CCGPS Frameworks Student Edition

Mathematics

Second Grade Unit Four

Applying Base Ten Understanding

Dr. John D. Barge, State School Superintendent
"Making Education Work for All Georgians"

Unit 4: Applying Base Ten Understandings

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OVERVIEW

In this unit students will:

- continue to develop their understanding of and facility with addition and subtraction
- add up to 4 two-digit numbers.
- use a variety of models (base ten blocks- ones, tens, and hundreds only; diagrams; number lines; place value strategies; etc.) to add and subtract within one thousand.
- become fluent with mentally adding or subtracting 10 or 100 to a given three-digit number.
- demonstrate fluency with addition and subtraction.
- understand the relationship between addition and subtraction (inverse operations).
- represent three digit numbers with a variety of different models (base ten blocks- ones, tens, and hundreds only; diagrams; number lines; place value strategies; etc.).
- recognize and use place value to manipulate numbers.
- continue to develop their understanding of, and facility with, money.
- count with pennies, nickels, dimes, and dollar bills.
- represent a money amount with words or digits and symbols (either cent or dollar signs).
- represent and interpret data in picture and bar graphs.
- use information from a bar graph to solve addition and subtraction equations.

Children in second grade are usually familiar with numbers to one hundred and can count and write them with a degree of accuracy. They are beginning to understand the place value system. An important item to facilitate this understanding is the relationship between the numbers and groups of hundreds, tens and ones (for example, the number 142 means one group of one hundred, four groups of ten and two ones). However, students need to understand that place value is not simply how many ones, tens and hundreds there are in a given number. Literally speaking, place value refers to the notion that where a digit is placed in a given number will determine the number's value. As students understand the significance of the positions of digits in numbers, they can explain the meaning of each digit and its assigned value in each place. Having a thorough understanding of place value in this manner provides a foundation for operations with numbers. Also, when students know the same number can be represented by different equivalent groupings, they become more flexible with their use of numbers in operations (for example, fifty-three can be represented by five tens and three ones; four tens and thirteen ones; three tens and twenty-three ones; etc.). Taking numbers apart (decomposing) and recombining (composing) them in different ways is a significant skill for computation. Important tools used to develop and extend place value understandings include base ten blocks, tens frames, and 99's charts.

Students need to build on their flexible strategies for adding within 20 in Grade 1 to fluently add and subtract within 100, add up to four two-digit numbers, and find sums and differences less than or equal to 1000 using numbers 0 to 1000.

A large portion of the second grade standards emphasizes the importance of students developing a solid understanding of the relationship between addition and subtraction. An example of this is

when a child uses an addition strategy (counting on) to solve a subtraction problem. For example, how far is it from 16 to 75? You could add **4** to 16 to make 20, and then add **50** to get to 70, and finally **5** more to make the total of 75. The total added to 16 to make 75 is **59** (4 + 50 + 5 = 59). This process of adding on from 16 to get to 75 helps students focus on the distance between the two amounts. Using a linear model of an "open number line" (meaning a line that does not have designated numbers already on it) can help students act out the scenario described above. They can begin at 16, make a jump of 4 to land on 20; make a jump of 50 to land on 70; then a jump of 5 to finally arrive at 75! Totaling up the "jumps" produces the answer of 59. Using this model also helps students develop an understanding and recognize that ***subtraction can also be thought of as a comparison*** and not just as taking away, separating, or "subtracting" something.

STANDARDS FOR MATHEMATICAL CONTENT

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

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900**.**

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

Work with time and money

MCC.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

MCC.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[1] using information presented in a bar graph.

STANDARDS FOR MATHEMATICAL PRACTICE

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education.

Students are expected to:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

ENDURING UNDERSTANDINGS

- Addition and subtraction are inverse operations; one undoes the other.
- We can verify the results of our computation by using the inverse operation.
- Estimation helps us see whether or not our answers are reasonable.
- A numeral's meaning and value is based upon where digits are placed to write the numeral.
- Adding or subtracting ten from a given number changes the digit in the tens place of a given number but not the digit in the ones place of a given number. It also changes the value of the given number by either increasing or decreasing it in increments of ten.
- Adding or subtracting 100 from a given number changes the digit in the hundreds place of that given number but not the digits in the tens and ones places of that given number. It also changes the value of the given number by either increasing or decreasing it in increments of 100.
- Addition means the joining of two or more sets that may or may not be the same size. There are several types of addition problems, see the chart below.
- Subtraction has more than one meaning. It not only means the typical "take away" operation, but also can denote finding the distance between two amounts, i.e. comparison. Different subtraction situations are described in the chart below.
- Numbers may be represented in a variety of ways such as base ten blocks, diagrams, number lines, and expanded form.
- Place value can help to determine which numbers are larger or smaller than other numbers.
- Counting dollars is just like counting by ones and tens in our place value system.
- Counting coins can be connected to how we count by ones, fives, and tens.

ESSENTIAL QUESTIONS

- How can I keep track of an amount?
- How can I learn to quickly calculate sums in my head?
- How can I use a number line to add or subtract?
- How can I use a number line to figure out 10 more or less than a number?
- How can I use data to help me understand the answers to the questions posed?
- How can place value help us locate a number on the number line?
- How can we select among the most useful mental math strategies for the task we are trying to solve?
- How do we know if we have enough money to buy something?
- How does mental math help us calculate more quickly and develop an internal sense of numbers?
- If we have two or more numbers, how do we know which is greater?
- In what type of situations do we add?
- In what type of situations do we add?
- In what type of situations do we subtract?
- What are the different ways we can represent an amount of money?
- What are the different ways we can show or make (represent) a number?
- What estimation and mental math strategies can I use to help me solve real world problems?
- What happens to the value of a number when we add or subtract 10 from it? What digits change? What digits stay the same? Why?
- What happens to the value of a number when we add or subtract 100 from it? What digits change, what digits stay the same? Why?
- What is an effective way to estimate numbers?
- What is mental math?
- What is the difference between place and value?
- What mental math strategies are available to us?
- What strategies are helpful when estimating sums in the hundreds?
- What strategies will help me add multiple numbers quickly and accurately?
- What strategies will help me add numbers quickly and accurately?
- What type of graph should I use to display the data?
- Why do I need to ask questions and collect data?
- Why is it important to be able to count amounts of money?
- Why should we understand place value?

CONCEPTS AND SKILLS TO MAINTAIN

It is expected that students will have prior knowledge/experience related to the concepts and skills identified below. It may be necessary to pre-assess in order to determine if time needs to be spent on conceptual activities that help students develop a deeper understanding of these ideas.

In Grade 1, instructional time focused on four critical areas:

- Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20;
- Developing understanding of whole number relationships and place value, including grouping in tens and ones;
- Developing understanding of linear measurement and measuring lengths as iterating length units; and
- Reasoning about attributes of, and composing and decomposing geometric shapes.

Routine topics such as counting, time, money, positional words, patterns, and tallying should be addressed on an ongoing basis through the use of calendars, centers, and games. Organizing and graphing data, as stated in MCC.MD.10, should be incorporated in activities throughout the year. Students should be able to draw a picture graph and a bar graph to represent a data set with up to four categories, as well as solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

SELECTED TERMS AND SYMBOLS

The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, instructors should pay particular attention to them and how their students are able to explain and apply them.

The terms below are for **teacher reference only and are not to be memorized by the students**. Teachers should present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

- **addition**
- **addition and subtraction within 5, 10, 20, 100, or 1000**
- **associative property for addition**
- **bar graph**
- **commutative property for addition**
- **comparing**
- **compose**
- **concrete model**
- **counting strategy**
- **decompose**
- **difference**
- **dime**
- **dollar bill**
- **estimate**

- **expanded form**
- **fluency**
- **hundreds**
- **identity property for addition**
- **join**
- **line plot**
- **mental addition/subtraction**
- **nickel**
- **ones**
- **penny**
- **picture graph**
- **place value**
- **properties of operations**
- **quantity**
- **quarter**
- **remove**
- **scale**
- **strategy**
- **subtraction**
- **tens**

STRATEGIES FOR TEACHING AND LEARNING

(Information adapted from North Carolina DPI Instructional Support Tools)

In general:

- Students should be actively engaged by providing them with multiple opportunities to develop their own understanding, and encouraged to share their thinking on a regular basis.
- Mathematics should be represented in as many ways as possible by using graphs, tables, pictures, symbols, and words. The tasks that address the CCGPS for data in 2nd grade are embedded within each of the 2nd grade units.
- Appropriate manipulatives and technology should be used to enhance student learning.
- Students should be given opportunities to revise their work based on teacher feedback, peer feedback, and metacognition which includes self-assessment and reflection.
- Math journals are an excellent way for students to show what they are learning about a concept. These could be spiral bound notebooks that students draw or write in to describe the day's math lesson. Second graders love to go back and look at things they have done in the past, so journals could also serve as a tool for a nine week review, parent conferencing, as well as a tool for assessment.

Specific to the Common Core Standards:

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

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900**.**

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

Instructional Strategies
Provide many activities that will help students develop a strong understanding of number relationships, addition and subtraction, so they can develop, sharem and use efficient strategies for mental computation. An efficient strategy is one that can be done mentally and quickly. Students gain computational fluency, using efficient and accurate methods for computing, as they come to understand the role and meaning of arithmetic operations in number systems. Efficient mental processes become automatic with use.

Students need to build on their flexible strategies for adding within 100 in Grade 1, to fluently add and subtract within 100, add up to four two-digit numbers, and find sums and differences less than or equal to 1000, using numbers 0 to 1000.

Initially, students apply base-ten concepts and use direct modeling with physical objects or drawings to find different ways to solve problems. They move to inventing strategies that do not involve physical materials or counting by ones to solve problems. Student-invented strategies likely will be based on place-value concepts, the commutative and associative properties, and the relationship between addition and subtraction. These strategies should be done mentally or with a written record for support.

It is vital that student-invented strategies be shared, explored, recorded, and tried by others. Recording the expressions and equations in the strategies horizontally, encourages students to think about the numbers and the quantities they represent instead of the digits. Not every student will invent strategies, but all students can and will try strategies they have seen that make sense to them. Different students will prefer different strategies.

Students will decompose and compose tens and hundreds when they develop their own strategies for solving problems where regrouping is necessary. They might use the make-ten strategy (37 + 8 = 40 + 5 = 45, add 3 to 37 then 5) or (62 - 9 = 60 – 7 = 53, take off 2 to get 60, then 7 more) because no ones are exchanged for a ten or a ten for ones.

Have students analyze problems before they solve them. Present a variety of subtraction problems within 1000. Ask students to identify the problems requiring them to decompose the tens or hundreds to find a solution and explain their reasoning.

Work with time and money

MCC.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 Strategies
The topic of money begins at Grade 2 and builds on the work in other clusters in this and previous grades. Help students learn money concepts and solidify their understanding of other topics by providing activities where students make connections between them. For instance, link the value of a dollar bill as 100 cents to the concept of 100 and counting within 1000. Use play money - nickels, dimes, and dollar bills to skip count by 5s, 10s, and 100s. Reinforce place value concepts with the values of dollar bills, dimes, and pennies.

Students use the context of money to find sums and differences less than or equal to 100 using the numbers 0 to 100. They add and subtract to solve one- and two-step word problems involving money situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. Students use drawings and equations with a symbol for the unknown number to represent the problem. The dollar sign, $, is used for labeling whole-dollar amounts without decimals, such as $29.

Students need to learn the relationships between the values of a penny, nickel, dime, quarter and dollar bill.

Represent and interpret data

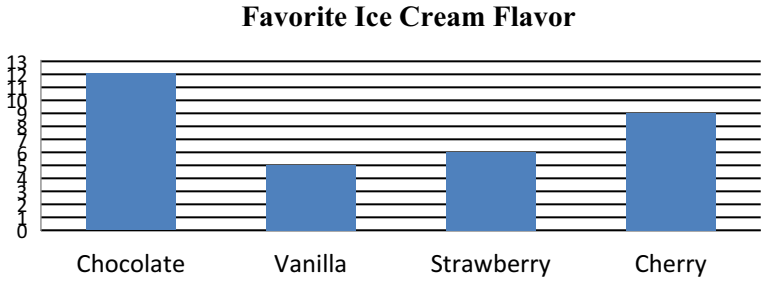
MCC.2.MD.10 Draw a **picture graph** and a **bar graph** (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems[2] using information presented in a bar graph**.**

Instructional Strategies

At first students should create real object and picture graphs so each row or bar consists of countable parts. These graphs show items in a category and do not have a numerical scale. For example, a real object graph could show the students' shoes (one shoe per student) lined end to end in horizontal or vertical rows by their color. Students would simply count to find how many shoes are in each row or bar. The graphs should be limited to 2 to 4 rows or bars. Students would then move to making horizontal or vertical bar graphs with two to four categories and a single-unit scale.

