. What is the difference between their lengths?

72 - 30 = 42

The difference is 42 centimeters

5. Ingrid measured her garden snake's skin to be 28 inches long using a yardstick, but didn't start her measurement at zero. What might be the two endpoints of her snakeskin on her yardstick? Write a subtraction sentence to match your idea.

28 inches

10 38

38 - 28 = 10

or

38 - 10 = 28

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

1. Each unit length on both number lines is 10 centimeters.
(Note: Number lines are not drawn to scale.)

   a. Show 30 centimeters more than 65 centimeters on the number line.

   b. Show 20 centimeters more than 75 centimeters on the number line.

   c. Write an addition sentence to match each number line.

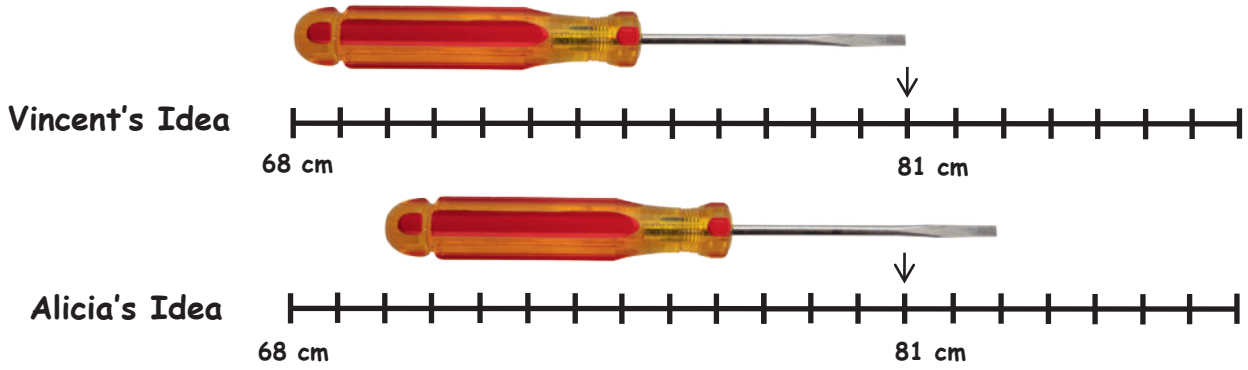
2. Each unit length on both number lines is 5 yards.

   a. Show 25 yards less than 90 yards on the following number line.

   b. Show 35 yards less than 100 yards on the number line.

   c. Write a subtraction sentence to match each number line.

3. Vincent's meter strip got cut off at 68 centimeters. To measure the length of his screwdriver, he writes "81 cm – 68 cm." Alicia says it's easier to move the screwdriver over 2 centimeters. What is Alicia's subtraction sentence? Explain why she's correct.



4. A large flute is 71 centimeters long, and a small flute is 29 centimeters long. What is the difference between their lengths?

5. Ingrid measured her garden snake's skin to be 28 inches long using a yardstick but didn't start her measurement at zero. What might be the two endpoints of her snakeskin on her yardstick? Write a subtraction sentence to match your idea.

Name _____ Date _____

Each unit length on both number lines is 20 centimeters.
(Note: Number lines are not drawn to scale.)

1. Show 20 centimeters more than 25 centimeters on the number line.

2. Show 40 centimeters less than 45 centimeters on the number line.

3. Write an addition or a subtraction sentence to match each number line.

Name _____ Date _____

1. Each unit length on both number lines is 10 centimeters.
(Note: Number lines are not drawn to scale.)

   a. Show 20 centimeters more than 35 centimeters on the number line.

   b. Show 30 centimeters more than 65 centimeters on the number line.

   c. Write an addition sentence to match each number line.

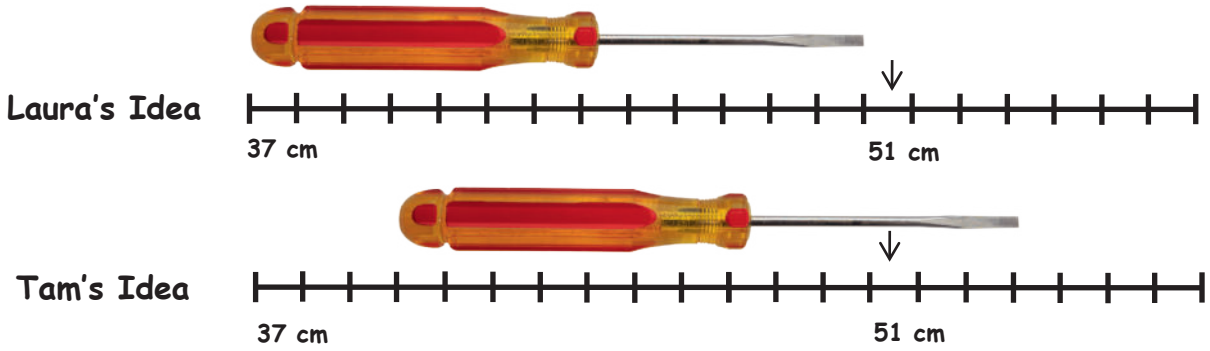
2. Each unit length on both number lines is 5 yards.

   a. Show 35 yards less than 80 yards on the following number line.

   b. Show 25 yards less than 100 yards on the number line.

   c. Write a subtraction sentence to match each number line.

3. Laura's meter strip got cut off at 37 centimeters. To measure the length of her screwdriver, she writes "51 cm – 37 cm." Tam says it's easier to move the screwdriver over 3 centimeters. What is Tam's subtraction sentence? Explain why she's correct.

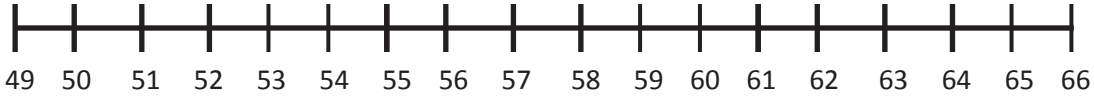


4. Alice measured her belt to be 22 inches long using a yardstick, but she didn't start her measurement at zero. What might be the two endpoints of her belt on her yardstick? Write a subtraction sentence to match your idea.

5. Isaiah ran 100 meters on a 200-meter track. He started running at the 19-meter mark. On what mark did he finish his run?

Number Line A

Number Line B



number lines A and B

Topic F

Displaying Measurement Data

2.MD.6, 2.MD.9, 2.MD.1, 2.MD.5

Focus Standards:		2.MD.6	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.
		2.MD.9	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
Instructional Days:		4	
Coherence	**-Links from:**	G1–M3	Ordering and Comparing Length Measurements as Numbers
	-Links to:	G3–M5	Fractions as Numbers on the Number Line
		G3–M6	Collecting and Displaying Data

Building on the work in Topic E, students now connect the process of measuring to displaying data on line plots. In Lesson 23, students measure their own handspans (i.e., the distance from the tip of the thumb to the tip of the pinky with the hand fully extended), as well as those of five friends, rounding the lengths to the nearest whole inch. They then share the data as a class. Using tally marks, students create a table to record and organize the data.

In Lesson 24, students display the data from the previous day's table on a line plot, where the measurements are shown on a horizontal scale marked off in whole inches (**2.MD.9**). Then, they generate new data by measuring shoe lengths in centimeters. They make a line plot to display the data by using their rulers to mark off whole centimeters. As they create the line plot, students relate their line plot back to the centimeter ruler and the centimeter ruler to a number line.

Finally, in Lessons 25 and 26, students are presented with different data sets, which they represent using line plots (**2.MD.6**). They then discuss the results and learn how to interpret the data. For example, using the table shown, students create a plot and then answer questions, such as "What was the most common distance reached? What was the least common?" They infer and draw conclusions from the data set and representations, discovering that, while a table is useful for organizing data, a line plot allows for the visual comparisons of the different quantities.

Sit and Reach Distance	Number of Students
22 cm	1
23 cm	1
25 cm	1
26 cm	2
27 cm	3
28 cm	4
29 cm	3
30 cm	3
31 cm	1
34 cm	1

A Teaching Sequence Toward Mastery of Displaying Measurement Data

Objective 1: Collect and record measurement data in a table; answer questions and summarize the data set.
(Lesson 23)

Objective 2: Draw a line plot to represent the measurement data; relate the measurement scale to the number line.
(Lesson 24)

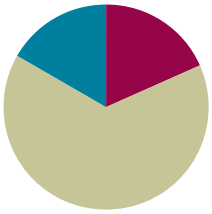
Objective 3: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.
(Lessons 25–26)

Lesson 23

Objective: Collect and record measurement data in a table; answer questions and summarize the data set.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Concept Development	(39 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- How Many More Hundreds? **2.NBT.7** (2 minutes)
- Sprint: Adding Across a Ten **2.OA.2** (9 minutes)

How Many More Hundreds? (2 minutes)

Note: Practicing subtracting multiples of a hundred prepares students for today's lesson.

T: If I say "300 – 200," you say "100." To say it in a sentence, you say, "100 more than 200 is 300." Ready?
T: 300 – 200.
S: 100.
T: Say it in a sentence.
S: 100 more than 200 is 300.

Continue with the following possible sequence: 405 – 305, 801 – 601, 650 – 350, 825 – 125, and 999 – 299.

Sprint: Adding Across a Ten (9 minutes)

Materials: (S) Adding Across a Ten Sprint

Note: This Sprint gives practice with the grade level fluency of adding within 20.

Concept Development (39 minutes)

Materials: (T) Ruler, document camera (if available) (S) Ruler, Recording Sheet

Note: The Concept Development today might be time consuming because it involves data collection from the entire class. For this reason, and because the lesson itself is within a real-world context, the Application Problem has been omitted for today.

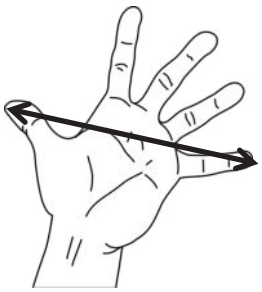
Part 1: Collect and record data.

T: Everyone hold up your right hand.

S: (Hold up the right hand.)

T: How do you know if it's your right or left hand? Turn and talk.

S: Because my left hand makes an L. → I write with my right hand. → I write with my other hand. → I just do.



T: Now, stretch your fingers all the way out. (Demonstrate.)

T: Talk to a partner. How many inches do you think it is from the tip of your pinky to the tip of your thumb?

S: (Various guesses.)

T: This measurement from the tip of our pinky to the tip of our thumb is called our *handspan*. We will be measuring that today.

MP.5

T: (Hold the ruler with the right hand, and show the ruler against the handspan, as in the picture to the right, mirroring what students will do.) Look at how I measure my handspan. What are some important things I need to remember when I measure this?

S: Start measuring at zero on the ruler. → Remember what unit you are using. → Notice where your handspan starts and ends.

T: Very good! I just measured my handspan, and it is ___ inches. Even though it was not exactly that many inches, I said it was about ___ inches because it was closer to the next whole inch. (Write the measurement on the board.)

Put students in groups of four or five. Hand out the Recording Sheets and rulers. Project the Recording Sheet, or have a copy of the table on the board to fill in.

T: Look at your Recording Sheet. Notice that the top of the first page has a chart where we can record our measurements in inches. Let's start with my hand measure. (Tally it on the table for students to copy.)

T: Now, work with a partner. Measure your handspan, and have your partner help you make sure your measurement is correct. Then, record your measurement on the line. (Give students time to complete this task.)

T: Now, switch. When you have finished with your partner, record the handspans of the other people in your group.

Circulate among students as they complete this activity.

T: Now, take the data in your chart, and fill in the table. Use a tally mark to record each person's measurement in the appropriate box. (Provide work time.)

T: You have now recorded data in a table! Real scientists collect and record information like this when they do research.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Scaffold the lesson for English language learners by posting key vocabulary after introducing it in the lesson. Post terms such as *handspan, table, data,* and *tally marks* with a visual for each that captures its meaning. Having such a reference helps English language learners to talk with a partner and complete the activities in the lesson.

T: Now that we have this information, we can use it to learn some things. Look at your data set in your table and the questions that are next to it. Count the tally marks to answer the questions.

Circulate among students, and provide support as they complete this activity.

T: Tell your partner what you think the most common handspan will be for the whole class. (Pause for sharing.) Let's check your predictions.

Part 2: Create a larger data set.

T: Now we're going to look at the information we can get by looking at *all* the handspans in our class.

Collect the measurements from each group, and make a tally mark for each student, or have students record their own tally marks on the board.

T: Let's count up and answer the questions on our Recording Sheet. (Add and write the totals of the handspans next to the tallies for each measurement.)

T: Which handspan was the most common in our class?

S: (Answer.)

T: And the least common?

S: (Answer.)

T: Now, write a comparison question about the class data for your friend to answer. For example, "How many more students' handspans measured 5 inches than measured 8 inches?" (Pause for students to write a question.)

T: Now, share your question with a partner, and answer your partner's question. (Provide work time.)

T: Let's listen to and answer some of the questions you came up with about this data set.

Solicit questions from students, and facilitate a discussion about them.

NOTES ON MULTIPLE MEANS OF ACTION AND REPRESENTATION:

Before asking students working below grade level to move on to the final activity, ask them to restate what they learned in the last part of the lesson. Ask guiding questions like, "How did we record our handspan data? What kind of questions did we ask about data?" to encourage them to think about and express their learning from the lesson.

Problem Set (5 minutes)

Note: Students should complete the Problem Set in 5 minutes, as it is only one page.

Student Debrief (10 minutes)

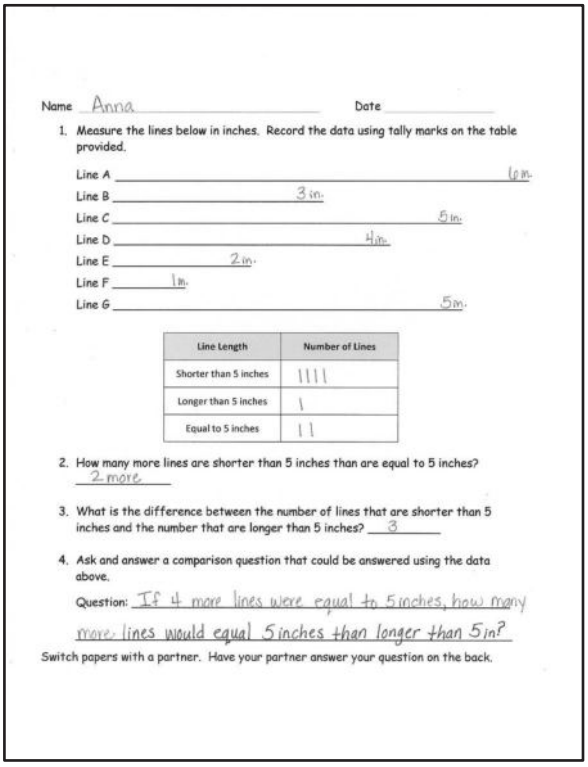
Lesson Objective: Collect and record measurement data in a table; answer questions and summarize the data set.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Recording Sheets. They should check their work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Recording Sheets and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Why doesn't the whole class data set match your individual data sheet?
- Do you think having more or fewer data points is better in science? Why? Turn and talk.
- Why do you think ____ was the most common handspan length in our class? If we collected data from all the second-grade classes, do you think this would change? Why or why not?
- If we collected data in the fifth-grade classroom, do you think ___ will still be the most common handspan length? Why or why not?
- Talk to your partner about what you think would happen to our data if we measured the handspan length of everyone at our school from the kindergartners to the fifth graders and even the adults. Why is it good to have as much data as possible?
- When you used the handspan data to make your comparison problem, did you use addition or subtraction? Show your partner your solution to your comparison problem.



Name Anna Date

1. Measure the lines below in inches. Record the data using tally marks on the table provided.

Line A 6 in.
Line B 3 in.
Line C 5 in.
Line D 4 in.
Line E 2 in.
Line F 1 in.
Line G 5 in.

Line Length	Number of Lines
Shorter than 5 inches	1111
Longer than 5 inches	1
Equal to 5 inches	11

2. How many more lines are shorter than 5 inches than are equal to 5 inches? 2 more

3. What is the difference between the number of lines that are shorter than 5 inches and the number that are longer than 5 inches? 3

4. Ask and answer a comparison question that could be answered using the data above.

Question: If 4 more lines were equal to 5 inches, how many more lines would equal 5 inches than longer than 5 in?

Switch papers with a partner. Have your partner answer your question on the back.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Note: Students need a 12-inch ruler to complete Homework.