Flavor	Number of People
Chocolate	12
Vanilla	5
Strawberry	6
Cherry	9

Students display their data using a picture graph or bar graph using a single unit scale.



Favorite Ice Cream Flavor

Chocolate												
Vanilla												
Strawberry												
Cherry												
	1	2	3	4	5	6	7	8	9	10	11	

As students continue to develop their use of reading and interpreting data it is highly suggested to incorporate these standards into daily routines. It is not merely the making or filling out of the graph but the connections made from the date represented that builds and strengthens mathematical reasoning.

Students would then move to making horizontal or vertical bar graphs with two to four categories and a single-unit scale. Use the information in the graphs to pose and solve simple put together, take-apart, and compare problems illustrated in Table 1.

Table 1: Common addition and subtraction situations

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3

	Total Unknown	Addend Unknown	Both Addends Unknown
Put Together **Take Apart**	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2

	Difference Unknown	Bigger Unknown	Smaller Unknown
Compare	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

EVIDENCE OF LEARNING

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- Know how to add up to 4 two-digit numbers
- Be able to use a variety of models (base ten blocks- ones, tens, and hundreds only; diagrams; number lines; place value strategies; etc.) to add and subtract within one thousand
- Mentally add or subtract 10 or 100 to a given three-digit number
- Understand the relationship between addition and subtraction (inverse operations)
- Represent three digit numbers with a variety of different models (base ten blocks- ones, tens, and hundreds only; diagrams; number lines; place value strategies; etc.)
- Recognize and use place value to manipulate numbers
- Count with pennies, nickels, dimes, and dollar bills
- Represent a money amount with words or digits and symbols (either cent or dollar signs)
- Interpret data in picture and bar graphs
- Use information from a bar graph to solve addition and subtraction questions and equations.

TASKS

The following tasks represent the level of depth, rigor, and complexity expected of all second grade students. These tasks or a task of similar depth and rigor should be used to demonstrate evidence of learning. It is important that all elements of a task be addressed throughout the learning process so that students understand what is expected of them.

To assure that this unit is taught with the appropriate emphasis, depth, and rigor, it is important that the tasks be reviewed prior to instruction. The tasks in this unit illustrate the types of learning activities that should be conducted to meet the CCGPS. A variety of additional resources should be utilized to supplement these tasks.
Below is a description of the types of tasks you will see in this unit and their purpose.

Scaffolding Task	Constructing Task	Practice Task	Performance Tasks
Tasks that build up to the constructing task.	Constructing understanding through deep/rich contextualized problem solving tasks	Games/activities	Summative assessment for the unit.

Task Name	Task Type/ *Grouping Strategy*	Content Addressed
Where Am I on the Number Line?	Constructing Task *Partners*	Represent numbers using models, diagrams, and number sentences
What's My Number?	Practice Task *Small Groups*	Represent numbers using models, diagrams, and number sentences
Shake Rattle and Roll	Practice Task *Partners*	Represent numbers using models, diagrams, and number sentences
Mental Mathematics Revisited	Constructing Task *Large Group*	Mental Math strategies
Story Problems Revisited	Constructing Task *Large Group, Small Group*	Representing numbers, Addition and Subtraction
Base Ten Pictures Revisited	Scaffolding Task *Large Group, Individual*	Represent numbers using models, diagrams, and number sentences
Tokens to Spend	Constructing Task *Small Group*	Use money as a medium of exchange
Desktop Basketball- Money Version	Practice Task *Partner, Individual*	Use money as a medium of exchange
What I Have and What I Need	Performance Task *Individual*	Use money as a medium of exchange
Shopping for school supplies	Constructing Task *Large Group*	Use money as a medium of exchange
Take 100 Revisited	Constructing Task *Partners*	Use money as a medium of exchange
Multi-digit Addition Revisited	Scaffolding Task *Individual*	Multi-digit addition with regrouping
Subtraction: Modeling w/ regrouping	Scaffolding Task *Large group, Partners*	Multi-digit subtraction with regrouping
Perfect 500	Practice Task *Small Groups or Individual*	Represent numbers using models, diagrams, and number sentences
I have/ You Have a Story	Practice Task Small Group or Individual	Represent numbers using models, diagrams, and number sentences
Money in my Pocket	**Culminating Task**	Summative Assessment

CONSTRUCTING TASK: Where Am I On the Number Line Revisited

Approximately 1 Day (Adapted from: http://www.Mathwire.com)

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900**.**

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
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4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

In this game, students will be reviewing counting up and counting back by ten to get an answer. As the students play the game they will also be able to see where a number lives on a number line and the number's relative position to each other. Being able to locate a number on the number line (the relative position of numerals) in relation to other numbers is essential to developing solid number sense. It will also help the student understand its value in relation to other numbers. This task is an extension of a task from Unit 1, titled, Where Am I on the Number Line? The work in this task prepares students for addressing standard **MCC2.NBT.8.**

A large portion of the second grade standards emphasize the importance of students developing a solid understanding of the relationship between addition and subtraction. An example of this is when a child uses an addition strategy (counting on) to solve a subtraction problem. The process of adding-on helps students focus on the distance between the two amounts. Using a linear model of an "open number line" (meaning a line that does not have designated numbers already on it) in this game will help students act out adding or subtracting 10 from a given number. Use of a number chart for this activity is not recommended because it will not introduce or provide support for demonstrating how students can utilize the strategy of an open number line to solve addition and subtraction problems.

ESSENTIAL QUESTIONS

- How can place value help us locate a number on the number line?
- How can I use a number line to add or subtract?
- How can I use a number line to figure out 10 more or less than a number?
- What happens to the value of a number when we add or subtract 10 from it? What digits change? What digits stay the same? Why?

MATERIALS

- Spinners, one per pair of students
- 0 -100 student number lines
- 0 -100 class number line made from adding machine tape

GROUPING

Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

Introduce the game with the whole class before assigning partners to play. Using adding machine tape, create a 0 -100 number line. Use this number line to introduce "Where Am I on the Number Line?" Each time the spinner is spun, a student will move a paper clip or clothespin the appropriate number of spaces either up or down the number line. Have students give a number sentence that matches with their move. Example: The player's clothespin is on 25 and he spins a -10. He will move the clothespin back and tell the class, "25 – 10 = 15." Students will begin on "25" and move forward or back accordingly. If they spin a number that is more than they can subtract they lose that turn. **When this happens make sure to discuss the fact that there ARE numbers on the other side of zero, negative numbers, but for now we are only working with/talking about the positive numbers.**

Student Directions

- Each player puts a paper clip or clothespin on 25.
- Place a transparent spinner on the game spinner. (See example provided)
- Player A spins the spinner, adds or subtracts that number spun and places the paper clip on that answer.
- Player B spins the spinner and moves as above.
- Player A spins the spinner, adds or subtracts the number based on where his/her paper clip is, then moves the paper clip to the new answer.
- Player B does the same.
- The game continues until one of the players reaches or passes 100 on the number line.
- The first player to reach or pass 100 wins the game.

Variation: *As the year progresses, change the number lines to show counts by 5's, 10's or 100's. Using dice, each roll of the dice has to be changed into the corresponding multiple of that number. Example: If a student rolls a 3 on a 10's number line that roll will represent 30.*

FORMATIVE ASSESSMENT QUESTIONS

- How does place value help us locate a number on the number line?
- How can I use a number line as a model to help us to add or subtract?
- Does a number line always have to begin with zero or one? Why not?
- How did you figure out what number was 1, 2, 3, or 10) to the left or right of the marked number?
- What happens to the value of a number when we add or subtract 10 from it? What digits change? What digits stay the same? Why?

DIFFERENTIATION

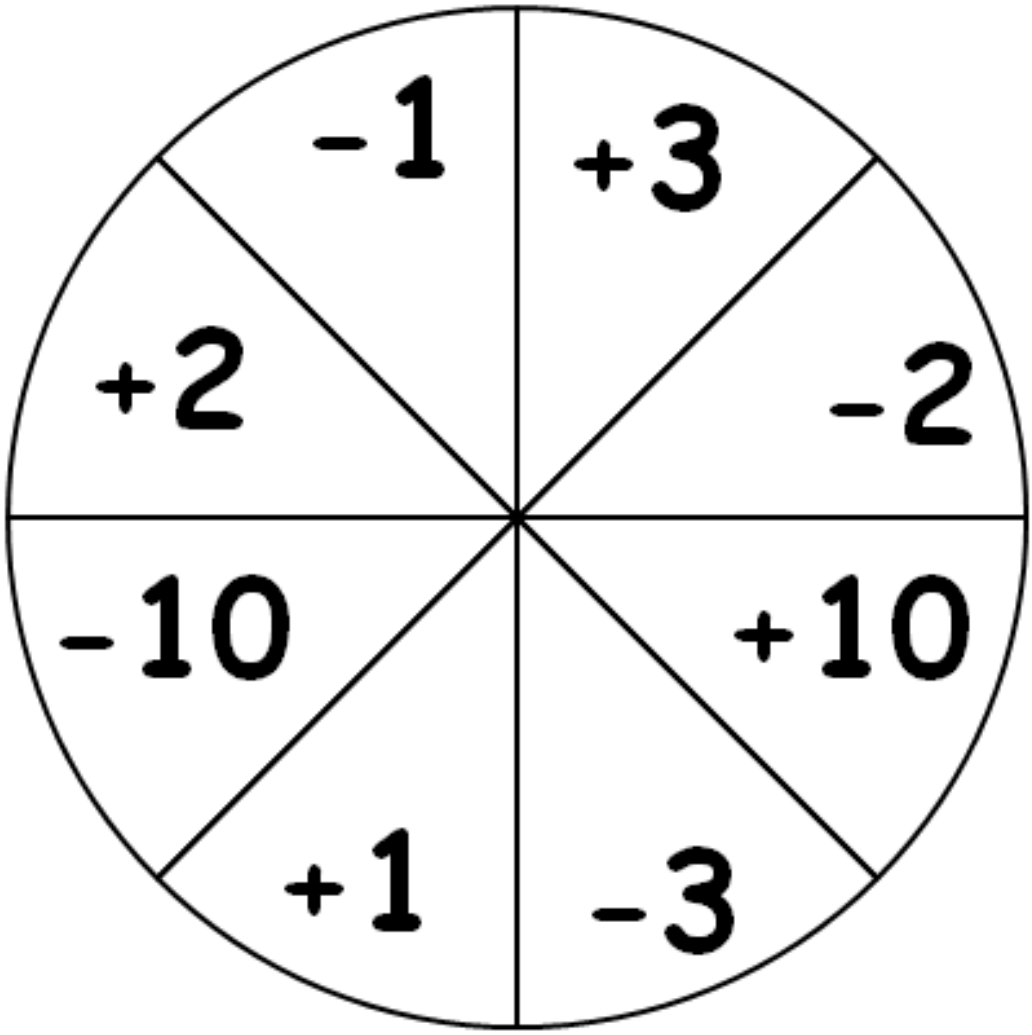
Extension

- Make a number line with only even or odd numbers so that students create a mental image of what the numeral's "neighbor" is on the number line.
- Have students use a 100 chart or a 0-99 chart to perform their calculations.
- Use a spinner with larger numbers.

Intervention

- Reduce the number line to numerals less than 50 and use dice, either one or two depending on the level of the student. As the student becomes more proficient, the number line may be lengthened to include larger numbers.
- Use a spinner with fewer numbers.
- Use a 0-99 chart so that students can circle the numbers that do or do not match the clue.

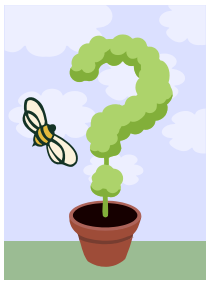
Spinner – Where Am I on the Number Line?



Where Am I On the Number Line? Revisited

Students will cut these apart and glue together to make a 0 -100 number line.

0	1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19	
20	21	22	23	24	25	26	27	28	29	
30	31	32	33	34	35	36	37	38	39	
40	41	42	43	44	45	46	47	48	49	
50	51	52	53	54	55	56	57	58	59	
60	61	62	63	64	65	66	67	68	69	
70	71	72	73	74	75	76	77	78	79	
80	81	82	83	84	85	86	87	88	89	
90	91	92	93	94	95	96	97	98	99	100



PRACTICE TASK: What's My Number? Revisited

Approximately 2-3 Days

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

This activity helps students build flexibility using language and equivalent representations of numbers. Base-ten manipulatives should be available if students desire to use them to visualize the numbers. Students could also draw pictures to help them make up their clues to find the mystery number. Children may begin with very simple, straightforward clues about their number. But eventually, they will start to try to make up more difficult clues that don't simply give away the answer. They played this game initially in Unit 1, but now they will be working with larger numbers. They will need practice with it, so provide multiple opportunities for this activity. If you have not already done the task, "What's My Number", from Unit 1, then consider completing that task first with your students. A brief review of the rules is provided in the Task description below, but you may want to refer back to the original task in Unit 1.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?

- What happens to the value of a number when we add or subtract 10? What digits change? What digits stay the same? Why?
- What happens to the value of a number when we add or subtract 100? What digits change, what digits stay the same? Why?

MATERIALS

- Math Journals to record/explain concepts (optional)
- Base 10 manipulatives, as needed

GROUPING

Small Group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

PartI
Review of original "What's My Number" task from Unit 1
Begin the lesson with the following reminder clues for playing "What's My Number"
I am a two digit number
One of my digits is twice as big as the other
I am an even number
I live between 40 and 50 on the number line.
When you add my digits the sum is 6
Who Am I?
(Answer: 42)

Discuss with students what strategies they used to figure out the correct number. Do another example with the whole class if necessary. Then have students work with a partner and together they will choose any two-digit number. After thinking of multiple ways to describe their number, students write down at least 3 clues to help someone else figure out their number. Have each partner set switch with another set of partners to give their hints to so they can try to figure out the number.

Part II
Once students are able to successfully generate clues for a given number then tell them now they will get to choose any 3 digit number to write clues for, but they will now have to write at least six clues for each number they select. Also, they will need to include use at least three of the following statements in their clues:

My number is 10 more than…
My number is 10 less than…
My number is 100 more than…
My number is 100 less than…

Part III
Each child creates their own set of clues. Some children may be able to create more than just one set. All sets could be collected and put together as a class game/book then placed in a center for continued use throughout the year.

Examples of clues that progress from easy to difficult (specific to general):

- I have a 4 in my tens place, a 2 in my ones place, and a 7 in my hundreds place. Who am I?
- I am 1 ten and 2 hundreds less than 490. Who am I?
- I have 1 more ten than the number 14. Add 3 ones and two more hundreds to get my total. Who am I?
- I am 1 ten 5 hundreds, and 29 ones. Who am I?

FORMATIVE ASSESSMENT QUESTIONS

- What is the difference between place and value?
- How did you use your understanding of place value to write clues?
- What are the different ways we can show or make (represent) a number?
- Did you use a strategy for writing clues? If so what was it?
- Did you use a strategy for figuring out someone else's clues? If so what was it?
- What happens to the value of a number when we add or subtract 10? What digits change? What digits stay the same? Why?
- What happens to the value of a number when we add or subtract 100? What digits change, what digits stay the same? Why?

DIFFERENTIATION

Extension

- After a student has guessed the number, challenge them to describe that same number in several different ways.

Intervention

- Students who are still having difficulty with understanding the magnitude of numbers and their place value should continue to work with two digit numbers. They can be given Popsicle sticks to bundle into groups of ten. As they are bundled, the student places the Popsicle sticks in cups or on a mat labeled ones, tens, and hundreds. This is more hands-on for the student who has a difficult time accepting the base 10 rod as a group of ten because it is already together. Have the student stop on occasion and count out what they have on their mat. Add single Popsicle sticks to the mat and ask what number that would make. Have students count the Popsicle sticks in bundles, then take a bundle apart and have the student count it again. This extra practice will help them recognize that the number doesn't change even though the bundle of ten has been taken apart. This can also

be done by using connecting cubes (i.e. Unifix cubes) Finally, the student could trade each bundle of ten or one hundred for the matching base 10 blocks.

- Using pennies, dimes, and dollars may also help students to grasp the idea of regrouping ("changing") ones, tens and hundreds, but still keeping the same total amount.

PRACTICE TASK: Shake, Rattle, and Roll Revisited

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

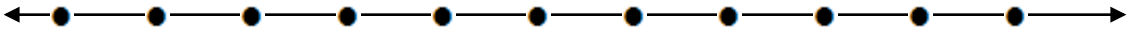
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

****Mathematical Practices 1 and 6 should be evident in EVERY lesson.** ***

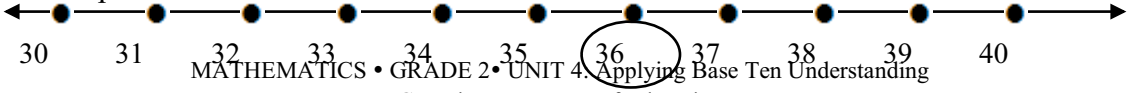
BACKGROUND KNOWLEDGE

This task is designed to provide addition practice and mental math/estimation skills. You may want to use a book like *Mental Math in the Primary Grades* by Jack Hope, R. Reys, Larry Leutizinger, Barbara Reys, and Robert Reys to practice mental math with the class as a whole group.

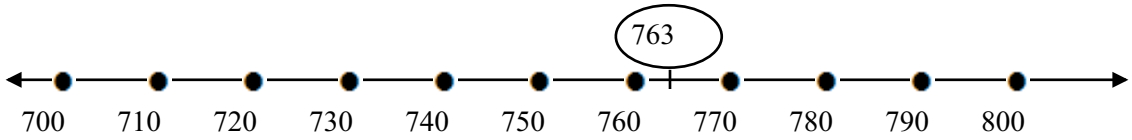
Use all available opportunities during the day to incorporate the use of estimation, for example, determining to which multiple of 10, or 100 a given number is nearest. This skill was addressed in the first two tasks of this Unit. (See Where am I on the Number Line and What's My Number). supported with the use of a number line 0-99 chart and/or a hundreds chart. Students should have these tools available for this task. Alternatively, students can create a number line to determine the closest multiple of ten. A student sheet with open number lines could be provided. An example of an open number line is shown below.



For the number 36, students can fill in the numbers around 36, including the two closest multiples of ten as shown below. Then looking at the number line, students can determine the multiple of ten that is the closest to 36. In this case 40 is 4 away, but 30 is 6 away, so 40 is the closest multiple of ten.



For the number 763, students can follow a similar procedure to estimate to the nearest hundred. Students will need to determine the multiple of one hundred that is the closest to 763. In this case 700 is more than 60 away, but 800 is less than 40 away, so 800 is the closest multiple of one hundred.



Estimating skills will help students determine reasonableness of answers, a vital skill for everyday living.

ESSENTIAL QUESTIONS

- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?
- What happens to the value of a number when we add or subtract 10 from it? What digits change? What digits stay the same? Why?
- What happens to the value of a number when we add or subtract 100 from it? What digits change, what digits stay the same? Why?
- How does mental math help us calculate more quickly and develop an internal sense of number?

MATERIALS

- Three six-sided dice for each pair of students
- "Shake, Rattle, and Roll" Recording Sheet
- Multiple decks of Addition and Subtraction Instruction cards that have either *add or subtract 10* or *add or subtract 100* on them.

GROUPING

Partner/Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students play a game with dice that enables them to build mental math concepts as they practice addition skills and strategies, and determine to which multiple of ten a given number is nearest.

Task Directions
Students will follow the directions below from the "Shake, Rattle and Roll" Recording Sheet.

Let the students know that this is a two player game that will help them practice adding and subtracting 10 and 100 from different numbers. The goal of the game is to be the person with the most points at the end of ten turns.

Directions:

1. The partners need to gather your materials. You will need 3 dice, a recording sheet for each player, and a stack of addition subtraction instruction cards.
2. Players will need to take turns rolling the dice each round
3. Player one rolls the three dice and then both players form the largest possible number.

Example: Rolled a 4, 1, and 5 so students should create the number

Then each player will flip over their own card from the addition/subtraction instructions deck that will instruct them to either add or subtract 10 or 100 from the number they made.

Players record both the original amount and the new amount on the game recording sheet. **Partner must agree on the new numbers generated after following instructions on the addition/subtraction card.**

For round two, player two takes a turn rolling the dice, and following the same procedures explained above. Players take turns for a total of five rounds. After each round, each player compares their numbers. The player with the higher number wins that particular round.

FORMATIVE ASSESSMENT QUESTIONS

- What strategy did you and your partner use to figure out the largest three digit number you could make from your roll?
- Explain how you decided if your partner was right when they were adding or subtracting?

DIFFERENTIATION

Extension

- Ask students to play the game again, but this time roll 4 dice and create numbers using the one thousands place. Make sure to ask students if they think this changes the game? If so, have them explain how.

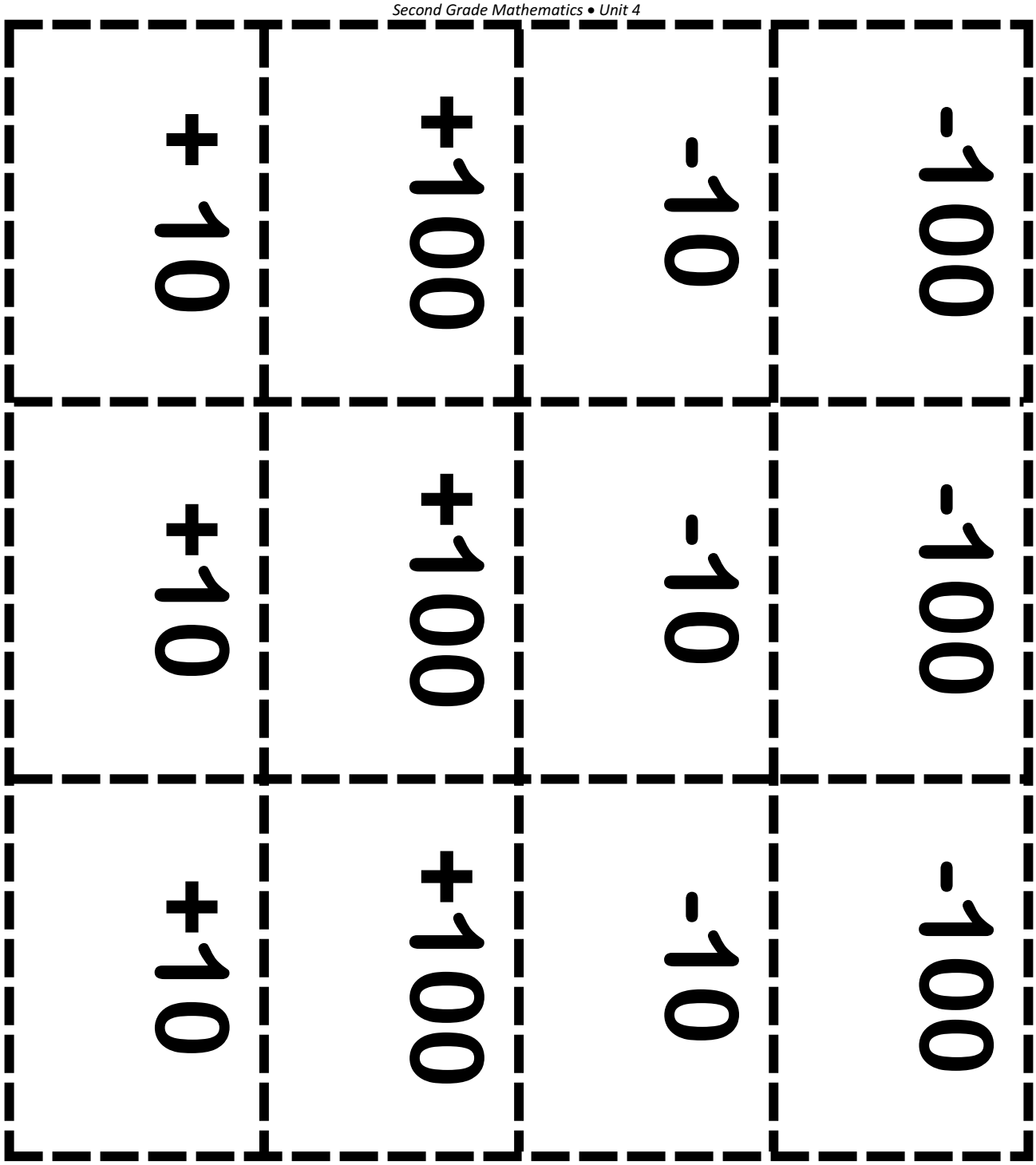
Intervention

- Use number lines, number charts, and models to help students who are having difficulty determining to which multiple of ten their number is nearest. Use counting up/counting back to the nearest multiple of ten, and compare the results to determine to which multiple of ten a number is closest.