A

Number Correct: _____

Adding Across a Ten

1.	9 + 2 =	
2.	9 + 3 =	
3.	9 + 4 =	
4.	9 + 7 =	
5.	7 + 9 =	
6.	10 + 1 =	
7.	10 + 2 =	
8.	10 + 3 =	
9.	10 + 8 =	
10.	8 + 10 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 9 =	
15.	9 + 8 =	
16.	7 + 4 =	
17.	10 + 5 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 6 =	

23.	4 + 7 =	
24.	4 + 8 =	
25.	5 + 6 =	
26.	5 + 7 =	
27.	3 + 8 =	
28.	3 + 9 =	
29.	2 + 9 =	
30.	5 + 10 =	
31.	5 + 8 =	
32.	9 + 6 =	
33.	6 + 9 =	
34.	7 + 6 =	
35.	6 + 7 =	
36.	8 + 6 =	
37.	6 + 8 =	
38.	8 + 7 =	
39.	7 + 8 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

B

Number Correct: _____

Improvement: _____

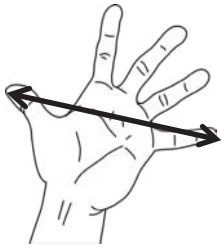
Adding Across a Ten

1.	10 + 1 =	
2.	10 + 2 =	
3.	10 + 3 =	
4.	10 + 9 =	
5.	9 + 10 =	
6.	9 + 2 =	
7.	9 + 3 =	
8.	9 + 4 =	
9.	9 + 8 =	
10.	8 + 9 =	
11.	8 + 3 =	
12.	8 + 4 =	
13.	8 + 5 =	
14.	8 + 7 =	
15.	7 + 8 =	
16.	7 + 4 =	
17.	10 + 4 =	
18.	6 + 5 =	
19.	7 + 5 =	
20.	9 + 5 =	
21.	5 + 9 =	
22.	10 + 8 =	

23.	5 + 6 =	
24.	5 + 7 =	
25.	4 + 7 =	
26.	4 + 8 =	
27.	4 + 10 =	
28.	3 + 8 =	
29.	3 + 9 =	
30.	2 + 9 =	
31.	5 + 8 =	
32.	7 + 6 =	
33.	6 + 7 =	
34.	8 + 6 =	
35.	6 + 8 =	
36.	9 + 6 =	
37.	6 + 9 =	
38.	9 + 7 =	
39.	7 + 9 =	
40.	6 + 6 =	
41.	7 + 7 =	
42.	8 + 8 =	
43.	9 + 9 =	
44.	4 + 9 =	

Name _____ Date _____

1. Gather and record group data.



Write your teacher's handspan measurement here: _____

Measure your handspan, and record the length here: _____

Measure the handspans of the other people in your group, and write them here. We will be using the data tomorrow.

Name:	Handspan:

Handspan	Tally of Number of People
3 inches	
4 inches	
5 inches	
6 inches	
7 inches	
8 inches	

What is the most common handspan length? _____

What is the least common handspan length? _____

What do you think the most common handspan length will be for the whole class? Explain why.

_____

_____

_____

_____

_____

_____

2. Record the class data.

   Record the class data using tally marks on the table provided.

Handspan	Tally of Number of People
3 inches	
4 inches	
5 inches	
6 inches	
7 inches	
8 inches	

What handspan length is the most common? _____

What handspan length is the least common? _____

Ask and answer a comparison question that can be answered using the data above.

Question: _____

_____

Answer: _____

_____

Name _____ Date _____

1. Measure the lines below in inches. Record the data using tally marks on the table provided.

   Line A _____

   Line B _____

   Line C _____

   Line D _____

   Line E _____

   Line F _____

   Line G _____

Line Length	Number of Lines
Shorter than 5 inches	
Longer than 5 inches	
Equal to 5 inches	

2. How many more lines are shorter than 5 inches than are equal to 5 inches?

   _____

3. What is the difference between the number of lines that are shorter than 5 inches and the number that are longer than 5 inches? _____

4. Ask and answer a comparison question that could be answered using the data above.

   Question: _____

   _____

Switch papers with a partner. Have your partner answer your question on the back.

Name _____ Date _____

1. The lines below have been measured for you. Record the data using tally marks on the table provided, and answer the questions below.

Line A 5 inches

Line B 6 inches

Line C 4 inches

Line D 6 inches

Line E 3 inches

Line Length	Number of Lines
Shorter than 5 inches	
5 inches or longer	

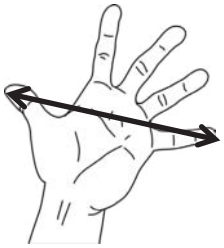
2. If 8 more lines were measured to be longer than 5 inches and 12 more lines were measured to be shorter than 5 inches, how many tallies would be in the chart?

_____

Name _____ Date _____

Measure your handspan, and record the length here: _____

Then, measure the handspans of your family members, and write the lengths below.



Name:	Handspan:

1. Record your data using tally marks on the table provided.

Handspan	Tally of Number of People
3 inches	
4 inches	
5 inches	
6 inches	
7 inches	
8 inches	

a. What is the most common handspan length? ___

b. What is the least common handspan length? ___

c. Ask and answer one comparison question that can be answered using the data above.

Question:

_____

_____

Answer:

_____

_____

2. a. Use your ruler to measure the lines below in inches. Record the data using tally marks on the table provided.

Line A _____

Line B _____

Line C _____

Line D _____

Line E _____

Line F _____

Line G _____

Line Length	Number of Lines
Shorter than 4 inches	
Longer than 4 inches	
Equal to 4 inches	

b. How many more lines are shorter than 4 inches than equal to 4 inches?

_____

c. What is the difference between the number of lines that are shorter than 4 inches and those that are longer than 4 inches? _____

d. Ask and answer one comparison question that could be answered using the data above.

Question: _____

_____

Answer: _____

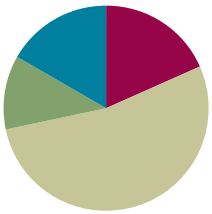
_____

Lesson 24

Objective: Draw a line plot to represent the measurement data; relate the measurement scale to the number line.

Suggested Lesson Structure

Fluency Practice	(11 minutes)
Application Problem	(7 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (11 minutes)

- Find the Difference **2.NBT.5** (2 minutes)
- Sprint: Subtraction Patterns **2.OA.2, 2.NBT.5** (9 minutes)

Find the Difference (2 minutes)

Materials: (S) Personal white board

Note: Students review using mental strategies to solve subtraction problems.

T: (Write 24 – 16 =____.) Solve using a mental math strategy, and write your answer on your personal white board.

Continue with the following possible sequence: 34 – 6, 44 – 16, 20 – 5, 21 – 5, 21 – 15, 31 – 25, 22 – 8, 32 – 18, and 42 – 19.

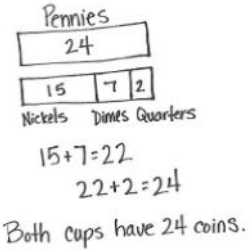
Sprint: Subtraction Patterns (9 minutes)

Materials: (S) Subtraction Patterns Sprint

Note: Students practice subtraction to gain mastery of the sums and differences within 20 and identify relationships with higher numbers.

Application Problem (7 minutes)

Mike, Dennis, and April all collected coins from a parking lot. When they counted their coins, they had 24 pennies, 15 nickels, 7 dimes, and 2 quarters. They put all the pennies into one cup and the other coins in another. Which cup has more coins? How many more?



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Challenge students working above grade level by asking them to find the value of the coins that Mike, Dennis, and April collected. Ask them to explain in writing how they arrived at their solutions.

Note: This two-step problem involves data comparisons, which is a skill that is used by students in their data work. Encourage students to use the RDW process and make a tape diagram to visualize their work.

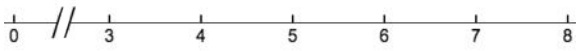
Concept Development (32 minutes)

Materials: (T) Data table and Recording Sheet with student data from Lesson 23 (S) Recording Sheet from Lesson 23, rulers, centimeter grid paper

Part 1: Plot Lesson 23's data on a line plot.

Project or show the data from Lesson 23, as shown to the right.

Hand Span	Tally
3 inches	11
4 inches	𝍸
5 inches	𝍸 𝍸 1
6 inches	𝍸 11
7 inches	
8 inches	1



Inches

T: This is our data table from our last math lesson, with all the handspan measurements from our class.

T: (Project or show the number line from the Recording Sheet.) What is this?

S: A number line!

T: Yes. We used the number line to help us with addition and subtraction problems the other day by sliding up and down the number line. We can also use a number line in a different way to show data.

T: Turn and talk: What do you notice about this number line?

S: It goes from 3 to 8. → It doesn't start at 1. → There is a zero and then some slashes and then a 3. → It says *inches.*

T: That's right! Our data don't start at 0, so we make two slashes to show that we are skipping some numbers.

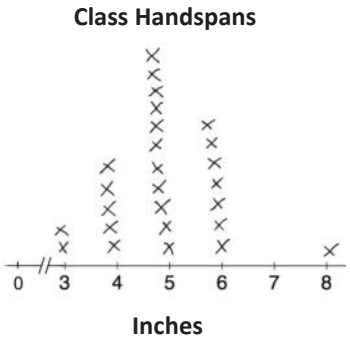
NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Support English language learners by pointing to the number line, the range of 3 to 8 on the number line, the line plot, and the tally marks when referring to them during the lesson. Label everything, and post on the word wall so that English language learners can refer to them as they do their math work.

T: The same way we give bar graphs a title, we always give a line plot a title. Let's call this one Class Handspans.

T: To show our data, we put an X for each of our tally marks above the number of inches our handspans were and write the unit of measure. (Demonstrate as shown in the graph to the right.)

T: Now it's your turn. (Distribute the Recording Sheets.) Transfer the class data from Lesson 23's tally table onto your Recording Sheet. (Circulate among students as they complete this activity.)



T: You have just made a graph called a **line plot**! Compare your line plot with a partner's. What information can you see in your line plot?

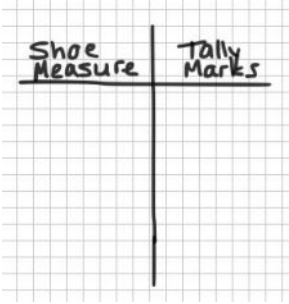
S: I see that most people have a 5-inch handspan. → There are a lot more people with a 5- or 6-inch handspan than 7- or 8-inch handspans. → The starting point of the labels is the shortest measurement, and the endpoint is the longest measurement.

Part 2: Collect, organize, and plot shoe measurements in a table.

T: Let's measure how long our shoes are. This time, we're going to use centimeters instead of inches. (Distribute the rulers and grid paper.)

T: Measure your shoe length by placing your ruler flat on the bottom of your shoe. Write the centimeter measurement down on the top of your page. (Model how to do this. Allow time for students to measure.)

T: Now we're going to make a collection table for our data. First, make your chart with the labels *Shoe Measure* and *Tally Marks.* (Model as shown to the right.)

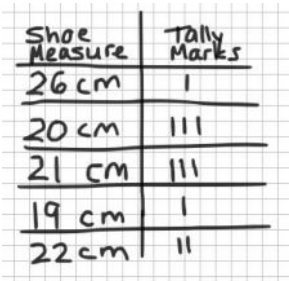


T: Next, on the table, make a tally mark to record your shoe measurement. I'm going to write 26 cm (use your own measure) and make the tally mark.

T: Next, collect 9 more shoe measurements from your friends. Just be sure to add a tally mark if you get the same measurement more than once. (Circulate among students, and facilitate the data collection.)

T: We now have a table with 10 measurements tallied on it. How many of you have 10 different measurements on your collection table? (Acknowledge student responses.)

T: How many of you found at least 5 people with the same shoe measure? (Acknowledge the responses.)



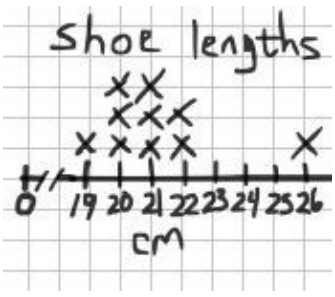
Part 3: Reorganize shoe measurement data on a line plot.

T: Let's turn our data into a line plot.

T: This time, instead of a number line that I give you, I'm going to have you create your own line plot using grid paper.

MP.4

T: Take your ruler, and measure the width of one of the boxes on your grid paper. (Pause for students to do this.)



T: What is the measure?

S: 1 centimeter!

T: Turn and talk: How might this help make the number line for our line plots?

S: I can use the grids to make it easier to draw my lines. → The centimeter grids are just like the centimeters on my ruler. → We can make our line plots match our rulers. → A ruler is just like a number line!

MP.4

T: I heard someone say that a ruler is just like a number line! That's true. In this case, though, we don't have to make our number line start at zero.

T: Let's draw the number line base. Turn and talk: How do you know how to label your number line?

S: We do it in order from shortest to longest. → We need to go from 19 centimeters to 26 centimeters. → If we don't have any shoes that measure 23 or 24 centimeters, do we label them, too?

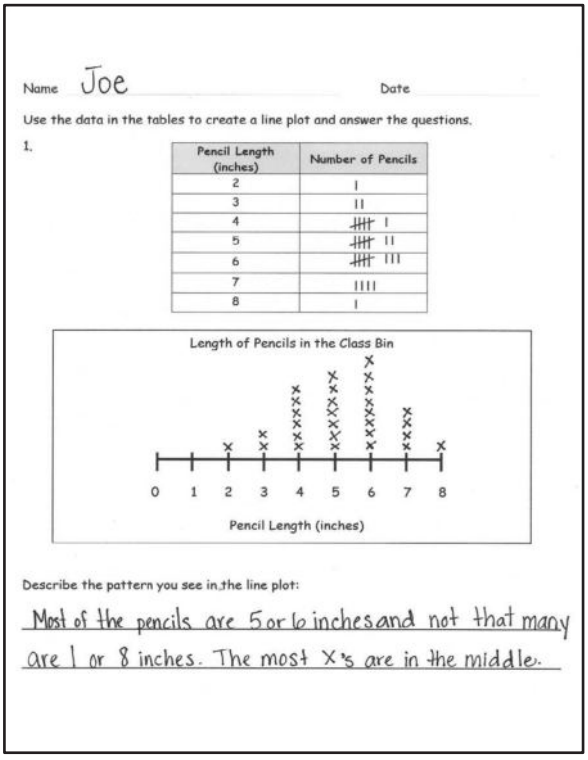
T: Good question. Yes. We need to show all the numbers between the shortest and the longest given lengths, even if no items measure those lengths. For example, no shoes measured 23 or 24 centimeters, but we need to include those measurements on our line plot.

T: Label your line plots, and mark an X for each tally of the measurements in your graph. Make sure that each X is the same size.

Circulate and help students draw their line plots. As they finish their plots, release them to work on the Problem Set.

Problem Set (10 minutes)

If the Concept Development lesson takes the entire amount of time, use the Problem Set for homework or early finishers instead.



Name Joe Date

Use the data in the tables to create a line plot and answer the questions.

1.

Pencil Length (inches)	Number of Pencils
2	I
3	II
4	IIII I
5	IIII II
6	IIII III
7	IIII
8	I

Describe the pattern you see in the line plot:

Most of the pencils are 5 or 6 inches and not that many are 1 or 8 inches. The most X's are in the middle.

Student Debrief (10 minutes)

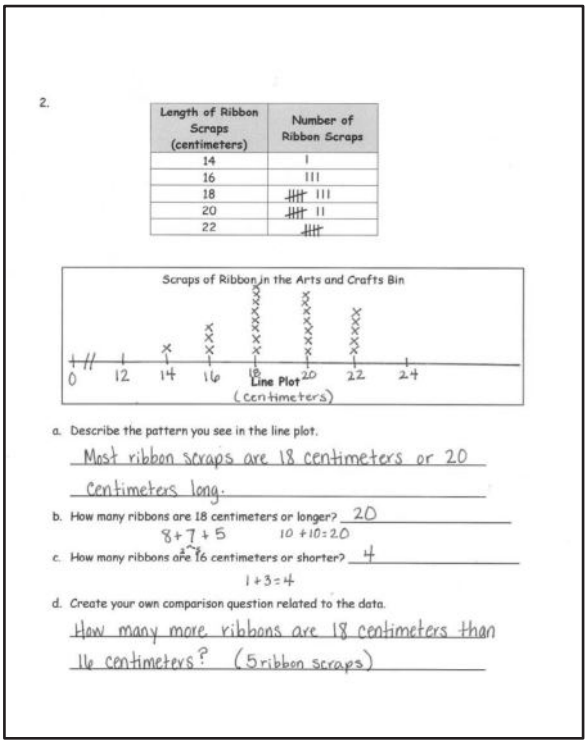
Lesson Objective: Draw a line plot to represent the measurement data; relate the measurement scale to the number line.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What other types of graphs do the line plots remind you of that you used to compare and record data?
- Compare the shape of the handspan plot and the shoe plot. What do you notice? Why do you think there is a curvy shape to it starting low, going up, and then coming down again?
- Which way did you like looking at the data: the tally chart or the line plot? Talk to your partner about the advantages and disadvantages of each.
- When we made our number line for our handspans in the lesson today, why didn't we start at 0 or 1? What happened when we measured our shoes? Did you make a number line that started with 1? Talk to your partner about why or why not.
- Look at the intervals on your number line for the shoe measurement data. Could we have just made intervals at 19, 20, 21, 22, and 26, since those were the only shoe measurements that we had in our class?



2.

Length of Ribbon Scraps (centimeters)	Number of Ribbon Scraps
14	I
16	III
18	⧸⧸⧸⧸ III
20	⧸⧸⧸⧸ II
22	⧸⧸⧸⧸

Scraps of Ribbon in the Arts and Crafts Bin

0 12 14 16 18 20 22 24

Line Plot
(centimeters)

a. Describe the pattern you see in the line plot.