- Students can play the game using fewer dice, adjusting the game accordingly. Once students become comfortable with fewer dice, they can challenge themselves by playing the game with the required four dice.

TECHNOLOGY CONNECTION

- http://www.shodor.org/interactivate/activities/EstimatorFour/?version=1.6.0_02&browser=MSIE&vendor=Sun_Microsystems_Inc. A "Four in a Row" game where players get checkers when they quickly and efficiently estimate a sum to two numbers.
- http://www.oswego.org/ocsd-web/games/Estimate/estimate.html Students estimate the number indicated on a number line.



Name _____ Date _____

Shake, Rattle, and Roll

Game Directions

This is a two player game that will help you practice adding and subtracting 10 and 100. The goal of the game is to be the person with the most points at the end of five turns.

Directions:

1. Play with a partner. You will need 3 dice, a recording sheet for each player, and a set of addition and subtraction instruction cards.

2. Player one rolls the three dice and then each player forms the largest possible number as shown below.

Example:

Using the digits 4, 5, and 1, make the number 541

5	4	1

3. Player one and two record the number on the game recording sheet.

4. Then each player will take a turn drawing one of the addition/subtraction instruction cards from the deck. Each player will need to follow the instructions on their own card! The card will tell you to either add or subtract 10 or 100 from the original number.

5. Each player then records their new number on the recording sheet.

6. **Each partner must agree with the other partner's new number!**

7. After each round, players compare their new numbers. The player with the higher number wins the round.

Player 1 _____

Shake, Rattle, and Roll Game

Round	Die 1	Die 2	Die 3	Actual Number	Add or subtract 10 or 100	New Number	More or Less than Partner	Record a score of ten points if you have a higher number than your partner
1								
2								
3								
4								
5								

Player 2 _____

Shake, Rattle, and Roll Game

Round	Die 1	Die 2	Die 3	Actual Number	Add or subtract 10 or 100	New Number	More or Less than Partner	Record a score of ten points if you have a higher number than your partner
1								
2								
3								
4								
5								

CONSTRUCTING TASK: Mental Mathematics Revisited

Approximately 1-2 Days

STANDARDS OF MATHEMATICAL CONTENT

MCC.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students should have some prior experiences with basic computation strategies allowing them to calculate quickly and reliably. Examples include counting on, doubling, making tens, making hundreds, and using 10 as a benchmark number. Previous tasks in this Unit have helped to establish this fluency. Additionally, in Unit 2 a similar task was introduced (Mental Mathematics) using smaller numbers. If you have not completed this task or a similar type task then you may want to consider completing this task before trying out this task with your students.

Discussions should move beyond whether or not the answers are correct. The goal here is to develop efficient ways to group numbers and/or develop compensation strategies for mental addition and subtraction. The value of group discussions and modeling is evident when students gather insights from their classmates that will reinforce basic number sense and develop strategies that will help them become better at mental computation.

Throughout the year, this type of task is a valuable opening activity and should be revisited frequently. When using mental math problems as an opening activity, use just one or two problems and focus on the strategies students use to find the solution.

Students should be encouraged to solve problems in ways that make sense to them. If students have never been encouraged to solve problems mentally and share their own strategies with others, they may be reluctant to share or may feel that their strategy is inappropriate. Establish ground rules in your classroom about sharing ideas and how students can appropriately respond to each other.

ESSENTIAL QUESTIONS

- What is mental math?
- How does mental math help us calculate more quickly and develop an internal sense of numbers?
- What mental math strategies are available to us?
- How can we select among the most useful mental math strategies for the task we are trying to solve?

MATERIALS

- Chalkboard, overhead projector, or Interactive Whiteboard
- "Mental Mathematics" Recording Sheet

GROUPING

Whole Class/Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will engage in mental math activities and rich group discussions about various strategies used to find the answers to addition and subtraction problems without paper and pencil.

Task Directions
Begin this activity by placing one problem at a time on the board (see examples below), preferably horizontally. Be aware that students may initially need individual time to solve these problems mentally, so encourage students to be patient and quiet during this time. Encourage students to use quiet think time rather than raising their hands or calling out the answer. One strategy is to place a symbol like a star or a smiley face on the board this can provide a more productive and friendly environment for students to work and think "mentally" about a particular problem.

After allowing enough time for students to consider the problem, lead a discussion by asking several students to share their solution and/or strategy. Simply stating an answer is not enough to make this a rich activity. Encourage students to share different strategies by explaining their thinking though both words and pictures, if possible. Encouraging them to visualize a number line can help facilitate this discussion. As students are sharing, be sure to keep others involved by asking them to try to make sense of each solution as it is presented. Remind students that the goal is to become **efficient** and **flexible** in their thinking and strategies.

Have students follow the directions below:

Solve the following problems as they are placed on the board using no paper or manipulatives. Use your mental math strategies. Be prepared to share your solutions and strategies.

- 180 + 60
  Students may solve this problem in a variety of ways. Examples are:
  - ❖ 180 + 20 is 200 and 40 more is 240.
  - ❖ 80 + 60 is 140 and 100 more is 240.
  - ❖ 60 + 40 is 100, 100 more is 200 and 40 more is 240.

- 370 + 230
  Students may solve this problem in a variety of ways. Examples are:
  - ❖ 300 + 200 is 500 and 70 + 30 is 100, so 500 + 100 is 600.
  - ❖ 70 + 30 is 100 and 200 + 300 is 500, so 100 + 500 is 600.
  - ❖ 230 + 70 is 300 and 300 more is 600.

- 870 - 60
  Students may solve this problem in a variety of ways. Examples are:
  - ❖ 870 is 87 tens and 6 less tens makes 81 tens which is the same as 810
  - ❖ 70-60 is 10. Add back 800 to make 810.
  - ❖ Some may attempt a traditional algorithm, but should notice that this is more cumbersome that examining the numbers and using the ideas above to compute.

- 720- 280
  Students may solve this problem in a variety of ways. Examples are:
  - ❖ 720 – 200 is 520, then 520 – 80 is 440.
  - ❖ 720 – 80 is 640, them 640 – 200 is 440.
  - ❖ You need 20 more to get to 300 from 280, then 420 more to get to 720, so the answer is 20 + 420 or 440. Note: Students who use this method are actually finding the *difference* between the two numbers and not simply "taking away." This is a wonderful opportunity to discuss different approaches to subtraction.

FORMATIVE ASSESSMENT QUESTIONS

- What is one strategy you could use to solve the problem quickly?
- How can you verify your solution?
- Could this problem be thought about in another way? How?
- Which problem solving strategy works best for you?

DIFFERENTIATION

Extension

- When you are presenting problems to students, vary the problems you use. Include various operations and numbers.
- Have students develop their own mental math problems, solve them, and explain their solution strategies.

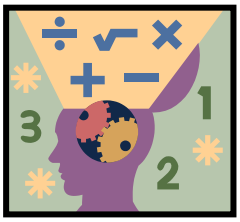
Intervention

- Have students work with smaller, single-digit numbers initially.
- Have students work with a partner to develop strategies.
- Students who struggle with math reasoning often have difficulty communicating their thinking. Extra sensitivity and encouragement must be shown for these students as they develop and strengthen these sets of process skills. Questioning can scaffold students who are challenged by discussing their math thinking.

TECHNOLOGY CONNECTION

- http://olc.spsd.sk.ca/de/math1-3/p-mentalmath.html Teacher background information as well as student practice materials on the topic of elementary mental math strategies
- http://www.curriculumsupport.education.nsw.gov.au/primary/mathematics/numeracy/mental/index.htm Mental computation strategies with some fun graphics to demonstrate the strategies.
- http://www.oswego.org/ocsd-web/games/SpeedGrid/Addition/urikaadd2res.html A fun race against time using mental addition skills.

Name _____ Date _____



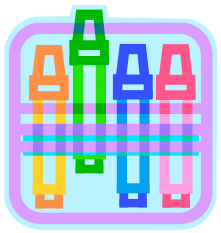
Mental Mathematics

Try to solve the problems using mental mathematics first. Then record your thinking in the correct box below. During student sharing, record any strategies you think are helpful.

Problem #1	**Problem #2**
Problem #3	**Problem # 4**

CONSTRUCTING TASK: Story Problems Revisited

Approximately 1 Day



STANDARDS FOR MATHEMATICAL CONTENT

MCC.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.

MCC.2.OA.2 Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

MCC.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.

MCC.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?*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students should be able to discuss how to solve the word problems. They should also be able to think about what is happening in a story and picture the story in their minds including the objects and actions in the story. The following questions would be used to guide their thinking prior to this task:

- What happened first? What happened next?
- What does each amount in the story represent?
- How could we draw a picture to show what is going on in the story?

They should solve the problems using pictures, words, and numbers. They should act out the story to make sure pictures, words, and numbers that were used make sense.

ESSENTIAL QUESTIONS

- How do we solve problems in different ways?
- How can we show/represent problems in different ways?
- How can different combinations of numbers and operations be used to represent the same quantity?
- How is addition and subtraction alike and how are they different?
- How does using ten as a benchmark number help us add and subtract?

MATERIALS

- A large selection of manipulatives
- Paper
- "Story Problems: Part 2" student task sheet (1 per students)

GROUPING

Partner, Individual

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Comment
Students are completing each of the problems in this task individually. In order to be successful in the task, students should have had multiple experiences solving problems involving addition and subtraction. This standard calls for students to add and subtract numbers within 100 in the context of one and two step word problems. Students should have ample experiences working on various types of problems that have unknowns in all positions using drawings, objects, and equations. Students can use place value blocks or number charts, or create drawings of place value blocks or number lines to support their work.

Part I
Have a brief discussion with the class where you do a few example problems, such as;

Gumdrops cost 2 cents each. I bought 4 gumdrops. How much did I spend?

Jake had 41 stickers in his book, 14 in his desk, and 26 under his bed. Sara has 50 stickers total. Who has more stickers? How many more do they have?

Present "Story Problems" task sheet and allow students to complete individually. Students can solve the problems any way they choose, using any manipulatives and tools they need. Remind

students to record their solutions with pictures, words, **and** numbers. Students should be prepared to share their solutions with the class.

FORMATIVE ASSESSMENT QUESTIONS

- What strategies did you use to solve the problems?
- Did you try to solve the problem more than one way?
- How did you determine which way, (equation, picture, words) to represent the number?
- Did you use skip counting to help you solve any of the problems? If so, which ones and how?
- How do you determine if an amount can be shared equally? Why should it be shared equally?

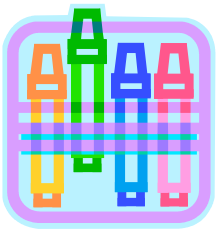
DIFFERENTIATION

Extension

- Have students show two strategies to solve each problem

Intervention

- Provide a 99 chart or number line to help with skip-counting.



Name: _____

Story Problems: Part 2

1. Jessica had 78 balloons. She gave away 40 to Kelly and Patti. How many does Jessica have now? Show your work.

2. If red tokens cost $1 each and Pat bought 7, then he bought 2 blue tokens that cost $5 each, how much more money did he spend on blue tokens?