Most ribbon scraps are 18 centimeters or 20 centimeters long.

b. How many ribbons are 18 centimeters or longer? 20

8+7+5 10+10=20

c. How many ribbons are 16 centimeters or shorter? 4

1+3=4

d. Create your own comparison question related to the data.

How many more ribbons are 18 centimeters than 16 centimeters? (5 ribbon scraps)

- Explain to your partner why we needed to put hash marks at 23, 24, and 25 centimeters on the number line even though there were no data for these measurements. (All intervals on a number line must be equal. It helps us to see that there is a gap in shoe sizes and to wonder about it like scientists.)

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Subtraction Patterns

1.	3 – 1 =	
2.	13 – 1 =	
3.	23 – 1 =	
4.	53 – 1 =	
5.	4 – 2 =	
6.	14 – 2 =	
7.	24 – 2 =	
8.	64 – 2 =	
9.	4 – 3 =	
10.	14 – 3 =	
11.	24 – 3 =	
12.	74 – 3 =	
13.	6 – 4 =	
14.	16 – 4 =	
15.	26 – 4 =	
16.	96 – 4 =	
17.	7 – 5 =	
18.	17 – 5 =	
19.	27 – 5 =	
20.	47 – 5 =	
21.	43 – 3 =	
22.	87 – 7 =	

23.	8 – 7 =	
24.	18 – 7 =	
25.	58 – 7 =	
26.	62 – 2 =	
27.	9 – 8 =	
28.	19 – 8 =	
29.	29 – 8 =	
30.	69 – 8 =	
31.	7 – 3 =	
32.	17 – 3 =	
33.	77 – 3 =	
34.	59 – 9 =	
35.	9 – 7 =	
36.	19 – 7 =	
37.	89 – 7 =	
38.	99 – 5 =	
39.	78 – 6 =	
40.	58 – 5 =	
41.	39 – 7 =	
42.	28 – 6 =	
43.	49 – 4 =	
44.	67 – 4 =	

B

Number Correct: _____

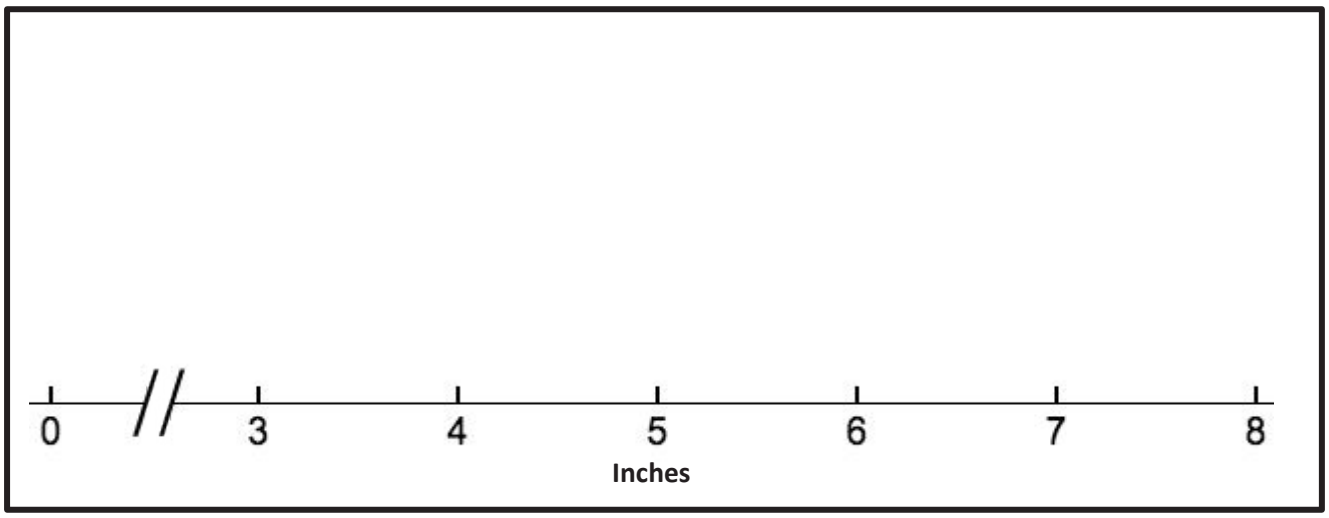
Improvement: _____

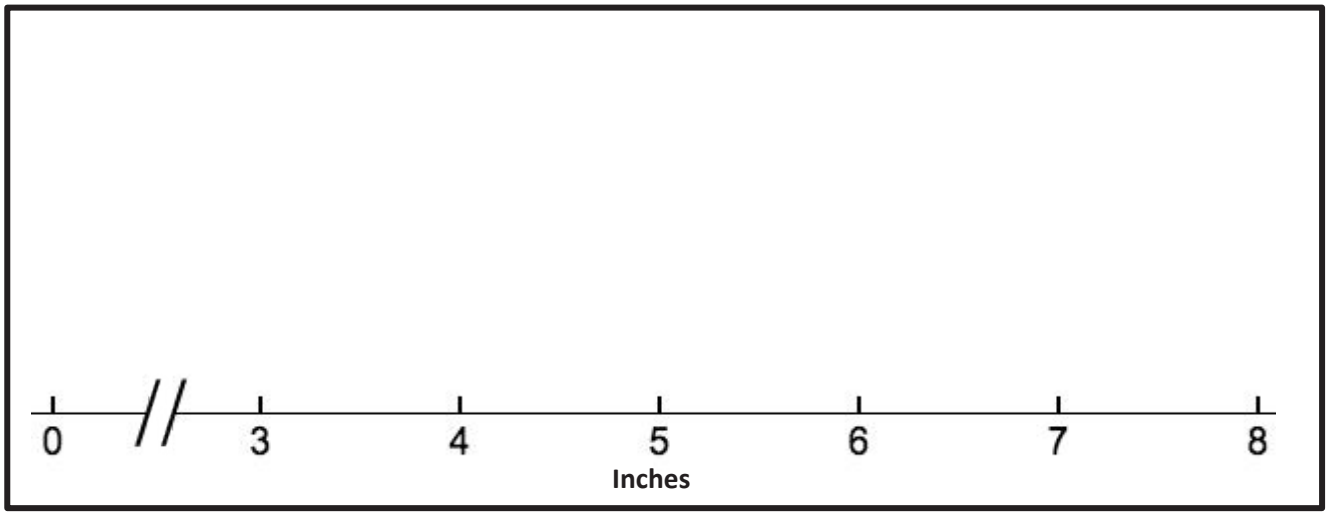
Subtraction Patterns

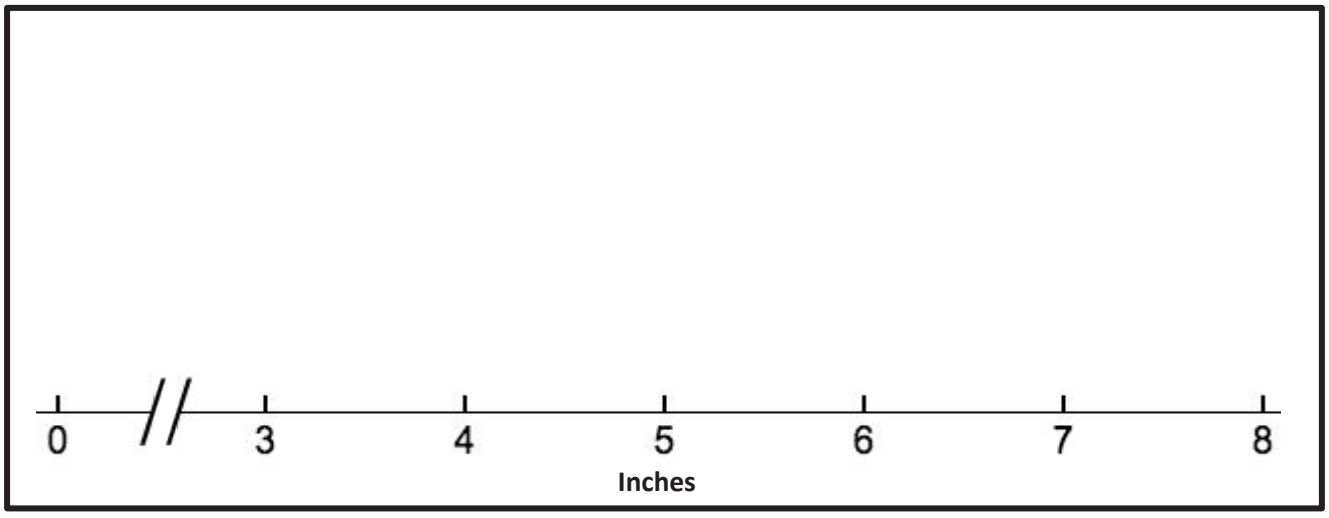
1.	2 – 1 =	
2.	12 – 1 =	
3.	22 – 1 =	
4.	52 – 1 =	
5.	5 – 2 =	
6.	15 – 2 =	
7.	25 – 2 =	
8.	65 – 2 =	
9.	4 – 3 =	
10.	14 – 3 =	
11.	24 – 3 =	
12.	84 – 3 =	
13.	7 – 4 =	
14.	17 – 4 =	
15.	27 – 4 =	
16.	97 – 4 =	
17.	6 – 5 =	
18.	16 – 5 =	
19.	26 – 5 =	
20.	46 – 5 =	
21.	23 – 3 =	
22.	67 – 7 =	

23.	8 – 7 =	
24.	18 – 7 =	
25.	68 – 7 =	
26.	32 – 2 =	
27.	9 – 8 =	
28.	19 – 8 =	
29.	29 – 8 =	
30.	79 – 8 =	
31.	8 – 4 =	
32.	18 – 4 =	
33.	78 – 4 =	
34.	89 – 9 =	
35.	9 – 7 =	
36.	19 – 7 =	
37.	79 – 7 =	
38.	89 – 5 =	
39.	68 – 6 =	
40.	48 – 5 =	
41.	29 – 7 =	
42.	38 – 6 =	
43.	59 – 4 =	
44.	77 – 4 =	

Recording Sheet for Part 1. Copy and cut one per student.





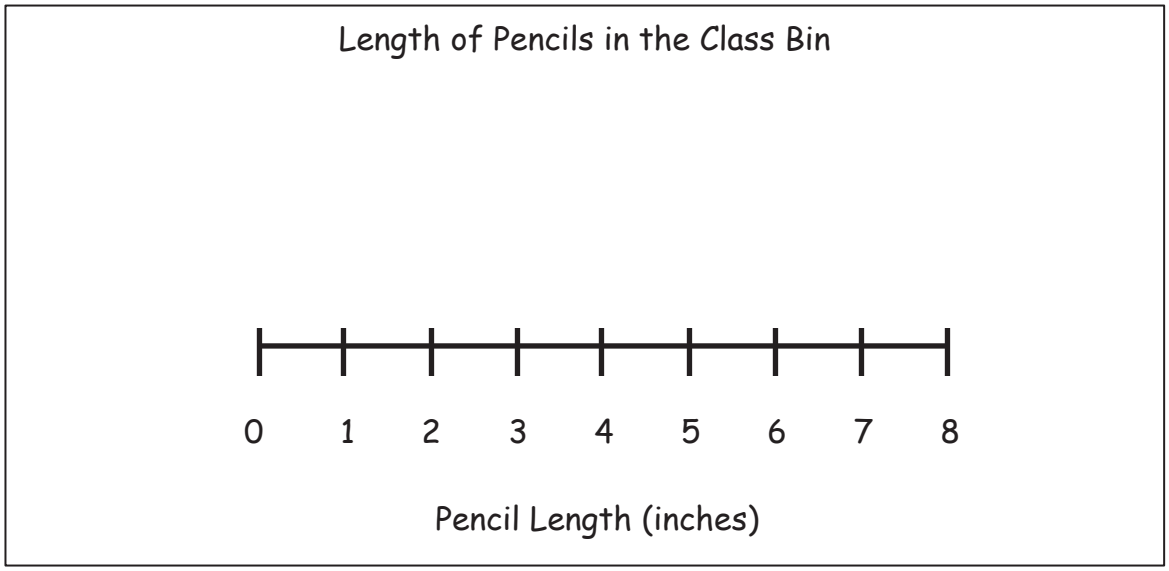


Name _____ Date _____

Use the data in the tables to create a line plot and answer the questions.

1.

Pencil Length (inches)	Number of Pencils
2	I
3	II
4	𝍸 I
5	𝍸 II
6	𝍸 III
7	IIII
8	I



Describe the pattern you see in the line plot:

_____

_____

2.

Length of Ribbon Scraps (centimeters)	Number of Ribbon Scraps
14	1
16	3
18	8
20	7
22	4

Scraps of Ribbon in the Arts and Crafts Bin

Line Plot

a. Describe the pattern you see in the line plot.

_____

_____

b. How many ribbons are 18 centimeters or longer? _____

c. How many ribbons are 16 centimeters or shorter? _____

d. Create your own comparison question related to the data.

_____

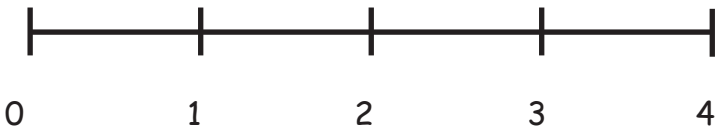
_____

Name _____ Date _____

Use the data in the table to create a line plot.

Length of Crayons in a Class Bin

Crayon Length (inches)	Number of Crayons
1	| | |
2	𝍸 | | | |
3	𝍸 | |
4	𝍸



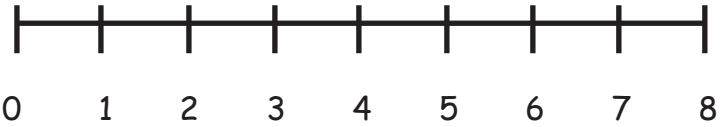
Crayon Length (inches)

Name _____ Date _____

1. Use the data in the table to create a line plot and answer the question.

Handspan (inches)	Number of Students
2	
3	
4	𝍸
5	𝍸 𝍸
6	𝍸 𝍸
7	𝍸
8	𝍸

Handspans of Students in Ms. DeFransico's Class



Handspan (inches)

Describe the pattern you see in the line plot:

_____

_____

_____

2. Use the data in the table to create a line plot and answer the questions.

Length of Right Foot (centimeters)	Number of Students
17	1
18	2
19	4
20	5
21	5
22	2
23	1

Lengths of Right Feet of Students in Ms. DeFransico's Class

Line Plot

a. Describe the pattern you see in the line plot.

_____

_____

b. How many feet are longer than 20 centimeters? _____

c. How many feet are shorter than 20 centimeters? _____

d. Create your own comparison question related to the data.

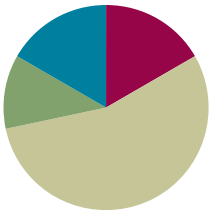
_____

Lesson 25

Objective: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.

Suggested Lesson Structure

Fluency Practice	(10 minutes)
Application Problem	(7 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (10 minutes)

- Decomposition Tree **2.OA.2** (5 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Decomposition Tree (5 minutes)

Materials: (S) Decomposition Tree (Lesson 6 Fluency Template)

Note: Students are given 90 seconds to decompose 36 inches.

T: (Distribute the decomposition tree template.)
T: You are going to break apart 36 inches on your decomposition tree for 90 seconds. Make as many pairs as you can. Go!
S: (Work for 90 seconds.)
T: Now, exchange your tree with your partner, and check each other's work. (Allow students 30–45 seconds to check.)
T: Return each other's papers. Did you see another way to make 36 inches on your partner's paper? (Allow students to share for another 30 seconds.)
T: Turn your paper over. Let's break apart 36 inches for another minute.

Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic F and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (7 minutes)

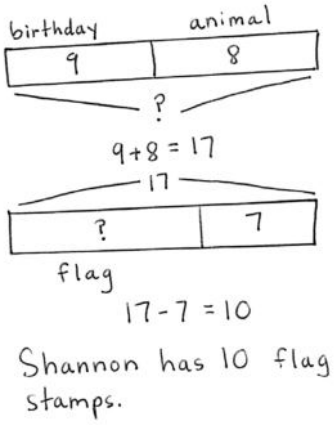
These are the types and numbers of stamps in Shannon's stamp collection.

Type of Stamp	Number of Stamps
Holiday	16
Animal	8
Birthday	9
Famous singers	21

Her friend Michael gives her some flag stamps. If he gives her 7 fewer flag stamps than birthday and animal stamps together, how many flag stamps does she have?

Extension: If the flag stamps are worth 12 cents each, what is the total value of Shannon's flag stamps?

Note: This two-step problem involves interpreting and comparing data using a table. Encourage students to use the RDW process and to draw a picture to visualize the *fewer than* situation.



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

The Application Problem can easily be extended for students working above grade level. Here are some examples:

- How many stamps does Shannon have altogether?
- What is the value of the holiday and the famous singers stamps?
- What is the value of all of Shannon's stamps?

Concept Development (33 minutes)

Materials: (T) Document camera to project tables and line plots
(S) Personal white board, centimeter grid paper

Project or show the bean plant data table, as shown to the right. Distribute one piece of grid paper per student.

Part 1: Plot measures of bean plant height.

The students in Mr. Shield's science class are growing bean plants. After five days, they measured the height of their bean plants in centimeters. The table shows their results.

MP.4

T: (Read the scenario.) Let's create a line plot to display these data.

T: Turn and talk: What do you need to draw?

S: A number line. → X's above a number line to show the data from the table. → A number line that starts at 9 cm and ends at 15 cm.

Height of Bean Plant	Number of Students
9 cm	1
11 cm	4
12 cm	6
13 cm	7
14 cm	5
15 cm	3

MP.4

T: Great! Get to work! Use the table to draw your line plot on the grid paper, just like you did yesterday (as shown to the right). Don't forget to label it.

T: (Circulate and provide support while students work.)

T: Check your line plot with a partner. Did you have the same start point and endpoint? How did you label? How many X's did you draw for each height?

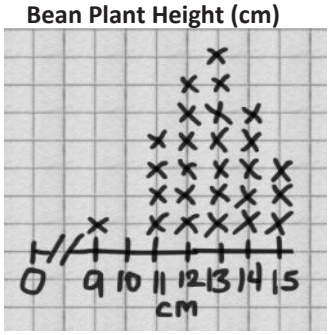
S: (Check and compare the line plots for essential elements.)

T: Now, let's use our line plots to answer questions about the data. (The following is a list of suggestions.)

- Which bean plant height occurred most often?
- What is the difference between the tallest and shortest bean plant? How do you know?
- How many students are in this science class?
- Are there any measurements outside the main grouping? Why might this have happened?
- What do you think would happen in five more days if we watered and gave extra vitamins to the plants?

T: Yes! Now, let's look at data from students in a gym class. Here we go.

Bean Plant Height (cm)



NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Support English language learners by pointing to visuals of key terms such as *line plot, start point, endpoint,* and *intervals* if these are already on the word wall. If not, find visuals for the terms, and post them as continued reference for English language learners during the lesson.

Part 2: Plot sit and reach distance.

In gym class, Mrs. Rincon measured students' flexibility with the sit and reach test. The table shows how far students were able to reach in centimeters.

T: (Read the scenario.) Go ahead and create a line plot to display the data.

S: (Draw the line plot, as shown on the next page.)

T: Check your line plot with a partner. Did you have the same start point and endpoint? How did you label your plot? How many X's did you draw for each distance?

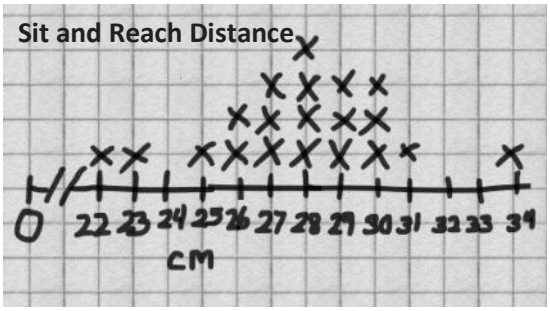
S: (Check and compare the line plots for essential elements.)

T: Now, let's use our line plots to answer questions about the data. (The following is a list of suggestions.)

- How many students were the most flexible?
- What was the difference between the longest and shortest sit and reach distance? How do you know?
- How many distances were reached by only one student? Which distances?
- How many students can reach farther than 28 cm?

Sit and Reach	Number of Students
22 cm	1
23 cm	1
25 cm	1
26 cm	2
27 cm	3
28 cm	4
29 cm	3
30 cm	3
31 cm	1
34 cm	1

- Why aren't 24 cm, 32 cm, and 33 cm listed in the table?
- What did you do on the line plot?
- How might these data be different for third graders?
- What can we do to become more flexible? If we do those things, how might our data set change?



T: I heard some thoughtful responses today! You're ready for the Problem Set.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

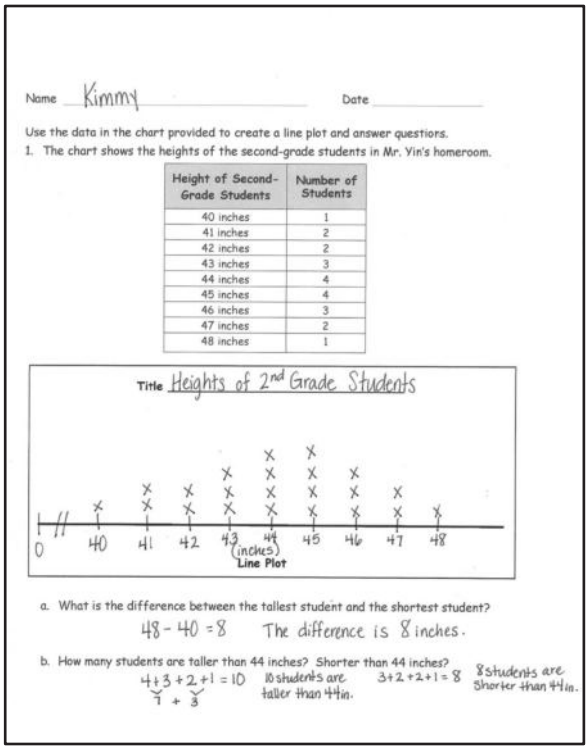
Lesson Objective: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the line plots on your Problem Set. What are the units of the heights in Mr. Yin's class measured in? Is it important to label the line plot units? Why?
- What do you notice about the X's on the first line plot with student heights and the X's on the second-grade art paper line plot? (The first one is shaped like a curve with a small number of X's on each end like a pattern. The second-grade heights have more measurements than the second-grade art paper line plot.) Why do you think this happened?



Name Kimmy Date

Use the data in the chart provided to create a line plot and answer questions.

1. The chart shows the heights of the second-grade students in Mr. Yin's homeroom.

Height of Second-Grade Students	Number of Students
40 inches	1
41 inches	2
42 inches	2
43 inches	3
44 inches	4
45 inches	4
46 inches	3
47 inches	2
48 inches	1

Title Heights of 2nd Grade Students

0 40 41 42 43 44 45 46 47 48 (inches)

Line Plot

a. What is the difference between the tallest student and the shortest student?

48 - 40 = 8 The difference is 8 inches.

b. How many students are taller than 44 inches? Shorter than 44 inches?

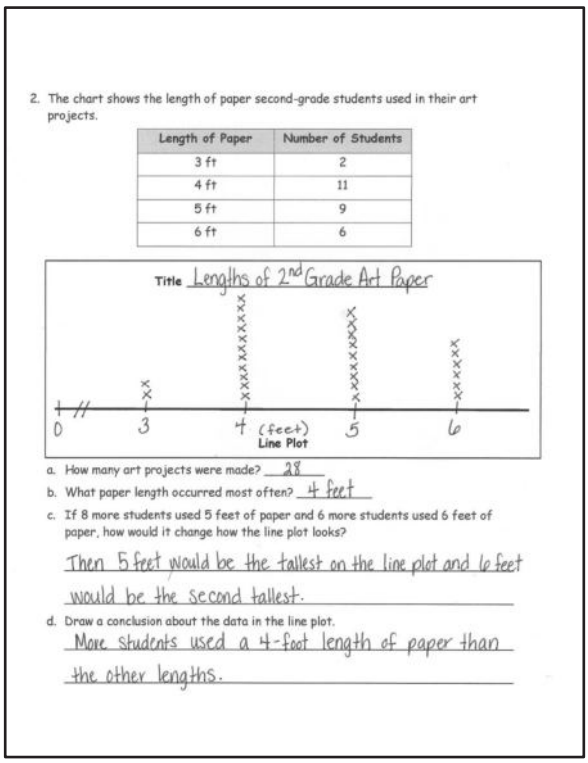
4+3+2+1 = 10 10 students are taller than 44in. 3+2+2+1 = 8 8 students are shorter than 44in.

7 + 3

- Choose one line plot, and ask your partner a question about the data that is not on the Problem Set.
- Explain to your partner why using tables and line plots are both important ways to look at data. (A table is useful for organizing data, but a line plot allows for visual comparisons of the different quantities.)

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.



2. The chart shows the length of paper second-grade students used in their art projects.

Length of Paper	Number of Students
3 ft	2
4 ft	11
5 ft	9
6 ft	6

Title Lengths of 2nd Grade Art Paper

0 3 4 5 6 (feet)

Line Plot

a. How many art projects were made? 28

b. What paper length occurred most often? 4 feet

c. If 8 more students used 5 feet of paper and 6 more students used 6 feet of paper, how would it change how the line plot looks?

Then 5 feet would be the tallest on the line plot and 6 feet would be the second tallest.

d. Draw a conclusion about the data in the line plot.

More students used a 4-foot length of paper than the other lengths.

Name _____ Date _____

Use the data in the chart provided to create a line plot and answer the questions.

1. The chart shows the heights of the second-grade students in Mr. Yin's homeroom.

Height of Second-Grade Students	Number of Students
40 inches	1
41 inches	2
42 inches	2
43 inches	3
44 inches	4
45 inches	4
46 inches	3
47 inches	2
48 inches	1

Title _____

Line Plot

a. What is the difference between the tallest student and the shortest student?

b. How many students are taller than 44 inches? Shorter than 44 inches?

2. The chart shows the length of paper second-grade students used in their art projects.

Length of Paper	Number of Students
3 ft	2
4 ft	11
5 ft	9
6 ft	6

Title _____

Line Plot

a. How many art projects were made? _____

b. What paper length occurred most often? _____

c. If 8 more students used 5 feet of paper and 6 more students used 6 feet of paper, how would it change how the line plot looks?

_____

_____

d. Draw a conclusion about the data in the line plot.

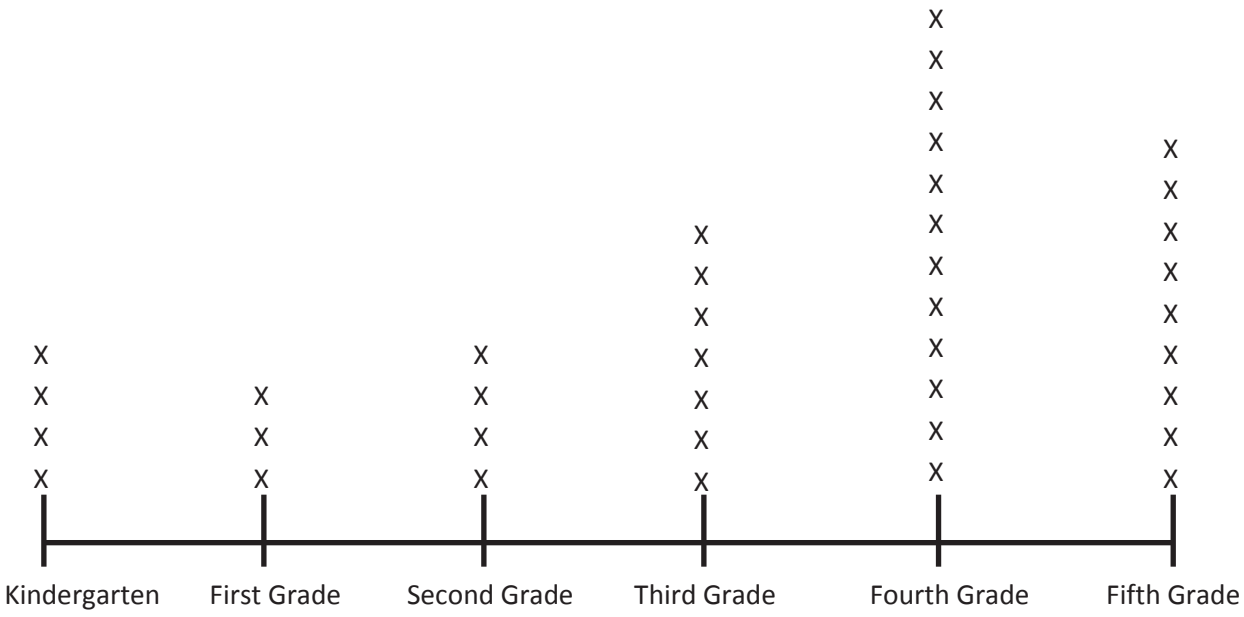
_____

_____

Name _____ Date _____

Answer the questions using the line plot below.

Number of Students in Each Grade at the School Baseball Game



Grade

1. How many students went to the baseball game? _____

2. What is the difference between the number of first-grade students and the number of fourth-grade students who went to the baseball game? _____

3. Come up with a possible explanation for why most of the students who attended are in the upper grades.

_____

_____

Name _____ Date _____

Use the data in the charts provided to create line plots and answer the questions.

1. The chart shows the lengths of the necklaces made in arts and crafts class.

Length of Necklaces	Number of Necklaces
16 inches	3
17 inches	0
18 inches	4
19 inches	0
20 inches	8
21 inches	0
22 inches	9
23 inches	0
24 inches	16

Title _____

Line Plot

a. How many necklaces were made? _____

b. Draw a conclusion about the data in the line plot:

_____

2. The chart shows the heights of towers students made with blocks.

Height of Towers	Number of Towers
15 inches	9
16 inches	6
17 inches	2
18 inches	1

Title _____

Line Plot

a. How many towers were measured? _____

b. What tower height occurred most often? _____

c. If 4 more towers were measured at 17 inches and 5 more towers were measured at 18 inches, how would it change how the line plot looks?

_____

_____

d. Draw a conclusion about the data in the line plot:

_____

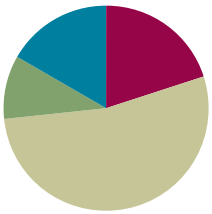
_____

Lesson 26

Objective: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Making the Next Hundred **2.NBT.5, 2.NBT.7** (3 minutes)
- Making the Next Hundred to Add **2.NBT.5, 2.NBT.7** (4 minutes)
- Grade 2 Core Fluency Differentiated Practice Sets **2.OA.2** (5 minutes)

Making the Next Hundred (3 minutes)

Note: This fluency activity reviews foundations that lead into today's lesson.

T: (Post 170 + ___ = 200 on the board.) Let's find missing parts to make the next hundred. If I say "170," you would say "30." Ready? 170.

S: 30.

T: Give the number sentence.

S: 170 + 30 = 200.

Continue with the following possible sequence: 190, 160, 260, 270, 370, 380, 580, 620, 720, 740, 940, 194, 196, 216, 214, and 224.

Making the Next Hundred to Add (4 minutes)

Note: This fluency activity reviews foundations that lead into today's lesson.

T: When I say "9 tens + 4 tens," you say "10 tens + 3 tens." Ready? 9 tens + 4 tens.

S: 10 tens + 3 tens.

Post on the board:

90 + 40 = _____

/\

10 30

100 + 30 = _____

T: Answer.
S: 130.
T: 90 + 40.
S: 130.

Continue with the following possible sequence: 19 tens + 4 tens, 29 tens + 4 tens, 29 tens + 14 tens, 9 tens + 6 tens, 19 tens + 6 tens, 19 tens + 16 tens, 29 tens + 16 tens, 8 tens + 3 tens, 18 tens + 3 tens, 18 tens + 13 tens, 28 tens + 13 tens, 8 tens + 5 tens, 18 tens + 15 tens, and 28 tens + 15 tens.

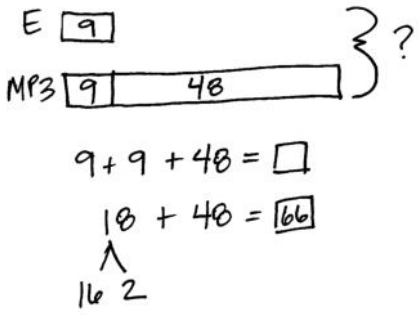
Grade 2 Core Fluency Differentiated Practice Sets (5 minutes)

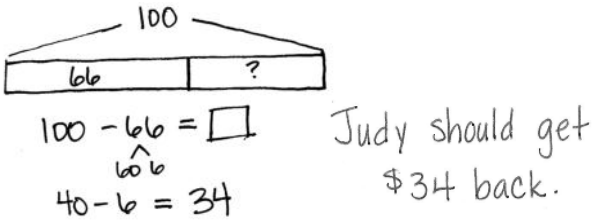
Materials: (S) Core Fluency Practice Sets (Lesson 1 Core Fluency Practice Sets)

Note: During Topic F and for the remainder of the year, each day's Fluency Practice includes an opportunity for review and mastery of the sums and differences with totals through 20 by means of the Core Fluency Practice Sets or Sprints. The process is detailed and Practice Sets are provided in Lesson 1.

Application Problem (6 minutes)

Judy bought an MP3 player and a set of earphones. The earphones cost $9, which is $48 less than the MP3 player. How much change should Judy get back if she gave the cashier a $100 bill?





Note: This two-step problem encourages students once again to use the RDW process and make a tape diagram to visualize the relationships within the problem and correctly identify the question being asked.

Concept Development (32 minutes)

Materials: (T/S) Length and temperature tables (Template 1), 2 pieces of grid paper (Template 2), thermometer (Template 3), ruler

Project or draw the length table from the length and temperature tables template, as shown on the next page.

Part 1: Plot the length of items in our pencil boxes.

The students in Mrs. Washington's class each chose an item from her pencil box and measured its length. The table shows their results.