3. I am thinking of an odd, 2 digit number. It is less than 60, but more than 40. The sum of the digits is 9. It is ten more than 35. What is my number? ___ Show your work.

SCAFFOLDING TASK: Base Ten Pictures Revisited

Approximately 1-2 Days (Adapted from Understanding Numbers: Place Value by Kathy Richardson – Math Perspectives p. 22, 23)

STANDARDS OF MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students need to build on their flexible strategies for adding to fluently add and subtract within 100, add up to four two-digit numbers, and find sums and differences less than or equal to 1000 using numbers 0 to 1000 and analyze problems before they solving them. Initially, students apply base-ten concepts and use direct modeling with physical objects or drawings to find different ways to solve problems. They move to inventing strategies that do not involve physical materials or counting by ones to solve problems. Student-invented strategies likely will be based on place-value concepts, the commutative and associative properties, and the relationship between addition and subtraction. These strategies should be done both mentally and with a

written record for support. **It is vital that student-invented strategies be shared, explored, recorded and tried by others.** Recording the expressions and equations in the strategies horizontally encourages students to think about the numbers and the quantities they represent instead of the digits. ***Not every student will invent strategies, but all students can and will try strategies they have seen that make sense to them.*** Different students will prefer different strategies. Students will decompose and compose tens and hundreds when they develop their own strategies for solving problems where regrouping is necessary. They might use the make-ten strategy (37 + 8 = 40 + 5 = 45, add 3 to 37 then 5) or (62 - 9 = 60 – 7 = 53, take off 2 to get 60, then 7 more) because no ones are exchanged for a ten or a ten for ones. This task presents an opportunity for students to create a picture using base ten blocks (using tens and hundreds only) and then figure out how they want to decompose that amount into different numbers to add together to figure out the total for their picture.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?

MATERIALS

- Centimeter graph paper or base-10 patterns

GROUPING

Large Group, Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

This task provides an interesting way for students to work with groups of hundreds, tens, and ones.

1. Provide students with centimeter graph paper. Have students trace the hundreds blocks and tens strips on the graph paper first to be sure they are marking the correct amount of squares. Encourage the children to label each part with its value. Have them cut out the pieces so they can use them to make the animal picture below.

2. Display the animal picture below on the overhead. Have the students recreate it with their pieces and then determine the number of hundreds, tens, and ones used to make the picture. Next, have them come up with a total for the "value" of the animal (how much it is worth). Allow students to work with a partner if necessary. Make sure to discuss the different strategies students use to determine the total value of the animal.

3. When students are sharing their thinking, have them come up and circle the parts they are adding together to show their classmates how they are organizing the numbers in order to reach a total. Ask if any other students had the same total, and if so, have them stand and share their picture at the same time so you can compare/contrast the work.

4. Once the students are comfortable with how to determine the value of a picture, have them take the pieces they made and reorganize/combine them to create their own picture. **Tell them that the value of their picture must be greater than 200 but less than 1,000!** Take time to allow students to share their pictures. Encourage them to be creative!

5. Collect the pictures at the end of the lesson to use for Part II

Part II
Hand each student a picture (not their own) from yesterday and have them determine what the total amount should be for the picture. You could post a number line on the wall or board between 200 and 900, and have students attach the picture where it would appear between two hundreds. You could also have students organize them by value, least to greatest or greatest to least. Save the pictures for work mentioned in Part III.

Part III
Choose a random picture from the pile of students' pictures and project it so all can see. Use the Addition and Subtraction Instruction cards from previous activity (Shake Rattle and Roll) and draw out one card (-10, +1-, -100, +100) Have students mentally calculate the new total.

FORMATIVE ASSESSMENT QUESTIONS

- What strategy did you use for figuring out how much a picture was worth?
- Could you have created other combinations of numbers to come up with the same total?
- Was it easier to mentally add or subtract? Why?

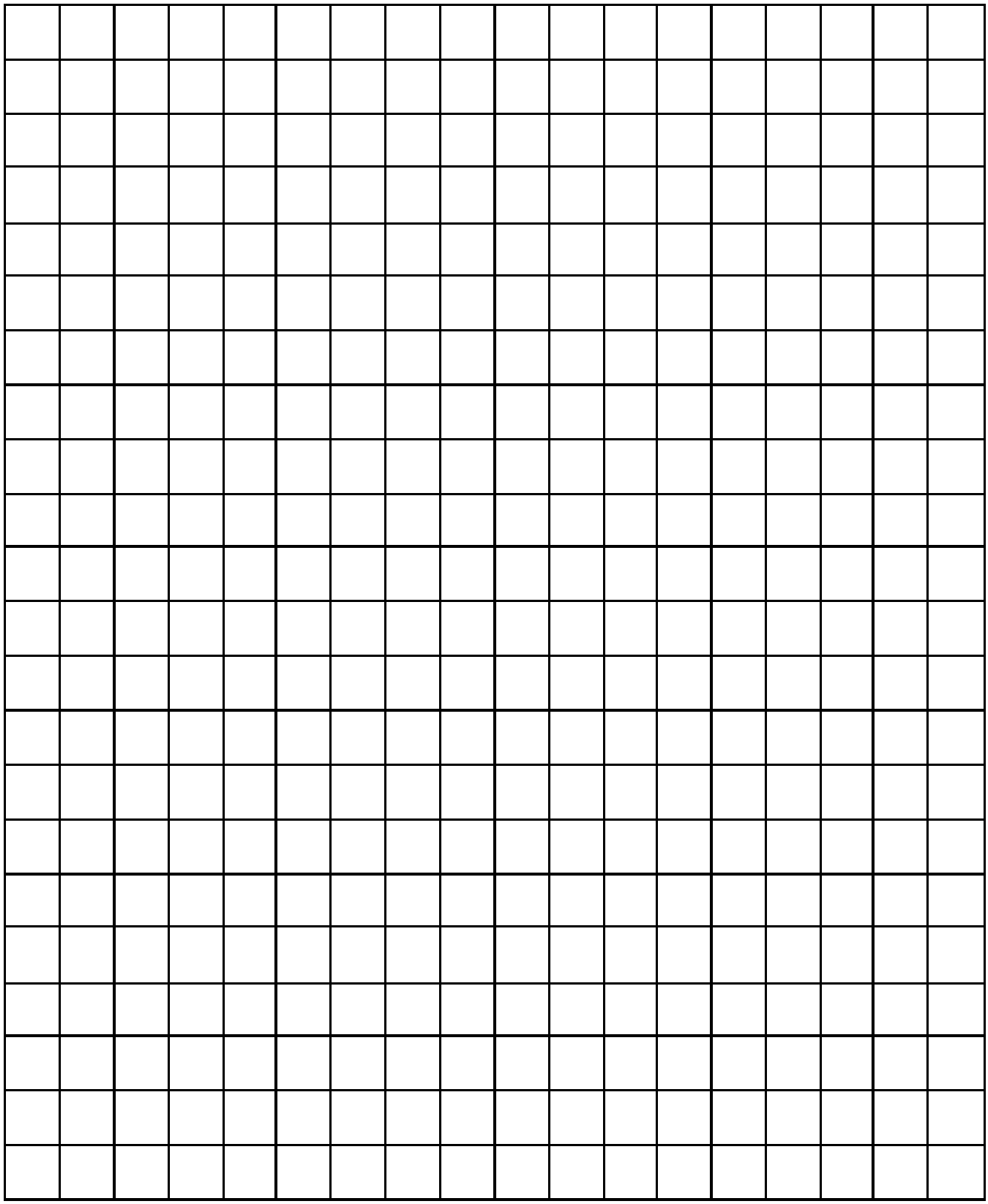
DIFFERENTIATION

Extension

- The teacher may want to encourage students to write the number in expanded notation as well as in number words.
- Have the students attribute money amounts to the pieces and then they can determine how much their picture costs.

Intervention

- Provide sample pictures that the student can recreate with real base ten blocks. The picture can then be labeled with the correct values and created with centimeter paper.



Base-Ten Picture Recording Sheet

Name:_____

I made a _____.
(name animal)

My design was built with _____ base ten blocks.
(write number)

My number has _____ digits.

Here is my number in expanded form.

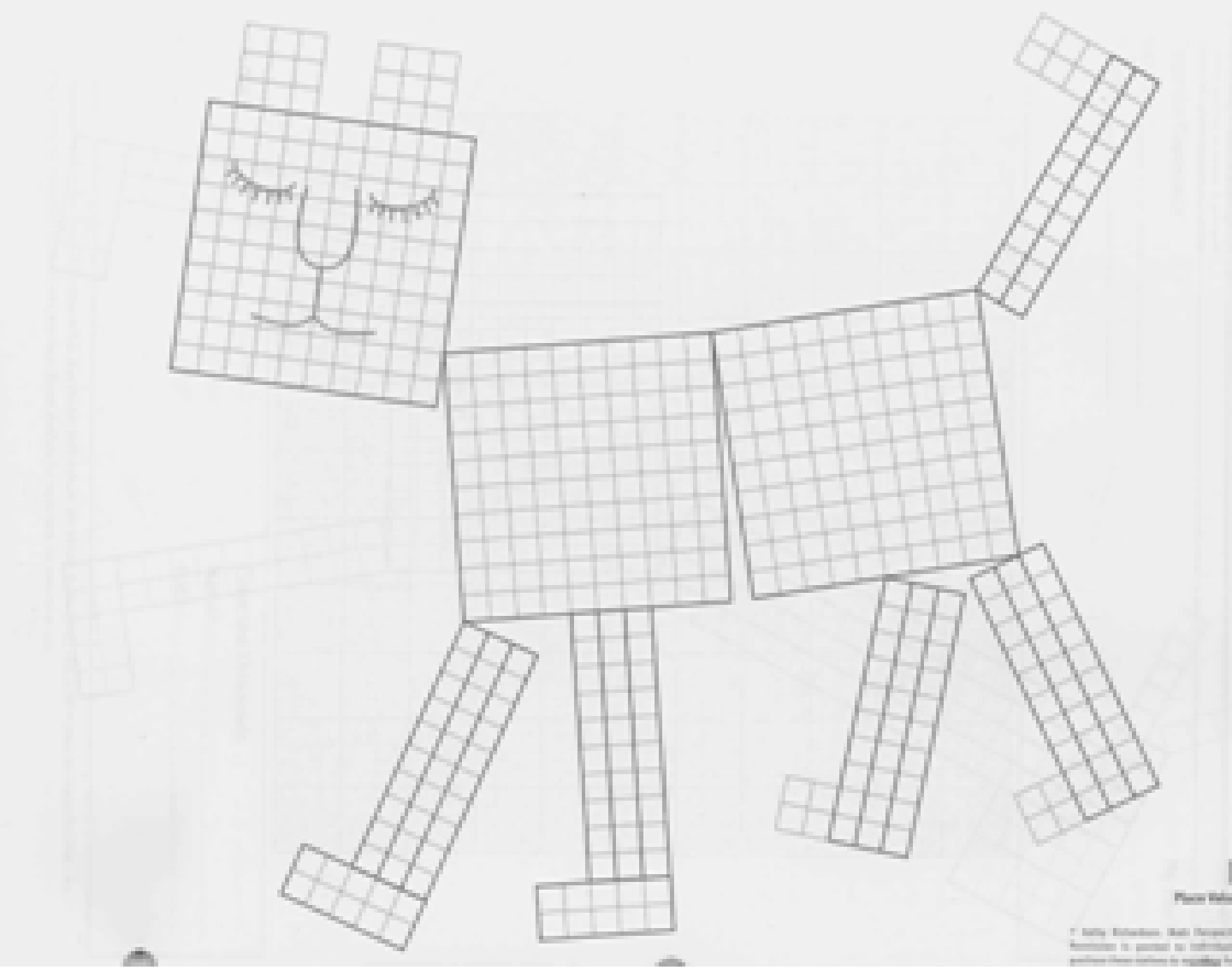
_____
(hundreds + tens + ones)