Length of Items in Our Pencil Boxes	Number of Items
6 cm	1
7 cm	2
8 cm	4
9 cm	3
10 cm	6
11 cm	4
13 cm	1
16 cm	3
17 cm	2

T: (Read the scenario, and then pass out the grid paper template and rulers.) Let's create a line plot to display these data.

T: Talk with your partner: What do we need to draw?

S: A number line!

T: Turn your paper horizontally, and let's use rulers to draw a straight line. (Draw a line across the bottom of the paper as students do the same.)

T: Let's write 0 at the beginning of our scale and then put two diagonal hash marks between that and the next hash mark. (Model as students do the same.)

T: What's the smallest length measurement in our data set?

S: 6 centimeters.

T: Write 6 below the hash mark that follows 0. (Model as students do the same.)

T: Remember, the double hash mark means that the numbers between 0 and 6 are not shown on the scale.

MP.6

T: What is the greatest measurement in our data set?

S: 17 centimeters.

T: Yes. So, our number line needs to continue on to 17. Remember to draw the hash marks on the count scale where the gridlines meet. (Model as students do the same.)

T: We label our scale based on the measurement tool used. Look at the table. What is the measurement unit?

S: Centimeters!

T: Yes. So, let's label that. (Write Length of Objects (centimeters) as students do the same.)

T: Talk with your partner: What do we do now?

S: We have to show the data. → We need to record the data by putting X's above the number line.

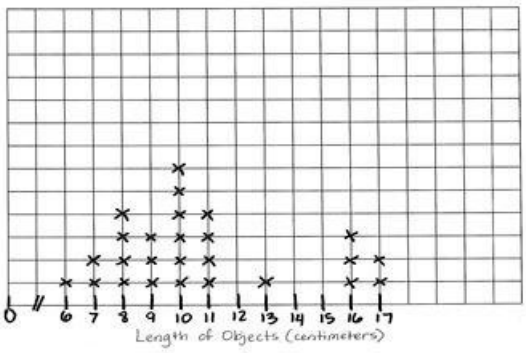
T: Go ahead and record the data. (Circulate and provide support as students work.)

T: Check your line plot with a partner. Do you have the same number of X's for each measurement? (Allow students time to compare.)

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Encourage students who have trouble measuring objects to first draw a line the length of the object using the object as a guide and then use a ruler to measure the line.

Length of Objects in Our Pencil Boxes



T: Now, let's use our line plots to answer questions about the data. (The following is a list of suggestions.)
- What observations can you make about the data?
- What measurement occurred most often?
- What is the difference between the smallest measurement and the greatest measurement?
- Do you think the data would look different if the students each chose a different item in their pencil box to measure? Why?

Part 2: Plot temperatures in May.

Project or draw the temperature table from the length and temperature Template, as shown to the right.

Mr. Enriquez's class measured the temperature each day during the month of May. The table shows the results.

T: (Read the scenario, and then show the thermometer template.) Talk with your partner: Have you ever seen a **thermometer** before? What does this tool measure?

S: My mom and dad use a thermometer to take my temperature when I'm sick. → When you send me to the nurse, she takes my temperature. → The problem is talking about weather like when you watch the weather on TV. → You use a thermometer to know how hot or cold it is outside.

T: Yes. A thermometer is a tool that measures temperature.

T: We measure temperature in **degrees**, so today, for example, it's ___ (insert today's actual temperature) degrees outside.

T: Look at this thermometer, and talk with your partner. What do you notice about the count scale?

S: The numbers are vertical, not horizontal!

T: Yes! Let's make the scale on our line plot vertical as well. Watch how I start the scale. (Model where to write the 0 and the double hash marks.)

T: Talk with your partner: Where will you mark the data points?

S: We have to put the X's next to the numbers. → This time, the number line will be vertical, and the X's will be horizontal.

T: Correct! Now, use the table to make a line plot of the temperatures during the month of May.

T: Remember to label it. (Circulate and provide support while students work.)

Temperatures in May	Number of Days
59°	1
60°	3
63°	3
64°	4
65°	7
67°	5
68°	4
69°	3
72°	1

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Scaffold the lesson for students working below grade level by placing the grid paper in their personal white boards. This allows students to practice marking the right number of X's onto the number line. Make sure they are transferring the data accurately by watching and asking questions as necessary: "How many items measured 10 cm? How many X's will you place above the 10 cm marker on the number line?"

T: Now, check your line plot with a partner. Did you have the same start point and endpoint? How did you label your plot? How many X's did you mark for each degree?

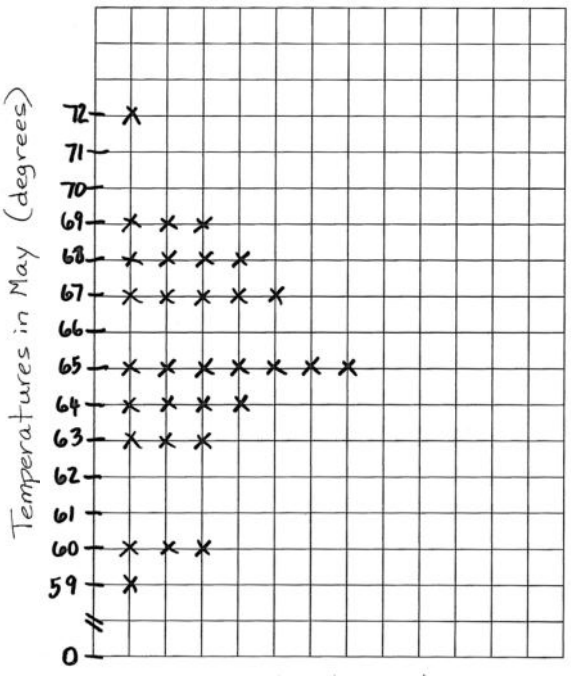
S: (Check and compare the line plots for essential elements.)

T: Let's use our line plots to answer questions about the data. (The following is a list of suggestions.)

- What observations can you make about the data?
- Which temperature occurred most often?
- Which temperatures occurred least often?
- What is the difference between the highest temperature and the lowest temperature?
- How would a line plot recording data look next month? In a different season?

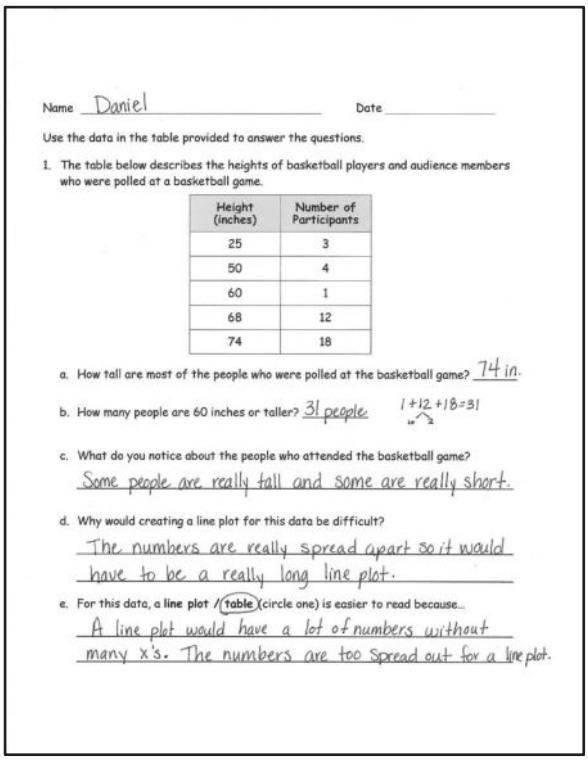
As students demonstrate proficiency creating and interpreting line plots, allow them to move on to the Problem Set.

Temperatures in May



Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.



Name Daniel Date

Use the data in the table provided to answer the questions.

1. The table below describes the heights of basketball players and audience members who were polled at a basketball game.

Height (inches)	Number of Participants
25	3
50	4
60	1
68	12
74	18

a. How tall are most of the people who were polled at the basketball game? 74 in.

b. How many people are 60 inches or taller? 31 people 1+12+18=31

c. What do you notice about the people who attended the basketball game?
Some people are really tall and some are really short.

d. Why would creating a line plot for this data be difficult?
The numbers are really spread apart so it would have to be a really long line plot.

e. For this data, a **line plot** / (**table**) (circle one) is easier to read because...
A line plot would have a lot of numbers without many x's. The numbers are too spread out for a line plot.

Student Debrief (10 minutes)

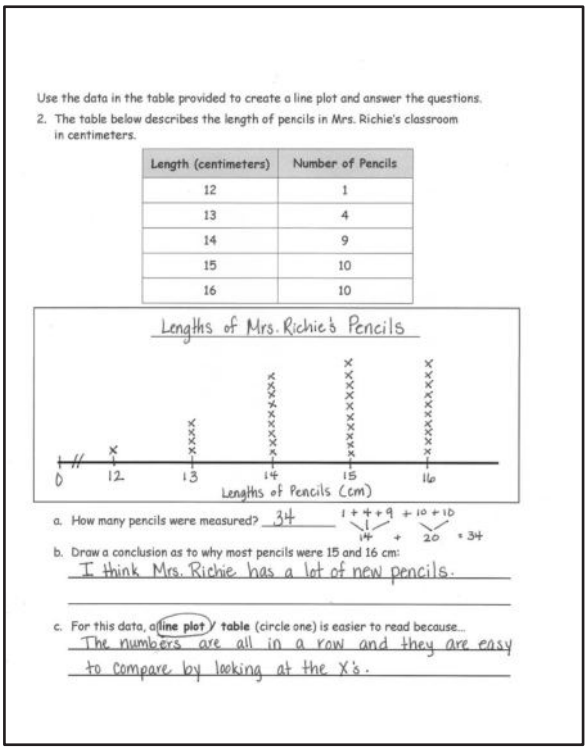
Lesson Objective: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Look at the table made at a basketball game. If you had to guess how many basketball players and how many audience members there were, how would you make the groups based on the data in the chart?
- Look at the pencil table on your Problem Set. Share with your partner why you thought so many pencils were 15 cm or 16 cm.
- Why did all of our line plots in today's lesson about the pencil box items look the same? (The whole class recorded the same data.)
- Can we make line plots horizontally and vertically? Does it change the data in any way? Talk to your partner about when you would use each. Why?
- Discuss with your partner a time in your life when you would need or want to organize information in a table or a line plot. How would it help you or make your life easier?



Use the data in the table provided to create a line plot and answer the questions.

2. The table below describes the length of pencils in Mrs. Richie's classroom in centimeters.

Length (centimeters)	Number of Pencils
12	1
13	4
14	9
15	10
16	10

Lengths of Mrs. Richie's Pencils

0 12 13 14 15 16

Lengths of Pencils (cm)

a. How many pencils were measured? 34 1 + 4 + 9 + 10 + 10 = 14 + 20 = 34

b. Draw a conclusion as to why most pencils were 15 and 16 cm:
I think Mrs. Richie has a lot of new pencils.

c. For this data, a (line plot) / table (circle one) is easier to read because...
The numbers are all in a row and they are easy to compare by looking at the X's.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

Name _____ Date _____

Use the data in the table provided to answer the questions.

1. The table below describes the heights of basketball players and audience members who were polled at a basketball game.

Height (inches)	Number of Participants
25	3
50	4
60	1
68	12
74	18

a. How tall are most of the people who were polled at the basketball game?

_____

b. How many people are 60 inches or taller? _____

c. What do you notice about the people who attended the basketball game?

_____

d. Why would creating a line plot for these data be difficult?

_____

_____

e. For these data, a **line plot / table** (circle one) is easier to read because …

_____

_____

Use the data in the table provided to create a line plot and answer the questions.

2. The table below describes the length of pencils in Mrs. Richie's classroom in centimeters.

Length (centimeters)	Number of Pencils
12	1
13	4
14	9
15	10
16	10

a. How many pencils were measured? _____

b. Draw a conclusion as to why most pencils were 15 and 16 cm:

_____

_____

c. For these data, a **line plot / table** (circle one) is easier to read because…

_____

_____

Name _____ Date _____

Use the data in the table provided to create a line plot.

The table below describes the heights of second-grade students on the soccer team.

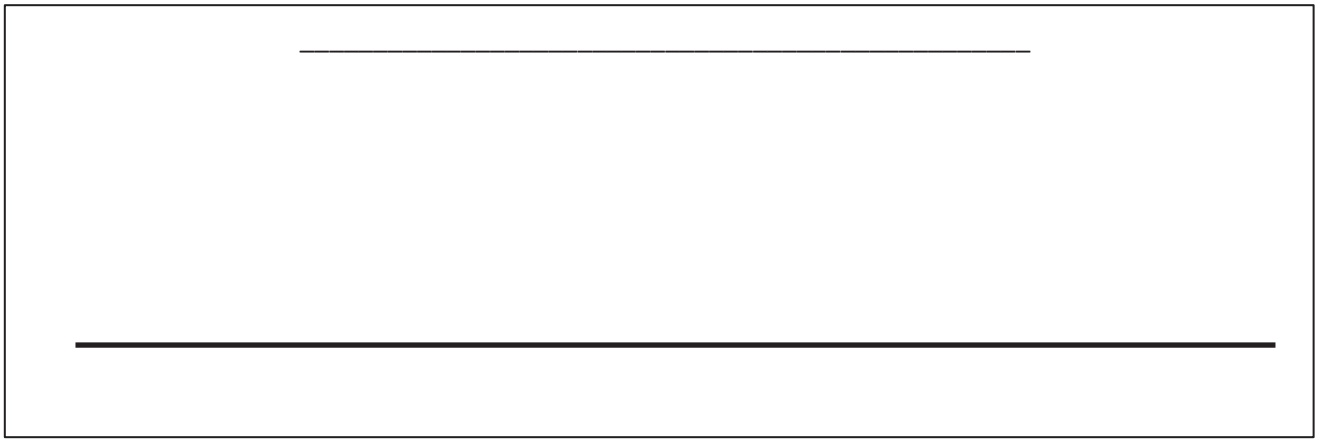
Height (inches)	Number of Students
35	3
36	4
37	7
38	8
39	6
40	5

Name _____ Date _____

Use the data in the table provided to create a line plot and answer the questions. Plot only the lengths of shoelaces given.

1. The table below describes the lengths of student shoelaces in Ms. Henry's class.

Length of Shoelaces (inches)	Number of Shoelaces
27	6
36	10
38	9
40	3
45	2



a. How many shoelaces were measured? _____

b. How many more shoelaces are 27 or 36 inches than 40 or 45 inches? _____

c. Draw a conclusion as to why zero students had a 54-inch shoelace.

_____

2. For these data, a **line plot / table** (circle one) is easier to read because…

_____

Use the data in the table provided to create a line plot and answer the questions.

3. The table below describes the lengths of crayons in centimeters in Ms. Harrison's crayon box.

Length (centimeters)	Number of Crayons
4	4
5	7
6	9
7	3
8	1

a. How many crayons are in the box? _____

b. Draw a conclusion as to why most of the crayons are 5 or 6 centimeters:

_____

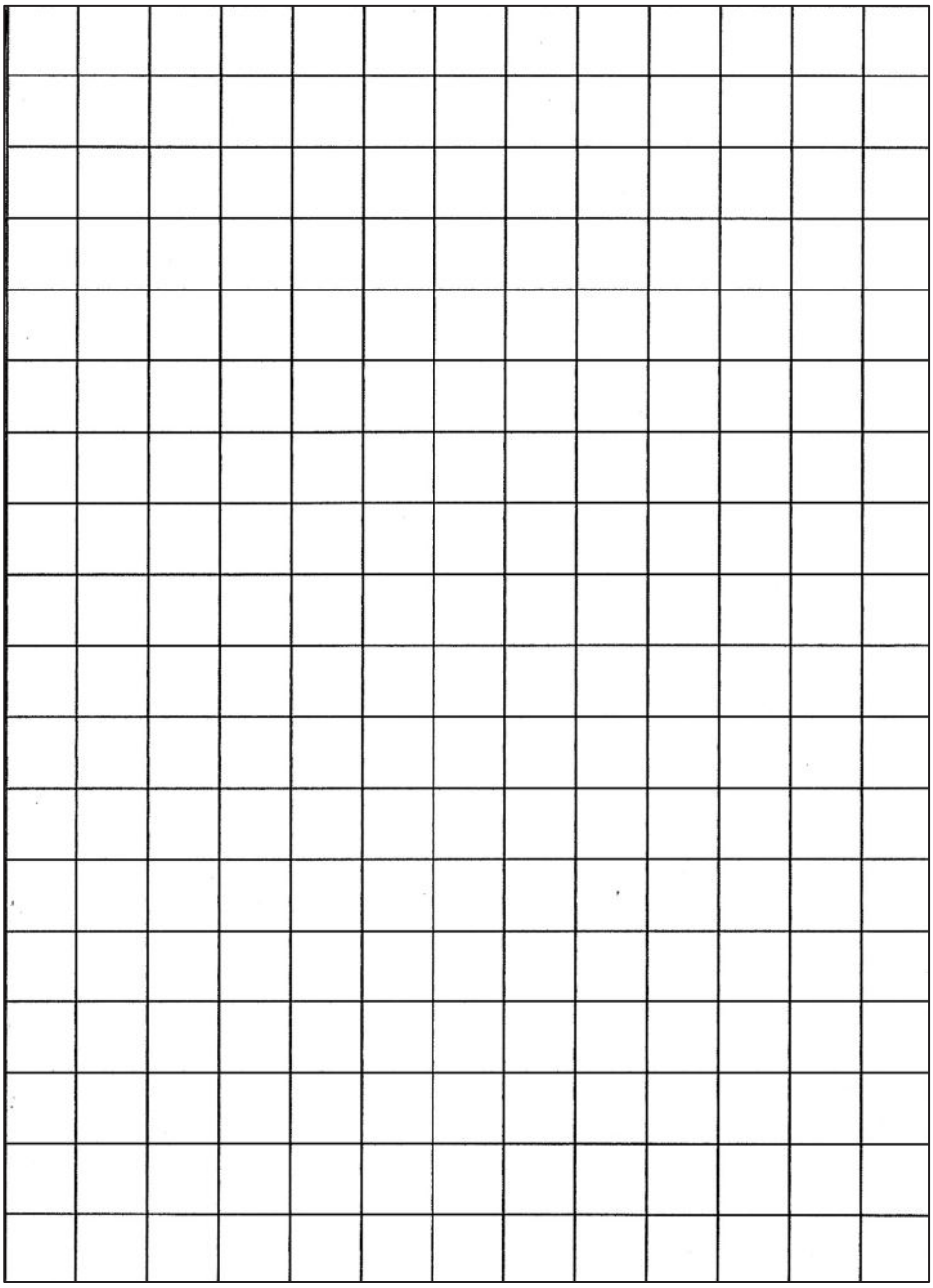
_____

_____

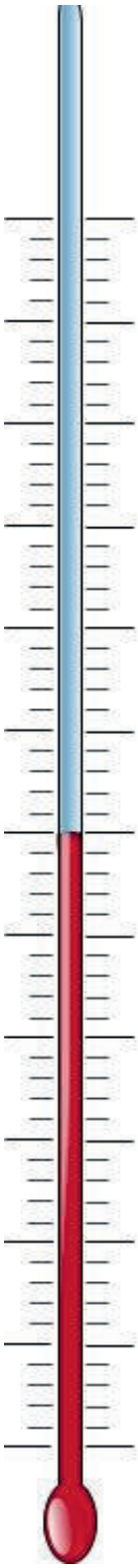
Length of Items in Our Pencil Boxes	Number of Items
6 cm	1
7 cm	2
8 cm	4
9 cm	3
10 cm	6
11 cm	4
13 cm	1
16 cm	3
17 cm	2

Temperatures in May	Number of Days
59°	1
60°	3
63°	3
64°	4
65°	7
67°	5
68°	4
69°	3
72°	1

length and temperature tables



grid paper



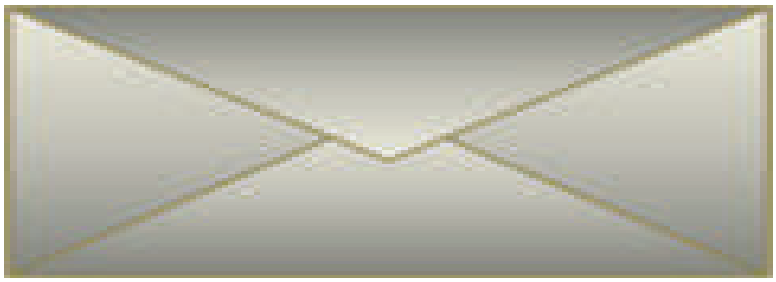
thermometer

Name _____ Date _____

Note: Do not pass out rulers until after students complete Problem 1(a).

1. a. Estimate the length of each item in inches.

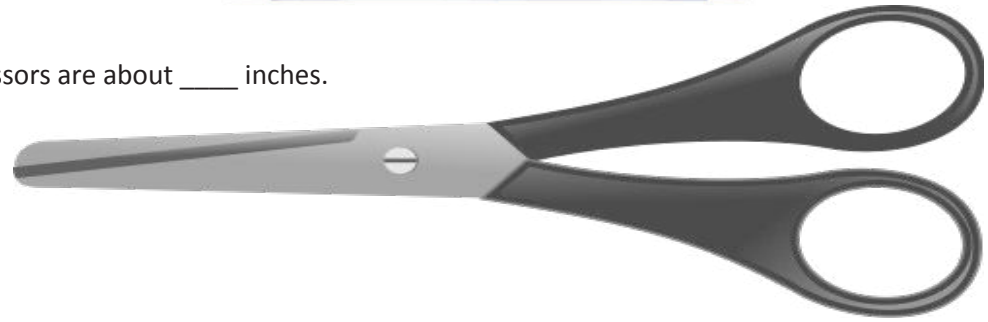
The envelope is about ____ inches.



The pencil is about ____ inches.

The crayon is about ____ inches.

The scissors are about ____ inches.



b. Use a ruler to measure the length of the items above using inches and then centimeters. Round to the nearest unit, and then record the measurements in the table.

Envelope	Pencil	Crayon	Scissors
_____ inches _____ centimeters	_____ inches _____ centimeters	_____ inches _____ centimeters	_____ inches _____ centimeters

c. The envelope is _____ centimeters longer than the crayon.

d. For each measurement, which is greater, the number of inches or the number of centimeters?
_____

e. Explain why.

2. Circle the appropriate tool for measuring each object.

a.	The length of a book:	12-inch ruler	yardstick
b.	The height of a flagpole:	12-inch ruler	yardstick
c.	The length of a paper clip:	12-inch ruler	yardstick
d.	The height of a doorway:	12-inch ruler	yardstick

3. a. What number is represented as Point A on the number line? _____

b. What is the distance between A and B? _____

c. What is 40 less than the number marked by Point C? Mark it as Point D on the number line.

4. Use the tables below to graph the data.

   a. Draw and label a line plot to show the length of the pencils in the table.

Length in Inches	Number of Pencils
1 inch	0
2 inches	2
3 inches	4
4 inches	4
5 inches	3
6 inches	2
7 inches	5

Title _____

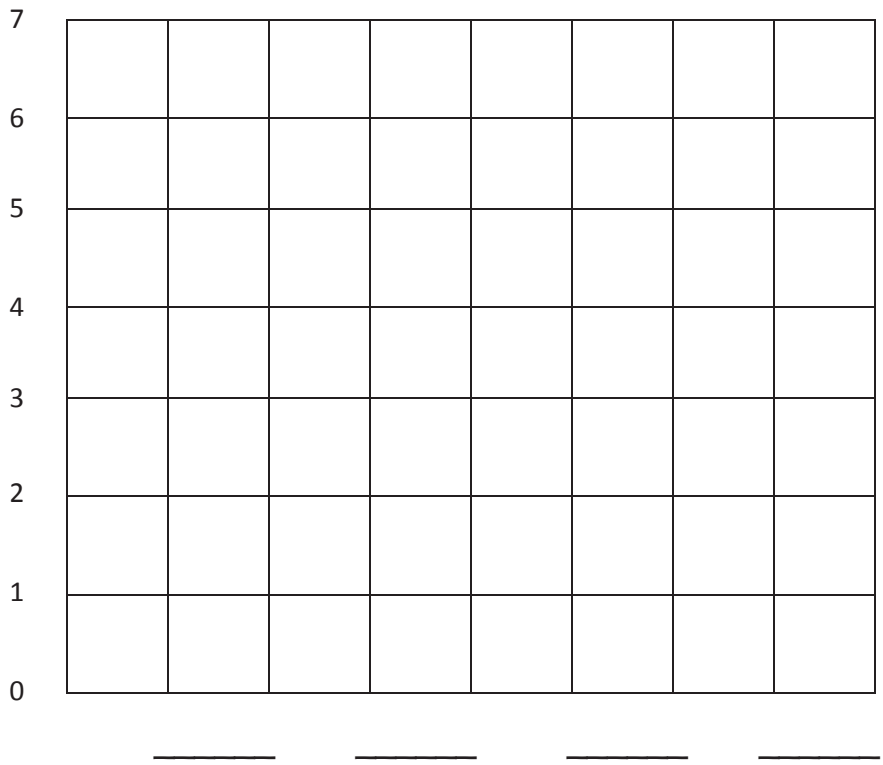
---

   b. Find the total number of pencils measured. _____

c. Draw and label a bar graph to show the number of pencils in each student's desk.

Student Name	Jill	Sven	Rocco	Lyla
Number of Pencils	4	2	5	1

Title: _____



5. Draw a picture, and write a number sentence to solve.

a. The height of the dog's doorway is 19 inches. The height of the family's doorway is 78 inches. How much taller is the family's doorway than the dog's doorway?

b. Albert saved 42 cents last week. This week, he added a quarter, 2 dimes, and 13 pennies to his savings. How much money has Albert saved from the last two weeks? Write the answer using the $ or ¢ symbol.

End-of-Module Assessment Task Standards Addressed	Topics A–F

Use place value understanding and properties of operations to add and subtract.

2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

Measure and estimate lengths in standard units.

2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.

2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, …, and represent whole-number sums and differences within 100 on a number line diagram.

Work with time and money.

2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

Represent and interpret data.

2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Evaluating Student Learning Outcomes

A Progression Toward Mastery is provided to describe steps that illuminate the gradually increasing understandings that students develop *on their way to proficiency.* In this chart, this progress is presented from left (Step 1) to right (Step 4). The learning goal for students is to achieve Step 4 mastery. These steps are meant to help teachers and students identify and celebrate what the students CAN do now and what they need to work on next.

A Progression Toward Mastery				
Assessment Task Item and Standards Assessed	**STEP 1 Little evidence of reasoning without a correct answer. (1 Point)**	**STEP 2 Evidence of some reasoning without a correct answer. (2 Points)**	**STEP 3 Evidence of some reasoning with a correct answer or evidence of solid reasoning with an incorrect answer. (3 Points)**	**STEP 4 Evidence of solid reasoning with a correct answer. (4 Points)**
1 **2.MD.2** **2.MD.3** **2.MD.4**	The student answers fewer than four out of eight parts correctly.	The student answers four or five out of eight parts correctly.	The student answers six or seven out of eight parts correctly.	The student correctly: a. Estimates the length of each item. b. Measures to the nearest whole unit to answer: ▪ The envelope is about 4 in and 10 cm. ▪ The pencil is about 6 in and 15 cm. ▪ The crayon is about 3 in and 8 cm. ▪ The scissors are about 5 in and 13 cm. c. Answers that the envelope is 2 cm longer than the crayon. d. Answers centimeters.

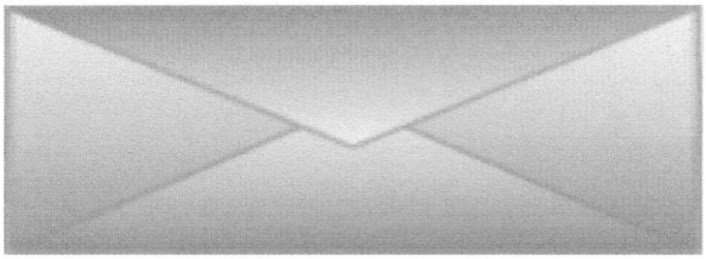
A Progression Toward Mastery				
				e. Explains that centimeters have a smaller length unit than inches, so there are more centimeters than inches.
2 **2.MD.1**	The student answers one out of four parts correctly.	The student answers two out of four parts correctly.	The student answers three out of four parts correctly.	The student correctly answers: a. 12-inch ruler. b. Yardstick. c. 12-inch ruler. d. Yardstick.
3 **2.MD.6**	The student answers zero out of three parts correctly.	The student answers one out of three parts correctly.	The student answers two out of three parts correctly.	The student correctly: a. Answers 40. b. Answers 25. c. Labels D on the number line at 35.
4 **2.MD.9** **2.MD.10**	The student answers one out of five parts correctly.	The student answers two or three out of five parts correctly.	The student answers four out of five parts correctly.	The student correctly: a. Draws and labels a line plot to represent the given data. b. Answers 20 pencils. c. Draws and labels a bar graph to represent the given data.
5 **2.MD.5** **2.MD.8** **2.NBT.5**	The student answers one out of six parts correctly.	The student answers two or three out of six parts correctly.	The student answers four or five out of six parts correctly.	The student correctly: a. Draws a picture (e.g., tape diagram), writes a number sentence, and solves to get 59 inches. b. Draws a picture, writes a number sentence, and solves to get $1 or 100¢.

Name Teri Date

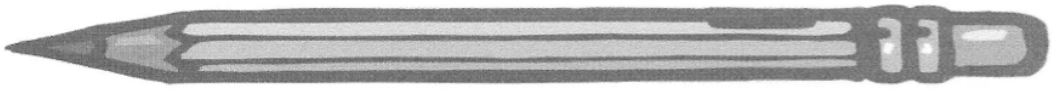
Note: Do not pass out rulers until after students complete Problem 1(a).

1. a. Estimate the length of each item in inches.

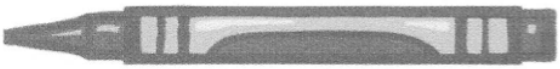
The envelope is about 4 inches.



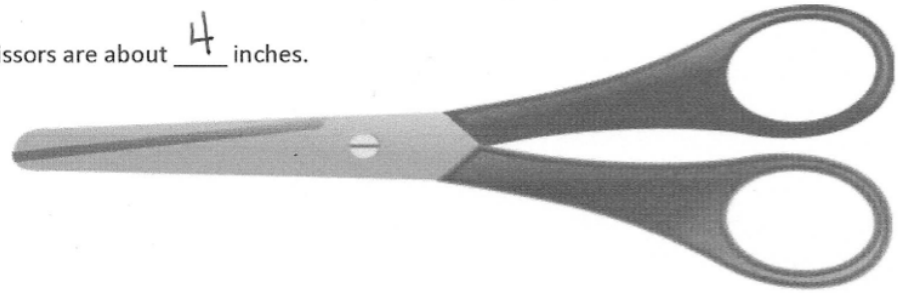
The pencil is about 5 inches.



The crayon is about 3 inches.



The scissors are about 4 inches.



b. Use a ruler to measure the length of the items above using inches and then centimeters. Round to the nearest unit, and then record the measurements in the table.

Envelope	Pencil	Crayon	Scissors
4 inches 10 centimeters	6 inches 15 centimeters	3 inches 8 centimeters	5 inches 13 centimeters

c. The envelope is 2 centimeters longer than the crayon.

d. For each measurement, which is greater, the number of inches or the number of centimeters?
Centimeters

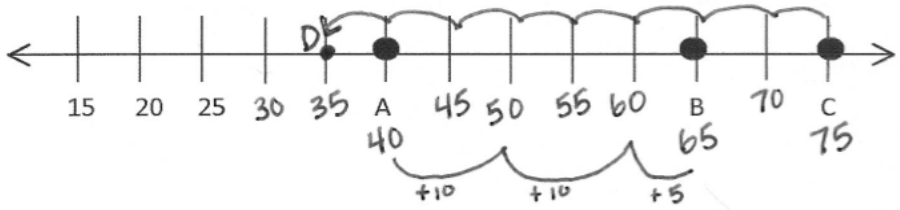
e. Explain why.

Centimeters have a shorter length unit than inches so more centimeters are needed to measure than inches.

2. Circle the appropriate tool for measuring each object.

a. The length of a book:	(12-inch ruler)	yardstick
b. The height of a flagpole:	12-inch ruler	(yardstick)
c. The length of a paper clip:	(12-inch ruler)	yardstick
d. The height of a doorway:	12-inch ruler	(yardstick)

3. a. What number is represented as Point A on the number line? 40



b. What is the distance between A and B? 25

10 + 10 + 5 = 25

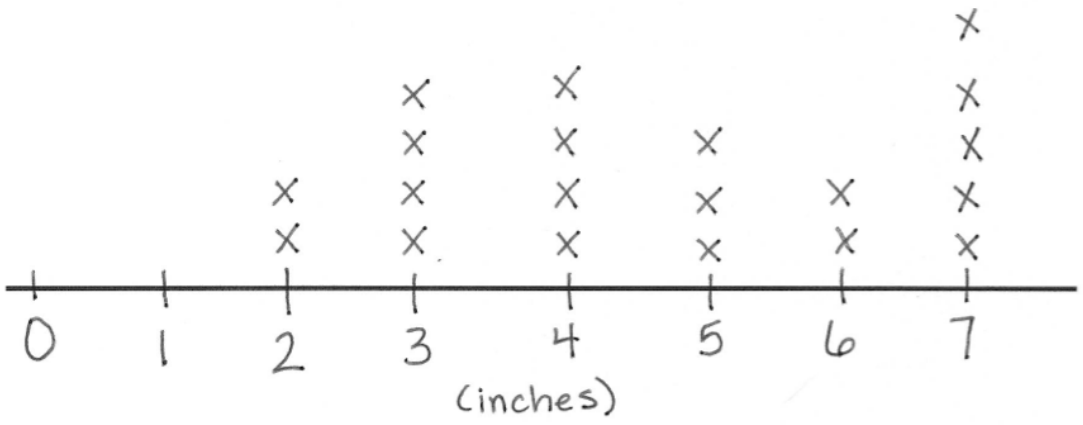
c. What is 40 less than the number marked by Point C? Mark it as Point D on the number line.