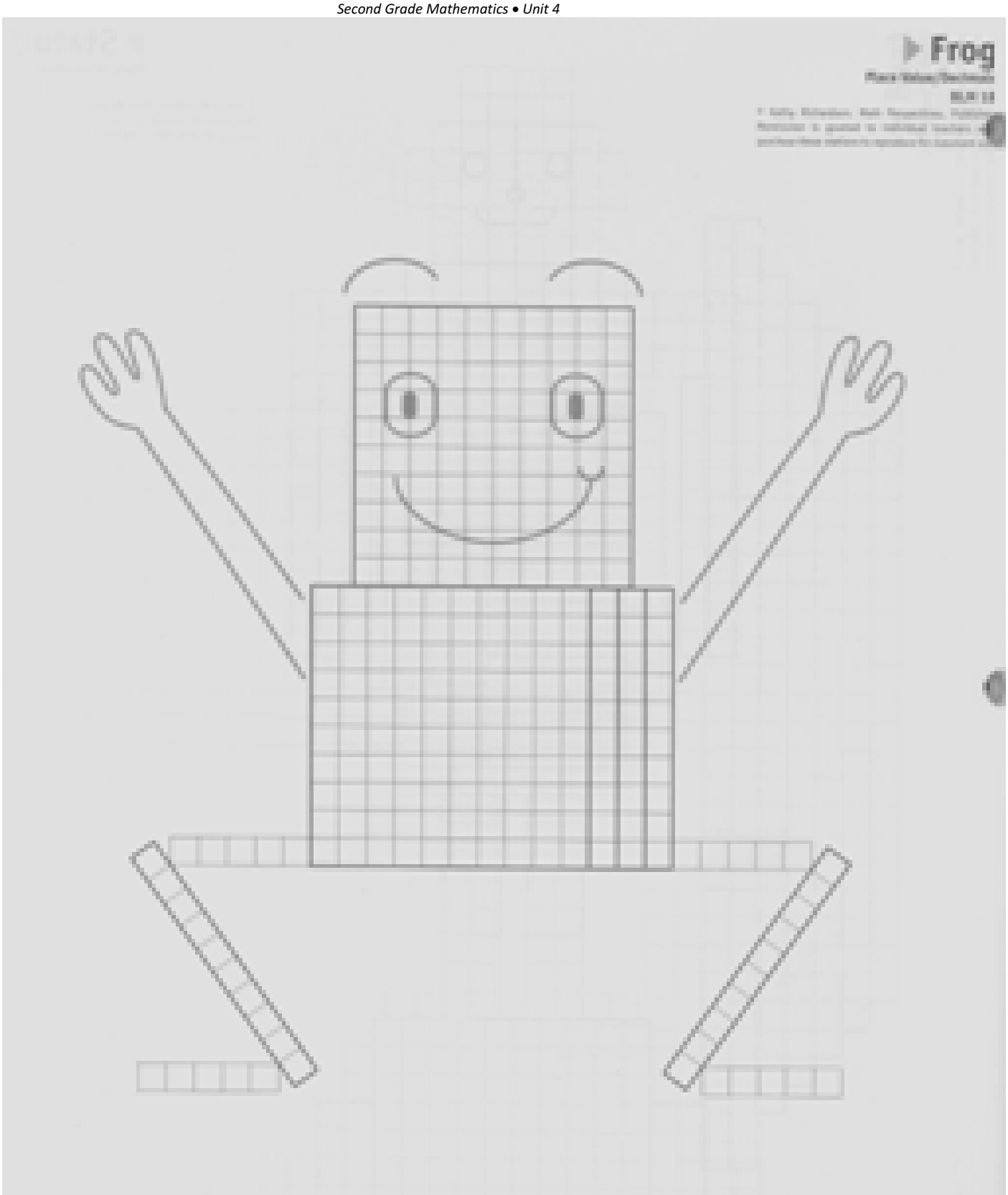
I can represent and show numbers using different models, pictures, or number sentences.

My work shows I understand the value of each digit in my number.

What is the difference between place and value?

_____
_____
_____
_____





CONSTRUCTING TASK: Tokens to Spend

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

MCC.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?*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

BACKGROUND KNOWLEDGE

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, page 150)

In 2nd grade students will be working with money for the first time. Limit problems to the use of just dollar and cents symbols. There should be no decimal notation for money at this point. Students need to understand the relationship between quantity and value and be able to relate money amounts to whole-number place value and base-ten understandings

"The recognition of coins is not a mathematical skill at all. The names of our coins are conventions of our social system. Students learn these names the same way that they learn the names of any physical objects in their daily environment- through exposure and repetition.

The value of each coin- a nickel is worth 5¢, a dime is worth 10¢, and so on- is also a convention that students must simply be told. However, a student can say, "A dime is worth 10 cents" and not really understand what that means. For these values to make sense, students have to have an

understanding of 5, 10, and 25. More than that, they need to be able to think of these quantities without seeing countable objects. Nowhere else do we say, "this is five," while pointing to a single item. A child whose number concepts remain tied to counts of objects is not going to be able to understand the values of coins. The social concept of having an *equivalent worth* or *value* is nontrivial for the young child. If your students seem to have good concepts of small numbers but still have difficulties with the values of single coins, then your lessons should focus on purchase power- a dime can *buy the same thing* that 10 pennies can buy."

ESSENTIAL QUESTIONS

- Why is it important to be able to count amounts of money?
- What are the different ways we can represent an amount of money?
- How does mental math help us calculate more quickly and develop an internal sense of numbers?

MATERIALS

- Recording sheet with story about Mia
- Play money for intervention purposes

GROUPING

Partners /Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Explain to students the following scenario:

> Mia has $30 to spend on toys that she will donate to a local charity for needy children. This is the only store she is going to, and she wants to spend all of her money there. What combinations of toys can she buy in order to spend all the tokens?

Together as a class, come up with one solution and record the solution on chart paper. While the students are discussing the solution, encourage additional strategies by asking the students to explain how they came to their answers. Then have the students come up with as many possible combinations as they can to ensure that Mia uses all of her money.

Come back together as a whole class and share combinations. Record what students share. When a combination is repeated (inevitably, this will happen) ask if there is a better way to record the information to keep track of all possible combinations (chart or table).

FORMATIVE ASSESSMENT QUESTIONS

- How is working with numbers expressed as money amounts similar to working with other numbers that are not expressed as money amounts?

- What strategies were you using to mentally calculate, (keep track of), the number of tokens spent?
- How did you figure out multiple possibilities of combinations for spending Mia's money?
- How did you record your combinations to keep up with your work?
- Could someone else look at your work and understand how you thought about and solved this problem?

DIFFERENTIATION

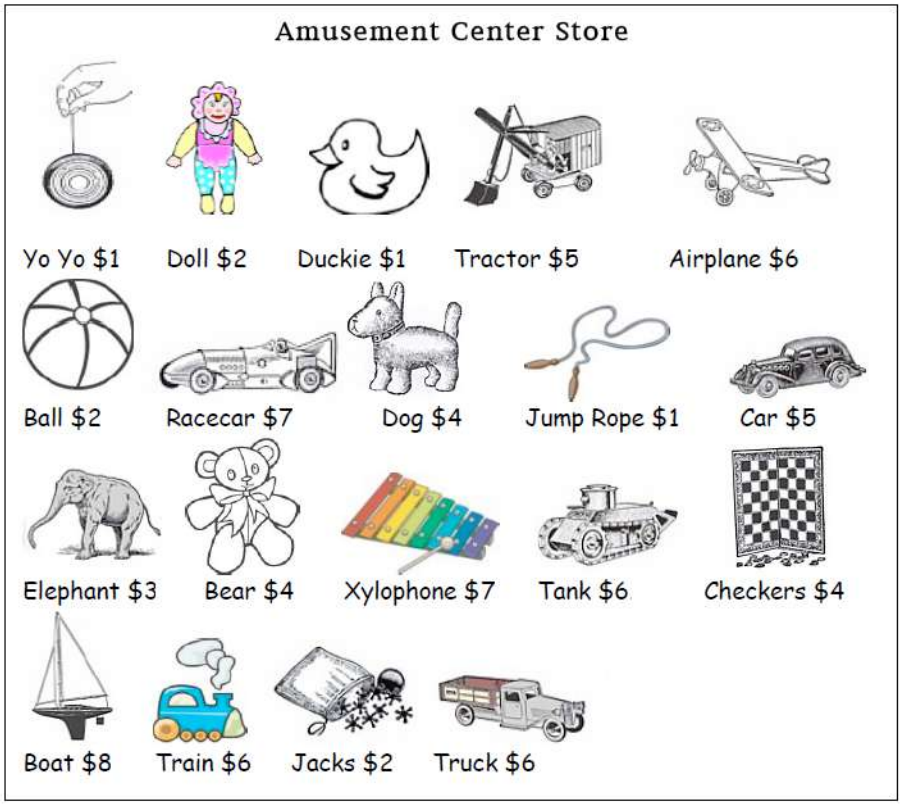
Extension

- Allow Mia to earn/spend more money and encourage students to use a chart, table or some other organizer to record every possible combination.

Intervention

- Some students may still be having difficulty counting with money. Allow these students opportunities to use actual dollar bills or copies of them (play money), paper and pencil, as well as a number line or number chart to keep track of their totals.

Name: _____



Mia has $30 to spend on toys that she will donate to a local charity for needy children. This is the only store she is going to and she wants to spend all of her money there. What combinations of toys can she buy in order to spend all of the tokens?

Show how you found your solutions.

PRACTICE TASK: Desktop Basketball- Money Version

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC.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?*

MCC2.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[3] using information presented in a bar graph.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Part one of this task calls for students to work with categorical data by organizing, representing and interpreting data. Students collect their data by using tallies or another way of keeping track. Students organize their data by totaling each category in a chart or table.

A similar task was done in 1st grade, however this time students will be attributing a money value to the paper slips they are tossing in Part two.

Students need to build on their flexible strategies for adding within 20 in first grade to fluently add and subtract within 100 in second grade. Students gain computational fluency, using efficient and accurate methods for computing, as they come to understand the role and meaning of arithmetic operations in number systems. An efficient strategy is one that can be done mentally and quickly. Frequent use of games like this provides the necessary experience students need in order to develop efficient mental processes, which lead to fluency and understanding the relationship between quantity and value. Since students have not been introduced to decimals, problems should either have only dollars or only cents.

ESSENTIAL QUESTIONS

- Why do I need to ask questions and collect data?
- How can I use data to help me understand the answers to the questions posed?
- What type of graph should I use to display the data?
- How can I keep track of my total amount?
- Why is it important to be abe to count amounts of money?
- How does mental math help us calculate more quickly and develop an internal sense of numbers?
- In what type of situations do we add?

MATERIALS

- Plastic cup
- Paper wad for a "basketball"
- Paper and pencil for recording information and drawing a graph

GROUPING

Partner or individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment-
Prior to the activity, each pair of students should have a plastic cup taped to one edge of a desk/table, a ¼ sheet of paper to wad up for a "basketball", and paper/pencil for recording and drawing a graph of the data.

Part I (Review of Game from 1st grade)
Tape the cup to the edge of the desk. Students will take turns gently tossing the crumpled paper into the cup taped to the desk. Allow each student ten tosses before switching players. The student who is not tossing the basketball will be the scorekeeper and will use tally

marks to record baskets made. They can create their own chart to keep track of the tallies. After each child has had a chance to make ten tosses, the students will use their table of basketball toss tally marks to create a graph. Since they have had many experiences with graphs prior to this experience, **students can choose the type of graph they want to make (picture graph or bar graph)**. Upon completion of their individual graphs, have students compare their results. If a student is working independently, then the activity could be repeated twice. The student would then have two different sets of tally marks to graph and compare.

Ask students to pose a question which can be answered using the data from their graph. Then have them swap graphs and questions with a neighbor to see if they can answer each other's questions based on the information provided in their graph.

Question examples:

- What type of game data is represented in this graph?
- How many baskets did you make?
- How many baskets did you miss?
- How many throws in all did you shoot?
- Do you think you will have the same results if you do it again? Why?
- How will this experience help you to predict what might happen if you were to do this experiment again?

Part II (four rounds- in each round the pieces of paper have a different value)
Now each student will have ten pieces of paper to throw and each piece will be worth a particular amount (see rounds 1-4 below). For each round, students need to keep a running **MENTAL** total of how much they earned and how much they lost. They "earn" money by making the basket, they "lose money" by missing the basket. They will announce what they mentally calculated to be their total earned and lost when their round is up, and their partner will check. If they are correct, they double their score. If they are incorrect, they lose half their score. The winner is the partner with the most money at the end of each round.

Round One-
Each piece of paper is worth 10 cents
Round Two-
Each piece of paper is worth 50 cents
Round three-
Each piece of paper is worth 10 dollars
****Round Four-**
(This round should only be played when students are ready, because the total may exceed 1,000. Consider your students' ability before playing this round. Adapt the number if necessary.)
Each piece of paper is worth 100 dollars

FORMATIVE ASSESSMENT QUESTIONS

- How did you keep track of the total baskets made when you first played the game?
- What type of graph did you decide to make?
- Why is it important to keep a record of some kind when you are doing an experiment?
- Were you able to answer your partner's graph question? Were they able to answer yours? How could you change your question or graph so that they are more useful?
- How much money did you make in each round when we changed the game?
- How would the amount change if you earned a quarter for each shot? How about 50 cents for each shot?
- How many baskets do you need to make to earn $5?
- If you earned a dollar for each shot made, but lost 50 cents for each shot missed, what would your total be?
- Let's say you are at a carnival playing this game. It costs $1.00 to take eight shots. For each shot you make, you will get back 25 cents. Think about how you did in the game in class. Based on this, would you play the game at the carnival? Why or why not?

DIFFERENTIATION

Extension

- Increase the number of tosses to twenty and have the students create their own graph of tosses made and tosses missed. Have students compare this to their first graph of ten tosses. Do they notice any significant differences? Ask students what they think would happen if they made thirty tosses. Forty tosses. How would their graph change?
- Write different coin amounts OR dollar amounts on each of the ten slips of paper. After the ten tosses students add up the total earned and the total lost. Compare and find the difference between the two amounts.

Intervention

- Give students a pre-made bar graph or pictograph on which they may color in the appropriate number of blocks or pictures for each successful basket.

PERFORMANCE TASK: What I Have and What I Need

Approximately 1-2 Days

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

MCC.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?*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning**.**

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

In this task, students will continue to develop their understanding of and facility with money by counting with pennies, nickels, dimes, and quarters. They will need to be able to represent a money amount with words or digits and the cent sign.

ESSENTIAL QUESTIONS

- Why is it important to be able to count amounts of money?
- What are the different ways we can represent an amount of money?
- How can I keep track of an amount?
- How do we know if we have enough money to buy something?

MATERIALS

- Suggested poem: "Smart" by Shel Silverstein
- Coins
- Coin mats

- "What I Have and What I Need" recording chart

GROUPING

Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Begin by reading the poem "Smart" by Shel Silverstein.
Discuss what happens to the amount of money as it is exchanged.

Part II
Give each student a copy of the chart. "What I Have and What I Need". Have students complete the chart individually. Coins and coin mats should be available to assist students in making these decisions. After they find a coin combination for each problem, have students compare their combination with a partner. After the partners have shared, allow the class to discuss the different combinations of coins that were used, whether they are correct, and how many different combinations there were. Encourage students to think of a way of recording the combinations so that you can be sure that you discovered them all.

FORMATIVE ASSESSMENT QUESTIONS

- How do you count the different amounts of money?
- What are some different ways we represented the same amount of money?
- How did you keep track of how much more money we needed?
- How did you know if you have enough money to buy something?
- What strategy did you use to figure out how much more you needed to buy the item?

DIFFERENTIATION

Extension
- Have students write some story problems involving buying something and having to count out the right change.

Intervention
- Have students make amounts using only pennies and dimes and relate this to place value.

"Smart" by Shel Silverstein

My dad gave me one dollar bill
'Cause I'm his smartest son,
And I swapped it for two shiny quarters
'Cause two is more than one!

And then I took the quarters
And traded them to Lou
For three dimes, I guess he don't know
that three is more than two!

Just them, along came old blind Bates
And just 'cause he can't see
He gave me four nickels for my three dimes,
And four is more than three!

And I took the nickels to Hiram Coombs
Down at the seed-feed store,
and the fool gave me five pennies for them,
And five is more than four!

And then I went and showed my dad,
and he got red in the cheeks
And closed his eyes and shook his head-
Too proud of me to speak!

Name: _____




What I Have and What I Need

What I have	What I need				To Make a Total of…
	Penny	Nickel	Dime	Quarter	
23 cents					45 cents
58 cents					93 cents
15 cents					87 cents
6 cents					60 cents
50 cents					75 cents

PERFORMANCE TASK: Shopping for School Supplies

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC.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?*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students will continue to develop their understanding of, and facility with, addition and subtraction, as well as continue to develop their understanding of, and facility with, money. Students will work with dollar amounts to determine if they have enough money to buy certain items listed. The money amounts will need to be represented using the dollar sign. Students will also have the opportunity to practice fluency with mentally adding two numbers together to generate an estimated total before finding the actual total. Formal discussions about rounding numbers does not need to take place, however discussions about what ten a given number lives closest to on the number line is something that should be continually discussed when solving equations. This allows students to determine whether or not final answers are reasonable. It also helps students learn how to calculate more quickly and develop an internal sense of number.

ESSENTIAL QUESTIONS

- Why is it important to be able to count amounts of money?
- What are the different ways we can represent an amount of money?
- How do we know if we have enough money to buy something?

- In what type of situations do we add?
- In what type of situations do we subtract?
- How do we know if we have enough money to buy something?
- What estimation and mental math strategies can I use to help solve real world problems?
- What is an effective way to estimate numbers?

MATERIALS

- *Bunny Money* by Rosemary Wells, or similar book about buying items
- "Shopping For School Supplies" chart or transparency

GROUPING

Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Read the book, *Bunny Money,* by Rosemary Wells, or a similar book about going to the store. Ask the students if any of them helped shop for their school supplies this year. Tell them they are going to help Mary Beth's mother figure out if she has enough money to purchase different items.

This activity should be done **orally** with partners. Without using paper and pencil, have the pairs talk to each other about how they would estimate if they have enough money to purchase the combinations of school supplies. Listen for the use of **benchmarks** such as five and ten. Be sure to have those students share to introduce the idea to the class. To encourage student responses, it may be necessary for the teacher to "model" the thinking he or she wants with an example problem.

A sample student response for the first one would be:
"I know that 15 plus 10 equals 25 and that's all Beth has. But the prices are actually 15 and 11, so she won't have enough, because 11 is one more than 10."

Special note:

****The money amounts and items may be adjusted to fit your students' understanding of money.***

***Some students may bring up the issue of tax being added to the price when they go to the store. You may say that since we are working with estimations and not actual amounts, they do not need to worry about tax at this time, or that it is a tax-free weekend.**

FORMATIVE ASSESSMENT QUESTIONS

- Why is it important to be able to count amounts of money?
- What are some different ways we can represent the same amount of money?
- When did you need to add during this activity? When did you need to subtract? How did you decide which operation to do?
- How did you know if you had enough money to buy the item?
- What estimation and mental math strategies did you use to help solve the problems?
- What does it mean to estimate numbers?

DIFFERENTIATION

Extension

- Challenge students to decide if Mary Beth has enough money to buy three different items and how much more money she might need, if any.
- Have students mentally add how much Mary Beth would need if she wanted to buy all of the school supplies.

Intervention

- Provide a 99's chart to help students find the nearest benchmark numbers.

Name: _____

Shopping for School Supplies

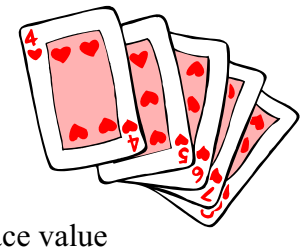
- Before the first day of school, Mary Beth went to the store to buy some school supplies.
- Estimate (without paper and pencil) the price for each pair of school supplies.
- Determine if Mary Beth had enough money to buy the items.

Pencils	Binder	Crayons	Ruler	Paper	Scissors	Glue	Pens
$4	$20	$5	$11	$13	$15	$15	$10

Amount Mary Beth has to spend	*Items Purchased*	*Estimated Cost*	*Does she have enough money? Yes/No If No, how much more does she need?*
$25	Glue and ruler		
$10	Pens and crayons		
$15	Scissors and pencils		
$30	Paper and binder		
$25	Pens and binder		
You decide!	You decide!		

CONSTRUCTING TASK: Take 100 Revisited

Approximately 1 Day



STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

This game is an extension of Take 100 found in Unit 2. In Unit 2, Take 100 is played with the cards visible at all times. The students flip over two cards and attempt to make pairs of 100. If they are the first one to yell "One Hundred!", they get to pick up the pair. Take 100 Revisited is played a little differently. This version is played with each child starting with 5 cards. On each turn, they can choose to pick up a card from the discard pile or pick up a card from the deck. The goal is still to make 100, but this time the student is working more independently. The first student to use all of their cards by creating sets of 100, wins the game.

ESSENTIAL QUESTIONS

- How can I learn to quickly calculate sums in my head?
- What strategies will help me add multiple numbers quickly and accurately?

MATERIALS

- A deck of cards containing two of each of the following numbers: 10, 20, 30, 40, 50, 60, 70, 80, 90, 50, 5, 95, 15, 85, 25, 75, 35, 65, 45, 55. (Copy 2 game cards sheets for each deck of cards)
- "Take 100 Game, Student Directions" Student Sheet

GROUPING

Partner/Small Group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This is a card game during which students must be the first to spot combinations of one hundred.

Task Directions
Students follow the directions below from the "Take 100 Game, Student Directions" Student Sheet.

Number of Players: 2
Materials: Deck of 40 Cards
Directions:

1. Your goal in this game is to make sets of one hundred.
2. Shuffle the cards and deal five cards to each player. Lay all unused cards face down in a pile on the desk. Take off the top card and turn it face-up, creating a new pile. This top card will begin the discard pile.
3. Player 1 can choose to take a card from the deck or to take the top card from the discard pile. They then have to choose one card to place on the discard pile. If the player can make a set of 100, they put the cards face up in front of them, and replace the cards from the draw deck or discard pile, so their hand continues to contain 5 cards.
4. Player 2 can choose to take a card from the discard pile or take a card from the deck. Then they have to choose one card to place on the discard pile. If the player can make a set of 100, they put the cards face up in front of them, and draw 2 cards to replace them.
5. If the draw deck runs out of cards, mix up the discard pile and place face down create a new draw deck.
6. This play continues until one player is out of cards, and there are no cards left to draw.

7. The winner is the student who has the most pairs of cards adding to 100.

As students play, ask them to record their pairs of 100 as an addition number sentence. This gives students an opportunity to focus on the pairs that make 100 and provides a record of the game.

Variation: Make multiple copies of cards to increase length of game.

FORMATIVE ASSESSMENT QUESTIONS

- What do you know about pairs of numbers that add to 100?
- What strategies are you using? How are they working for you?
- What can you do to find the answer quicker than your partner?
- Does 63 + 47 equal 100? How do you know?