75 − 40 = 35

4. Use the tables below to graph the data.
   a. Draw and label a line plot to show the length of the pencils in the table.

Length in inches	Number of Pencils
1 inch	0
2 inches	2
3 inches	4
4 inches	4
5 inches	3
6 inches	2
7 inches	5

Title Pencil Lengths

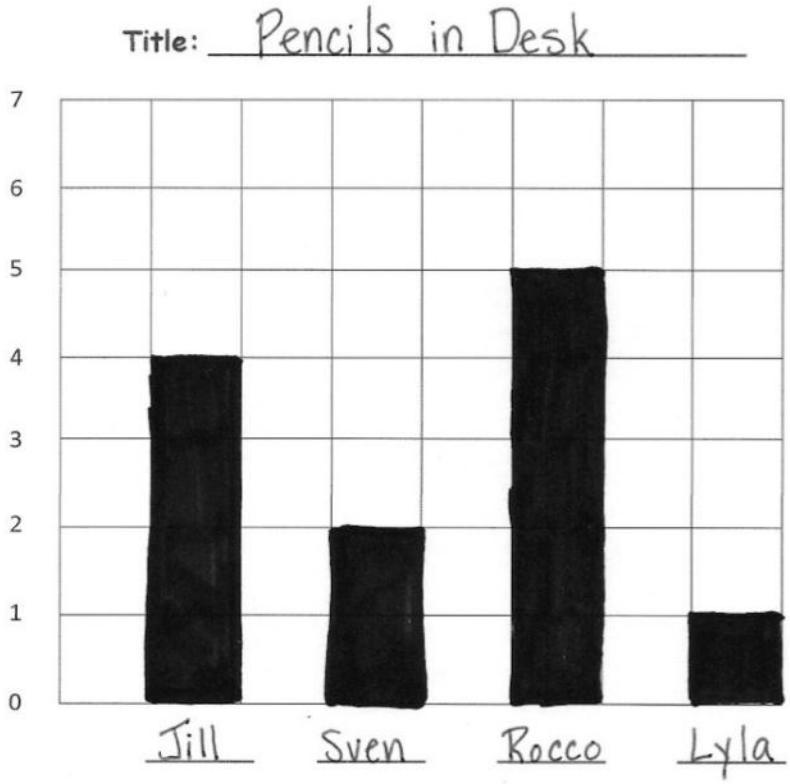


b. Find the total number of pencils measured. 20

2 + 8 + 5 + 5
10 + 10 = 20

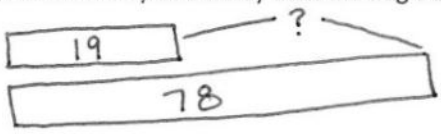
c. Draw and label a bar graph to show the number of pencils in each student's desk.

Student Name	Jill	Sven	Rocco	Lyla
Number of Pencils	4	2	5	1



5. Draw a picture and write a number sentence to solve.

a. The height of the dog's doorway is 19 inches. The height of the family's doorway is 78 inches. How much taller is the family's doorway than the dog's doorway?



$78 - 19 = 59$

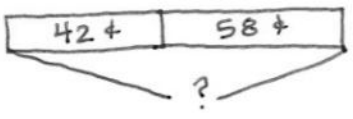
59 inches

The family's doorway is 59 inches taller.

b. Albert saved 42 cents last week. This week he added a quarter, 2 dimes, and 13 pennies to his savings. How much money has Albert saved from the last two weeks? Write the answer using the $ or ¢ symbol.

$25¢ + 20¢ + 13¢$

$45¢ + 13¢ = 58¢$



$42 + 58 = 100$

$1 or 100¢

Albert saved $1.

Answer Key

GRADE 2 • MODULE 7

Problem Solving with Length, Money, and Data

Lesson 1

Core Fluency Practice Set A

1.	12	11.	20	21.	16	31.	15
2.	17	12.	18	22.	13	32.	18
3.	15	13.	19	23.	12	33.	12
4.	14	14.	14	24.	14	34.	12
5.	17	15.	11	25.	11	35.	11
6.	14	16.	13	26.	14	36.	16
7.	17	17.	15	27.	12	37.	14
8.	18	18.	17	28.	11	38.	11
9.	19	19.	15	29.	13	39.	17
10.	18	20.	16	30.	15	40.	14

Core Fluency Practice Set B

1.	16	11.	19	21.	11	31.	12
2.	19	12.	16	22.	13	32.	6
3.	17	13.	18	23.	5	33.	14
4.	13	14.	12	24.	4	34.	16
5.	16	15.	15	25.	6	35.	16
6.	20	16.	9	26.	8	36.	12
7.	17	17.	6	27.	12	37.	9
8.	6	18.	4	28.	17	38.	10
9.	3	19.	15	29.	10	39.	5
10.	17	20.	13	30.	12	40.	7

Core Fluency Practice Set C

1.	10	11.	8	21.	8	31.	4
2.	10	12.	11	22.	9	32.	5
3.	5	13.	12	23.	9	33.	7
4.	8	14.	9	24.	8	34.	4
5.	10	15.	9	25.	9	35.	4
6.	1	16.	7	26.	9	36.	3
7.	4	17.	7	27.	9	37.	1
8.	10	18.	9	28.	5	38.	6
9.	3	19.	9	29.	8	39.	6
10.	4	20.	8	30.	7	40.	8

Core Fluency Practice Set D

1.	10	11.	9	21.	9	31.	5
2.	4	12.	8	22.	9	32.	9
3.	8	13.	8	23.	11	33.	7
4.	6	14.	9	24.	8	34.	5
5.	5	15.	7	25.	9	35.	8
6.	2	16.	11	26.	4	36.	9
7.	9	17.	8	27.	7	37.	6
8.	9	18.	9	28.	7	38.	13
9.	7	19.	8	29.	8	39.	9
10.	8	20.	7	30.	8	40.	12

Core Fluency Practice Set E

1.	20	11.	8	21.	6	31.	6
2.	18	12.	13	22.	3	32.	3
3.	17	13.	18	23.	9	33.	8
4.	19	14.	13	24.	19	34.	9
5.	14	15.	12	25.	17	35.	5
6.	16	16.	13	26.	20	36.	13
7.	7	17.	13	27.	12	37.	11
8.	8	18.	5	28.	17	38.	15
9.	9	19.	7	29.	12	39.	13
10.	8	20.	6	30.	7	40.	12

Problem Set

1. 2; 3; 4
2. 4; 3
3. a. 19
   b. 8
   c. 8
   d. 3
4. a. 14
   b. 9
   c. 25
   d. 10
   e. 6

Exit Ticket

1. 21
2. 13
3. 38
4. 7

Homework

1. 1; 3; 3
2. 4; 3
3. a. 6
   b. 20
   c. 5
   d. 8
   e. 26
4. a. 31
   b. 1
   c. 49
   d. 3

Lesson 2

Problem Set

1. Correctly completed picture graph with title, categories, and legend
   a. 6
   b. 7
   c. 8
   d. Answers will vary.
2. Correctly completed picture graph with title, categories, and legend
   a. 8
   b. 15
   c. Answers will vary.

Exit Ticket

Correctly completed picture graph with title, categories, and legend

a. 4

b. 5

c. 4

Homework

1. Correctly completed picture graph with title, categories, and legend
   a. 4
   b. 2
   c. 3
   d. Answers will vary.
2. Correctly completed picture graph with title, categories, and legend
   a. 8
   b. 15
   c. Answers will vary.

Lesson 3

Sprint

Side A

1.	5	12.	40	23.	15	34.	60
2.	10	13.	35	24.	20	35.	55
3.	15	14.	30	25.	25	36.	50
4.	20	15.	25	26.	30	37.	65
5.	25	16.	20	27.	35	38.	70
6.	30	17.	15	28.	40	39.	65
7.	35	18.	10	29.	45	40.	60
8.	40	19.	5	30.	50	41.	150
9.	45	20.	0	31.	50	42.	200
10.	50	21.	5	32.	100	43.	150
11.	45	22.	10	33.	55	44.	100

Side B

1.	5	12.	40	23.	15	34.	60
2.	10	13.	35	24.	20	35.	55
3.	15	14.	30	25.	25	36.	50
4.	20	15.	25	26.	30	37.	65
5.	25	16.	20	27.	35	38.	70
6.	30	17.	15	28.	40	39.	65
7.	35	18.	10	29.	45	40.	60
8.	40	19.	5	30.	50	41.	150
9.	45	20.	0	31.	50	42.	200
10.	50	21.	5	32.	100	43.	150
11.	45	22.	10	33.	55	44.	100

Problem Set

1. Correctly completed bar graph with title, bars, categories, and number scale
   a. 3
   b. 9
   c. 3
   d. Answers will vary.
2. Correctly completed bar graph with title, bars, categories, and number scale
   a. 13
   b. 26
   c. 16
   d. Answers will vary.

Exit Ticket

Correctly complete bar graph with title, bars, categories, and number scale

a. 6

b. 7

Homework

1. Correctly completed bar graph with title, bars, categories, and number scale
   a. 4
   b. Fur and feathers; 2 more
   c. Answers will vary.
2. Correctly completed bar graph with title, bars, categories, and number scale
   a. 31
   b. 6
   c. 22
   d. Answers will vary.

Lesson 4

Sprint

Side A

1.	10	12.	30	23.	40	34.	15
2.	15	13.	25	24.	20	35.	40
3.	20	14.	20	25.	45	36.	20
4.	25	15.	15	26.	20	37.	45
5.	30	16.	10	27.	45	38.	25
6.	35	17.	5	28.	15	39.	50
7.	40	18.	5	29.	40	40.	60
8.	45	19.	30	30.	10	41.	55
9.	50	20.	10	31.	35	42.	60
10.	40	21.	35	32.	5	43.	65
11.	35	22.	15	33.	30	44.	70

Side B

1.	15	12.	25	23.	20	34.	20
2.	20	13.	20	24.	40	35.	45
3.	25	14.	15	25.	25	36.	25
4.	30	15.	10	26.	20	37.	50
5.	35	16.	5	27.	45	38.	15
6.	40	17.	5	28.	15	39.	40
7.	45	18.	30	29.	40	40.	55
8.	50	19.	10	30.	10	41.	60
9.	40	20.	35	31.	30	42.	65
10.	35	21.	15	32.	5	43.	60
11.	30	22.	40	33.	30	44.	65

Problem Set

1. Correctly completed bar graph with title, categories, bars, and number scale
   a. 5
   b. 5
   c. Spiders
   d. 38
   e. 14
2. Correctly completed bar graph with title, categories, bars, and number scale
   a. 7
   b. 6
   c. 12
   d. Answers will vary.

Exit Ticket

Correctly completed bar graph with title, categories, bars, and number scale

a. 3

b. 36

Homework

1. Correctly completed bar graph with title, categories, bars, and number scale
   a. 39
   b. 17
   c. 9
   d. Answers will vary.
2. Correctly completed bar graph with title, categories, bars, and number scale
   a. 8
   b. 4
   c. Answers will vary.

Lesson 5

Activity Sheet 1

Correctly completed bar graph with title, categories, bars, and number scale

a. 36

b. 18

c. 4¢

d. She will have 20 pennies saved on Sunday.

e. Questions will vary.

Activity Sheet 2

Correctly completed bar graph with title, categories, bars, and number scale

a. 38

b. 65¢

c. 6

d. Annie and Scarlett

e. Questions will vary.

Activity Sheet 3

Answers will vary.

Problem Set

1. Correctly completed bar graph with title, categories, bars, and number scale
   a. 4
   b. 15
   c. Emily and Ava are circled; 3
   d. 39
2. Correctly completed bar graph with title, categories, bars, and number scale
   a. 3
   b. 13
   c. 14
   d. 50

Exit Ticket

Correctly completed bar graph with title, categories, bars, and number scale

a. 5

b. 6

Homework

1. Correctly completed bar graph with title, categories, bars, and number scale
   a. 3
   b. 6
   c. Justin and Melissa are circled; 3
   d. 41
2. Correctly completed bar graph with title, categories, bars, and number scale
   a. 13
   b. 16
   c. 15
   d. 50

Lesson 6

Problem Set

1. 8¢
2. 14¢
3. 25¢
4. 19¢
5. 31¢
6. 36¢
7. 52¢
8. 20¢
9. 12¢
10. 27¢
11. 37¢
12. 70¢
13. 56¢
14. 100¢ or $1
15. 95¢

Exit Ticket

1. 92¢
2. 70¢
3. 66¢
4. 73¢

Homework

1. 9¢
2. 13¢
3. 30¢
4. 23¢
5. 27¢
6. 37¢
7. 61¢
8. 17¢
9. 12¢
10. 37¢
11. 36¢
12. 55¢
13. 61¢
14. 97¢
15. 68¢

Lesson 7

Sprint

Side A

1. 7	12. 8	23. 2	34. 6
2. 8	13. 9	24. 3	35. 7
3. 9	14. 3	25. 8	36. 9
4. 8	15. 4	26. 2	37. 2
5. 9	16. 5	27. 3	38. 5
6. 5	17. 8	28. 4	39. 6
7. 6	18. 4	29. 8	40. 9
8. 7	19. 5	30. 4	41. 1
9. 9	20. 6	31. 7	42. 4
10. 6	21. 8	32. 9	43. 5
11. 7	22. 1	33. 3	44. 9

Side B

1. 8	12. 6	23. 4	34. 8
2. 9	13. 9	24. 5	35. 3
3. 6	14. 5	25. 9	36. 6
4. 7	15. 6	26. 1	37. 8
5. 8	16. 7	27. 2	38. 2
6. 9	17. 9	28. 3	39. 5
7. 7	18. 2	29. 9	40. 6
8. 8	19. 3	30. 5	41. 8
9. 9	20. 4	31. 8	42. 1
10. 4	21. 9	32. 4	43. 7
11. 5	22. 3	33. 7	44. 8

Problem Set

1. 52¢
2. 69¢
3. 94¢
4. 38¢
5. 91¢
6. 26¢

Exit Ticket

1. 65¢
2. 75¢

Homework

1. 71¢
2. 73¢
3. 21¢
4. 36¢
5. 87¢
6. 33¢

Lesson 8

Sprint

Side A

1.	11	12.	12	23.	11	34.	13
2.	12	13.	13	24.	12	35.	13
3.	13	14.	17	25.	11	36.	14
4.	16	15.	17	26.	12	37.	14
5.	16	16.	11	27.	11	38.	15
6.	11	17.	15	28.	12	39.	15
7.	12	18.	11	29.	11	40.	12
8.	13	19.	12	30.	15	41.	14
9.	18	20.	14	31.	13	42.	16
10.	18	21.	14	32.	15	43.	18
11.	11	22.	16	33.	15	44.	13

Side B

1.	11	12.	12	23.	11	34.	14
2.	12	13.	13	24.	12	35.	14
3.	13	14.	15	25.	11	36.	15
4.	19	15.	15	26.	12	37.	15
5.	19	16.	11	27.	14	38.	16
6.	11	17.	14	28.	11	39.	16
7.	12	18.	11	29.	12	40.	12
8.	13	19.	12	30.	11	41.	14
9.	17	20.	14	31.	13	42.	16
10.	17	21.	14	32.	13	43.	18
11.	11	22.	18	33.	13	44.	13

Problem Set

1. $24
2. $51
3. $25
4. $35
5. $11
6. $28

Exit Ticket

1. $35
2. $78

Homework

1. $61
2. $70
3. $84
4. $7
5. $60
6. $26

Lesson 9

Problem Set

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. Answers will vary, showing combinations that make 60¢.
7. Answers will vary, showing combinations that make $1.

Exit Ticket

Answers will vary.

Homework

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. Answers will vary, showing combinations that make 69¢.
7. Answers will vary, showing combinations that make $1.

Lesson 10

Problem Set

1. (b) circled; 2 nickels for 1 dime
2. Answers will vary; 2 dimes
3. Answers will vary; 1 quarter and 1 dime
4. Answers will vary; 1 quarter, 2 dimes, and 1 penny
5. Answers will vary; 2 quarters, 2 dimes, and 3 pennies
6. Answers will vary; 3 quarters and 1 dime
7. (a) and (b) circled; (b) starred
8. 2 quarters, 1 nickel, and 1 penny

Exit Ticket

1. Answers will vary; 1 quarter, 1 dime, and 1 penny
2. Answers will vary; 2 quarters, 2 dimes, and 4 pennies

Homework

1. (b) circled; 2 dimes and a nickel for a quarter
2. Answers will vary; 1 quarter, 1 dime, and 1 nickel
3. Answers will vary; 2 quarters and 1 nickel
4. Answers will vary; 2 quarters, 1 dime, 1 nickel, and 1 penny
5. Answers will vary; 3 quarters and 1 nickel
6. Answers will vary; 4 quarters
7. 9 dimes, 1 penny is circled; explanations will vary.

Lesson 11

Sprint

Side A

1. 1	12. 3	23. 10	34. 8
2. 2	13. 10	24. 9	35. 10
3. 3	14. 9	25. 8	36. 9
4. 9	15. 8	26. 6	37. 8
5. 10	16. 7	27. 10	38. 7
6. 10	17. 5	28. 9	39. 7
7. 10	18. 10	29. 8	40. 4
8. 10	19. 9	30. 7	41. 9
9. 9	20. 8	31. 5	42. 2
10. 8	21. 7	32. 10	43. 7
11. 7	22. 3	33. 9	44. 6

Side B

1. 10	12. 4	23. 10	34. 8
2. 10	13. 10	24. 9	35. 7
3. 10	14. 9	25. 8	36. 10
4. 10	15. 8	26. 7	37. 9
5. 1	16. 7	27. 5	38. 8
6. 2	17. 4	28. 10	39. 6
7. 3	18. 10	29. 9	40. 9
8. 8	19. 9	30. 8	41. 3
9. 9	20. 8	31. 6	42. 6
10. 8	21. 7	32. 10	43. 3
11. 7	22. 4	33. 9	44. 7

Problem Set

1. a. 55¢; 50, 50
   b. 85¢; arrow way answers will vary.
   c. 43¢; arrow way answers will vary.
   d. 29¢; arrow way answers will vary.
2. a. 21¢; 21¢; arrow way answers will vary.
   b. 36¢; arrow way answers will vary.
   c. 70¢; arrow way answers will vary.
3. a. 67¢
   b. 45¢
   c. 72¢
   d. 57¢
   e. 81¢

Exit Ticket

1. 54¢
2. 36¢
3. 87 cents

Homework

1. a. 75¢; 30¢, 70¢
   b. 55¢; arrow way answers will vary.
   c. 38¢; arrow way answers will vary.
   d. 21¢; arrow way answers will vary.
2. a. 81¢; arrow way answers will vary.
   b. 23¢; arrow way answers will vary.
   c. 47¢; arrow way answers will vary.
3. a. 62¢
   b. 35¢
   c. 59¢
   d. 73¢
   e. 86¢

Lesson 12

Sprint

Side A

1.	11	12.	12	23.	11	34.	13
2.	12	13.	13	24.	12	35.	13
3.	13	14.	17	25.	11	36.	14
4.	16	15.	17	26.	12	37.	14
5.	16	16.	11	27.	11	38.	15
6.	11	17.	15	28.	12	39.	15
7.	12	18.	11	29.	11	40.	12
8.	13	19.	12	30.	15	41.	14
9.	18	20.	14	31.	13	42.	16
10.	18	21.	14	32.	15	43.	18
11.	11	22.	16	33.	15	44.	13

Side B

1.	11	12.	12	23.	11	34.	14
2.	12	13.	13	24.	12	35.	14
3.	13	14.	15	25.	11	36.	15
4.	19	15.	15	26.	12	37.	15
5.	19	16.	11	27.	14	38.	16
6.	11	17.	14	28.	11	39.	16
7.	12	18.	11	29.	12	40.	12
8.	13	19.	12	30.	11	41.	14
9.	17	20.	14	31.	13	42.	16
10.	17	21.	14	32.	13	43.	18
11.	11	22.	18	33.	13	44.	13

Problem Set

1. 20¢
2. 65¢
3. 25¢
4. 45¢
5. 39¢
6. Answers will vary.

Exit Ticket

13¢

Homework

1. 51¢
2. 55¢
3. 25¢
4. 49¢
5. 47¢
6. 62¢
7. 59¢

Lesson 13

Problem Set

1. A quarter
2. $76
3. $19
4. $63
5. 5 dimes and a nickel
6. 7 nickels

Exit Ticket

Types of bills will vary to represent $36.

Homework

1. 18¢
2. 57¢
3. A quarter and a dime
4. $71
5. $45
6. $79

Lesson 14

Problem Set

1. Answers will vary.
2. Melissa's work is circled; explanations will vary.

Exit Ticket

Line A: 4

Line B: 6

Line C: 5

Homework

1. Answers will vary.
2. Answers will vary.
3. 5 inch tiles

Lesson 15

Sprint

Side A

1.	2	12.	16	23.	6	34.	88
2.	4	13.	14	24.	8	35.	66
3.	6	14.	12	25.	10	36.	44
4.	8	15.	10	26.	12	37.	22
5.	10	16.	8	27.	14	38.	0
6.	12	17.	6	28.	16	39.	22
7.	14	18.	4	29.	18	40.	44
8.	16	19.	2	30.	20	41.	66
9.	18	20.	0	31.	22	42.	88
10.	20	21.	2	32.	44	43.	666
11.	18	22.	4	33.	66	44.	444

Side B

1.	2	12.	16	23.	6	34.	88
2.	4	13.	14	24.	8	35.	66
3.	6	14.	12	25.	10	36.	44
4.	8	15.	10	26.	12	37.	22
5.	10	16.	8	27.	14	38.	0
6.	12	17.	6	28.	16	39.	22
7.	14	18.	4	29.	18	40.	44
8.	16	19.	2	30.	20	41.	66
9.	18	20.	0	31.	22	42.	88
10.	20	21.	2	32.	44	43.	444
11.	18	22.	4	33.	66	44.	666

Problem Set

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. A: 5; B: 4; C: 3
   a. C
   b. 5
   c. 7
   d. 2
7. a. 12
   b. 7
   c. 8

Exit Ticket

A: 4; B: 2; C: 2; D: 5

4

Homework

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. a. 5
   b. 2
   c. 3
   d. 1
   e. 3
   f. 2
   g. 1
   h. 6

Lesson 16

Sprint

Side A

1.	3	12.	24	23.	9	34.	99
2.	6	13.	21	24.	12	35.	66
3.	9	14.	18	25.	15	36.	33
4.	12	15.	15	26.	18	37.	666
5.	15	16.	12	27.	21	38.	0
6.	18	17.	9	28.	24	39.	33
7.	21	18.	6	29.	27	40.	33
8.	24	19.	3	30.	30	41.	36
9.	27	20.	0	31.	33	42.	39
10.	30	21.	3	32.	66	43.	96
11.	27	22.	6	33.	99	44.	99

Side B

1.	3	12.	24	23.	9	34.	99
2.	6	13.	21	24.	12	35.	66
3.	9	14.	18	25.	15	36.	33
4.	12	15.	15	26.	18	37.	666
5.	15	16.	12	27.	21	38.	0
6.	18	17.	9	28.	24	39.	33
7.	21	18.	6	29.	27	40.	33
8.	24	19.	3	30.	30	41.	36
9.	27	20.	0	31.	33	42.	39
10.	30	21.	3	32.	66	43.	69
11.	27	22.	6	33.	99	44.	99

Problem Set

Recording Sheets serve as Problem Set.

Exit Ticket

Inch; foot; inch; yard; inch; foot

Homework

1. Foot; inch; inch; foot; yard; inch
2. a. More than
   b. About the same as
   c. About the same as
   d. Less than
3. Answers will vary.
4. Answers will vary.

Lesson 17

Problem Set

All answers will vary.

Exit Ticket

Answers will vary.

Homework

All answers will vary.

Lesson 18

Grade 2 Core Fluency Differentiated Practice Sets

See Lesson 1 Answer Key.

Problem Set

1. 13 cm; 5 in
2. 11 cm; 4 in
3. 15 cm; 6 in
4. 8 cm; 3 in
5. a. Centimeters
   b. Explanations will vary.
6. a. Line drawn measuring 3 cm
   b. Line drawn measuring 3 in
7. Explanations will vary.

Exit Ticket

1. 10 cm; 4 in
2. 15 cm; 6 in

Homework

1. 15 cm; 6 in
2. 10 cm; 4 in
3. 8 cm; 3 in
4. 13 cm; 5 in
5. a. Line drawn measuring 5 cm
   b. Line drawn measuring 5 in
6. a. Line drawn measuring 7 in
   b. Line drawn measuring 7 cm
7. Explanations will vary.
8. Lines drawn measuring 9 cm and 4 in

Lesson 19

Sprint

Side A

1. 9	12. 58	23. 15	34. 9
2. 8	13. 6	24. 85	35. 79
3. 18	14. 7	25. 3	36. 8
4. 38	15. 17	26. 4	37. 68
5. 8	16. 67	27. 24	38. 8
6. 9	17. 5	28. 2	39. 78
7. 19	18. 6	29. 3	40. 7
8. 49	19. 16	30. 33	41. 87
9. 7	20. 76	31. 1	42. 9
10. 8	21. 4	32. 2	43. 39
11. 18	22. 5	33. 42	44. 59

Side B

1. 8	12. 68	23. 15	34. 9
2. 18	13. 6	24. 35	35. 89
3. 28	14. 7	25. 3	36. 8
4. 48	15. 17	26. 4	37. 38
5. 8	16. 77	27. 44	38. 8
6. 9	17. 5	28. 2	39. 58
7. 19	18. 6	29. 3	40. 7
8. 59	19. 16	30. 53	41. 77
9. 7	20. 86	31. 1	42. 9
10. 8	21. 4	32. 2	43. 69
11. 18	22. 5	33. 22	44. 49

Problem Set

1. 5 in; 2 in; 5, 2, 3
2. 3 in; 6 in; 3, 6, 3
3. a. 55 ft
   b. 39 ft
   c. 61 ft
4. a. 83
   b. 137

Exit Ticket

5; 6; 1; shorter

Homework

1. 5; 3; 2
2. 4; 3; 1
3. a. 3; 3
   b. 11; 19 cm – 8 cm = 11 cm
   c. 9; 8 cm + 9 cm = 17 cm
   d. 12; 18 cm – 6 cm = 12 cm
   e. 5; 7 in – 2 in = 5 in
   f. 4; 8 in + 4 in = 12 in

Lesson 20

Sprint

Side A

1.	7	12.	19	23.	21	34.	32
2.	17	13.	59	24.	26	35.	52
3.	6	14.	58	25.	2	36.	48
4.	16	15.	56	26.	20	37.	46
5.	3	16.	5	27.	21	38.	30
6.	13	17.	15	28.	28	39.	20
7.	23	18.	25	29.	40	40.	20
8.	53	19.	65	30.	44	41.	56
9.	51	20.	67	31.	30	42.	23
10.	8	21.	2	32.	37	43.	49
11.	9	22.	20	33.	30	44.	67

Side B

1.	6	12.	16	23.	31	34.	42
2.	16	13.	56	24.	36	35.	72
3.	5	14.	57	25.	3	36.	68
4.	15	15.	59	26.	30	37.	66
5.	2	16.	8	27.	31	38.	40
6.	12	17.	18	28.	37	39.	30
7.	22	18.	28	29.	30	40.	20
8.	52	19.	68	30.	34	41.	53
9.	51	20.	69	31.	20	42.	27
10.	5	21.	3	32.	25	43.	48
11.	6	22.	30	33.	40	44.	47

Problem Set

1. 17 inches
2. 24 yards
3. 110 inches
4. 12 inches
5. 16 feet
6. 16 yards

Exit Ticket

71 inches

Homework

1. 3 inches
2. 32 yards
3. 129 inches
4. 24 inches
5. 20 feet
6. 12 yards

Lesson 21

Grade 2 Core Fluency Differentiated Practice Sets

See Lesson 1 Answer Key.

Problem Set

1. 5; 40 cm
2. 10; 65 cm
3. 5; 70 cm
4. 75; 30
5. 120; 60
6. 65; 60

Exit Ticket

1. 10; 90 cm
2. 50; 53

Homework

1. 5; 25 cm
2. 10; 75 cm
3. 10; 200 cm
4. 10; 410, 420
5. 60; 55
6. 60; 590

Lesson 22

Problem Set

1. a. 65 cm indicated, 95 cm indicated 3 marks to the right
   b. 75 cm indicated, 95 cm indicated 2 marks to the right
   c. 65 + 30 = 95 or 30 + 65 = 95; 75 + 20 = 95 or 20 + 75 = 95
2. a. 90 yards indicated, 65 yards indicated 5 marks to the left
   b. 100 yards indicated, 65 yards indicated 7 marks to the left
   c. 90 – 25 = 65; 100 – 35 = 65
3. 83 cm – 70 cm = 13 cm; explanations will vary.
4. 42 cm
5. Answers will vary.

Exit Ticket

1. 20 cm indicated, 45 cm indicated 1 mark to the right
2. 45 cm indicated, 5 cm indicated 2 marks to the left
3. 25 + 20 = 45 or 20 + 25 = 45; 45 – 40 = 5

Homework

1. a. 35 cm indicated, 55 cm indicated 2 marks to the right
   b. 65 cm indicated, 95 cm indicated 3 marks to the right
   c. 35 + 20 = 55 or 20 + 35 = 55; 65 + 30 = 95 or 30 + 65 = 95
2. a. 80 yards indicated, 45 yards indicated 7 marks to the left
   b. 100 yards indicated, 75 yards indicated 5 marks to the left
   c. 80 – 35 = 45; 100 – 25 = 75
3. 54 cm – 40 cm = 14 cm; explanations will vary.
4. Answers will vary.
5. 119 meter mark

Lesson 23

Sprint

Side A

1.	11	12.	12	23.	11	34.	13
2.	12	13.	13	24.	12	35.	13
3.	13	14.	17	25.	11	36.	14
4.	16	15.	17	26.	12	37.	14
5.	16	16.	11	27.	11	38.	15
6.	11	17.	15	28.	12	39.	15
7.	12	18.	11	29.	11	40.	12
8.	13	19.	12	30.	15	41.	14
9.	18	20.	14	31.	13	42.	16
10.	18	21.	14	32.	15	43.	18
11.	11	22.	16	33.	15	44.	13

Side B

1.	11	12.	12	23.	11	34.	14
2.	12	13.	13	24.	12	35.	14
3.	13	14.	15	25.	11	36.	15
4.	19	15.	15	26.	12	37.	15
5.	19	16.	11	27.	14	38.	16
6.	11	17.	14	28.	11	39.	16
7.	12	18.	11	29.	12	40.	12
8.	13	19.	12	30.	11	41.	14
9.	17	20.	14	31.	13	42.	16
10.	17	21.	14	32.	13	43.	18
11.	11	22.	18	33.	13	44.	13

Recording Sheet

Answers will vary.

Problem Set

1. Data appropriately recorded on the table:
   Shorter than 5 inches—4 tally marks
   Longer than 5 inches—1 tally mark
   Equal to 5 inches—2 tally marks
2. 2
3. 3
4. Answers will vary.

Exit Ticket

1. Data appropriately recorded on the table:
   Shorter than 5 inches—2 tally marks
   5 inches or longer—3 tally marks
2. 25

Homework

1. Answers will vary.
2. a. Data appropriately recorded on the table:
      Shorter than 4 inches—4 tally marks
      Longer than 4 inches—2 tally marks
      Equal to 4 inches—1 tally mark
   b. 3
   c. 2
   d. Answers will vary.

Lesson 24

Sprint

Side A

1.	2	12.	71	23.	1	34.	50
2.	12	13.	2	24.	11	35.	2
3.	22	14.	12	25.	51	36.	12
4.	52	15.	22	26.	60	37.	82
5.	2	16.	92	27.	1	38.	94
6.	12	17.	2	28.	11	39.	72
7.	22	18.	12	29.	21	40.	53
8.	62	19.	22	30.	61	41.	32
9.	1	20.	42	31.	4	42.	22
10.	11	21.	40	32.	14	43.	45
11.	21	22.	80	33.	74	44.	63

Side B

1.	1	12.	81	23.	1	34.	80
2.	11	13.	3	24.	11	35.	2
3.	21	14.	13	25.	61	36.	12
4.	51	15.	23	26.	30	37.	72
5.	3	16.	93	27.	1	38.	84
6.	13	17.	1	28.	11	39.	62
7.	23	18.	11	29.	21	40.	43
8.	63	19.	21	30.	71	41.	22
9.	1	20.	41	31.	4	42.	32
10.	11	21.	20	32.	14	43.	55
11.	21	22.	60	33.	74	44.	73

Problem Set

1. Line plot appropriately created using data in the table
   Answers will vary.
2. Line plot appropriately created using data in the table
   a. Answers will vary.
   b. 20
   c. 4
   d. Questions will vary.

Exit Ticket

Line plot appropriately created using data in the table

Homework

1. Line plot appropriately created using data in the table
   Answers will vary.
2. Line plot appropriately created using data in the table
   a. Answers will vary.
   b. 9
   c. 7
   d. Questions will vary.

Lesson 25

Problem Set

1. Line plot appropriately created using data in the chart
   a. 8 inches
   b. 10 are taller; 8 are shorter
2. Line plot appropriately created using data in the chart
   a. 28
   b. 4 ft
   c. Answers will vary.
   d. Answers will vary.

Exit Ticket

1. 39
2. 9
3. Answers will vary.

Homework

1. Line plot appropriately created using data in the chart
   a. 40
   b. Answers will vary.
2. Line plot appropriately created using data in the chart
   a. 18
   b. 15 inches
   c. Answers will vary.
   d. Answers will vary.

Lesson 26

Problem Set

1. a. 74 inches
   b. 31
   c. Answers will vary.
   d. Answers will vary.
   e. Table circled; answers will vary.
2. Line plot appropriately created using data in the table
   a. 34
   b. Answers will vary.
   c. Line plot circled; answers will vary.

Exit Ticket

Line plot appropriately created using data in the table

Homework

1. Line plot appropriately created using data in the table
   a. 30
   b. 11
   c. Answers will vary.
2. Table; answers will vary.
3. Line plot appropriately created using data in the table
   a. 24
   b. Answers will vary.