DIFFERENTIATION

Extension

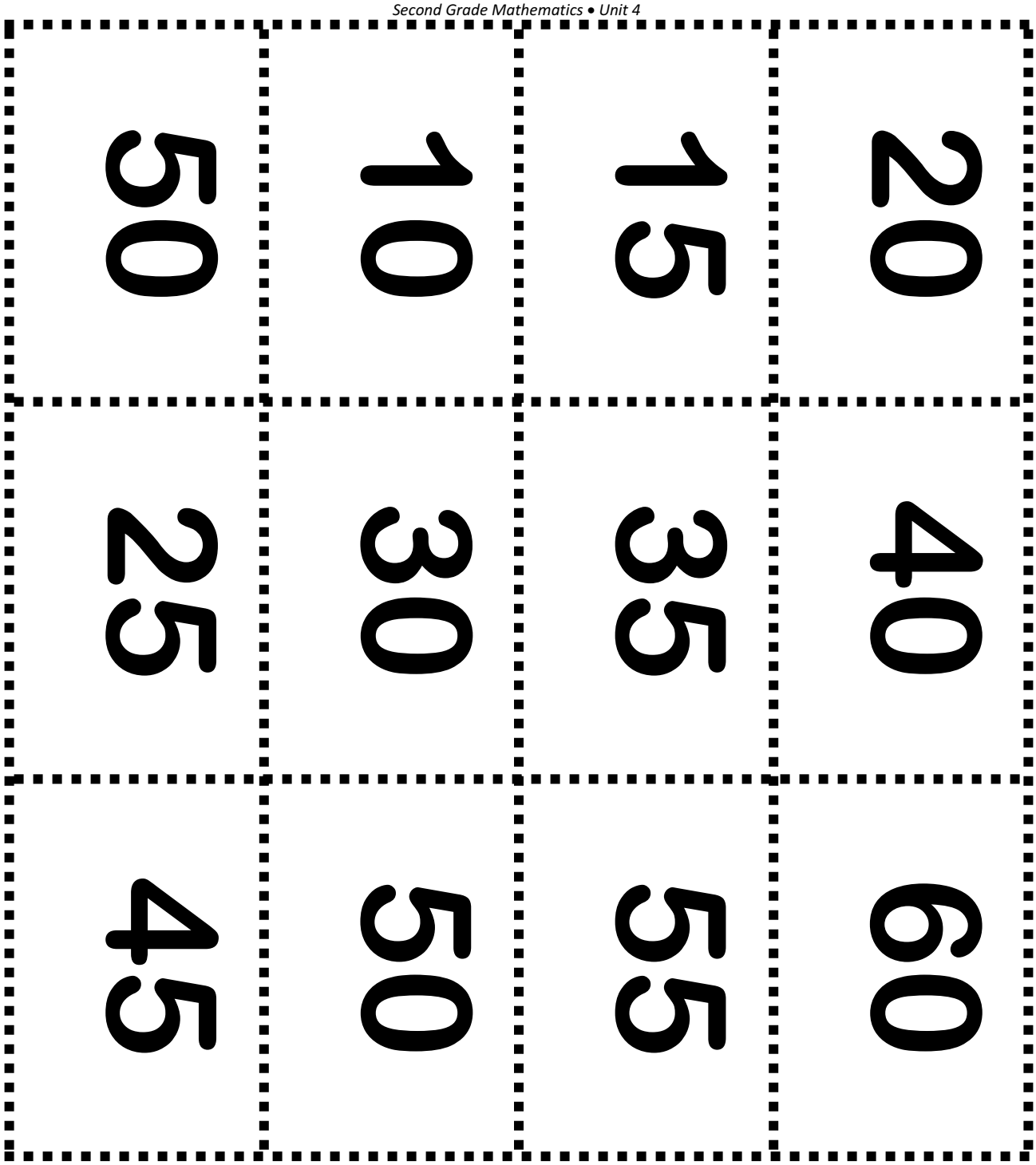
- Ask students to make cards to add to the deck of cards. Provide blank card outlines and allow students to either create their own pairs of 100 cards to the deck or to create their own deck of cards with which to play the game.
- Play the version Take 1,000- same rules just larger numbers and a lot more combinations.

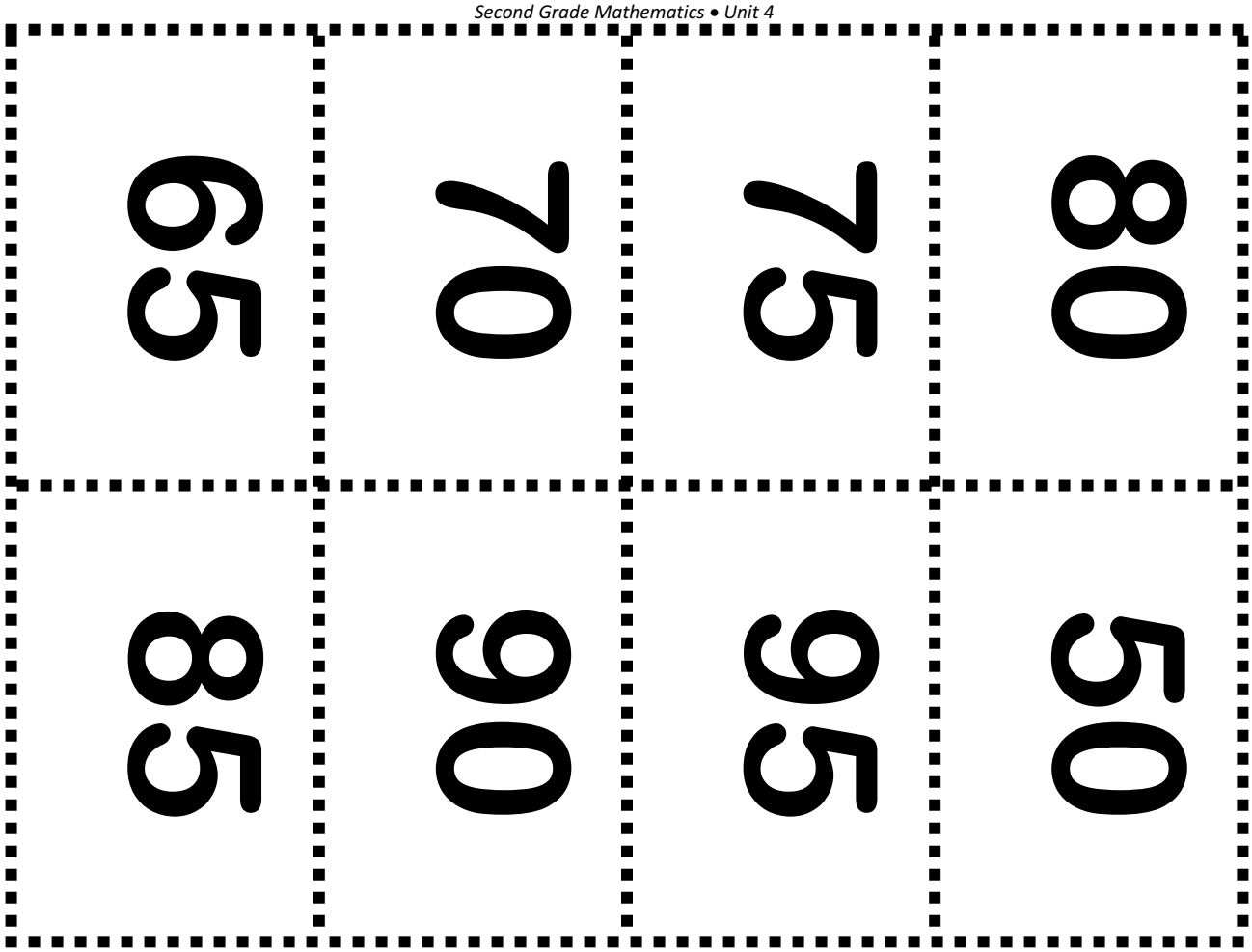
Intervention

- If two struggling students are going to play this game together, it may help to model the game during small group instruction first. While modeling the game, use the think-aloud strategy to model ways students can think about pairs to one hundred.
- Play a version of this game but call it "Pairs to 10" or a "Pairs to 20" game using two of each of the following cards: 1, 19, 2, 18, 3, 17, 4, 16, 5, 15, 6, 14, 7, 13, 8, 12, 9, 11, 10, 10.

TECHNOLOGY

http://letsplaymath.wordpress.com/tag/mental-math/ Offers ideas for other games and links to additional math sites.





Name _____ Date _____

Take 100 Game
Student Directions

Number of Players: 2
Materials: Deck of 40 Cards
Directions:

1. Your goal in this game is to make sets equaling one hundred.
2. Shuffle the cards well and deal out five cards to each player. Lay all cards not used face down in a pile on the desk. Turn over the top card face up, this face up card will begin the discard pile.
3. Player 1 can choose to take a card from the deck or to take the top card from the discard pile. Then they have to choose one card to place on the discard pile. If the player can make a set of 100, they put the cards face up in front of them. Take enough new cards to keep 5 in your hand.
4. Player 2 can choose to take a card from the discard pile or take a card from the deck. Then they have to choose one card to place on the discard pile. If the player can make a set of 100, put the cards face up in front of them. Take enough new cards to keep 5 in your hand
5. This play continues until players can no longer take cards. If the draw deck runs out of cards, mix up the discard pile and place them face down in a pile to create a new draw deck.
6. The player with the most sets of 100 wins.

SCAFFOLDING TASK: Multi-digit Addition Strategies Revisited

Approximately 3 Days

STANDARDS FOR MATHEMATICAL CONTENT

MCC.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.

MCC.2.OA.2 Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

MCC.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.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

****Mathematical Practices 1 - 6 should be evident in EVERY lesson.** ***

BACKGROUND KNOWLEDGE

Students should have had prior experiences and/or instruction with addition and subtraction of two-digit numbers without regrouping. Students should also have experience solving various story problems with the use of manipulatives. Students can use place value blocks, number charts, create drawings of place value blocks, or number lines to support their work.

Some students may draw a picture, solve the problem with manipulatives, or use benchmark numbers. All of these strategies demonstrate a solid foundation of number sense. If you notice students using the traditional algorithm for regrouping, it is imperative that you ask them to explain their reasoning for using this method. The idea that numbers can be "carried" is not a natural progression when numbers are combined. Algorithms are a short cut method that makes recording numbers more convenient and efficient. Students need to explore many different strategies for combining numbers before they can understand the idea of an amount being "carried" from one place value position to another. Moving to the standard algorithm too early

will often prevent students from continuing to make sense of the numbers that work within a given situation.

ESSENTIAL QUESTIONS

- How can we solve addition problems with and without regrouping?
- Can we change the order of numbers when we add (or subtract)? Why or why not?
- How can we solve problems mentally?
- How can strategies help us when adding and subtracting with regrouping?

MATERIALS

- Various manipulatives (counters, base-ten blocks, unifix cubes)
- Chart paper for class recording sheets

GROUPING

Large group, Partners, Individual, Small group

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Introduce task with this story problem:

Mrs. Jones and Mrs. Smith are going to plan a popsicle party for their classes. Mrs. Jones has 28 students in her class and Mrs. Smith has 25 students in her class. They plan on getting one popsicle for each student in their classes. How many popsicles do Mrs. Jones and Mrs. Smith need to buy?

Have several students retell the story problem to you and discuss what is happening in the problem to ensure their understanding.

Part II
Split students into pairs and give each student a half sheet of chart paper to use in solving the problem. Also, have various manipulatives available for students to use as they work to solve the problem. Walk around and observe students as they are problem solving. Ask questions such as:

- What are you trying to find out?
- How many students are in Mrs. Jones's class?
- How many students are in Mrs. Smith's class?
- Can you explain the strategies you are you using to solve this problem?
- Are there other ways you could solve the problem?
- Is there a way you can check your answer?

As you are walking around, find students who are using a variety of strategies.

Part III
Let several students share their different strategies and answers to the problems. Allow the students to call on their peers to ask questions or make comments about their strategy and the answer that was found. After students have shared various strategies, spend some additional time discussing the different strategies students have used. Some students may have broken the numbers into smaller pieces to simplify the addition problem.

- For example, in 28 + 25 you can begin by pulling out the tens and add 20 +20 = 40. You then have 8 + 5. You can then break up the 5 into 3 and 2. Next, add 8 + 2 to get 10. You will then have 3 more to add. 20 +20 +10 +3 = 53.
- Other students may have used benchmark numbers to help add. For example 28 + 25 could have been solved by keeping the 28 and taking 2 from 25. You can have 30 and 23. You can then add 30 + 23 to get 53.
- Another Strategy may be to add 5 to 25 to make a group of 30 then add 20 to 30 by grouping 20 more, equally 50 then add 3.

This may sound convoluted to adults, but students who have strong number sense will tend to think in this way. When we teach **just** the algorithm we discourage the students from using a more natural strategy. When they are allowed to develop strategies that make sense to them, they are developing better number sense of addition and subtraction! Create a list of the various strategies students used when solving addition problems (anchor chart). Some students may have also mentioned the traditional algorithm for addition with regrouping. As long as they can explain **what** they are doing and **why** it works, then it is okay to include this as a strategy. It is more beneficial to encourage students to utilize the various other strategies at this time; then move towards the algorithm when they can demonstrate true number sense.

Comments
If no student describes using the number line or number chart as a strategy, then this is a good time to bring up this tool for combining amounts. Students should be able to use the number line or number chart as a tool for adding numbers. For example, students could find 28 on the number line or number chart, and count on 25, or vice versa. Use of models in this way elicits a natural discussion about the commutative property of addition.

Part IV
Give students this problem:
Amy had a collection of 46 stamps. Her brother Chris had a stamp collection with 35 stamps. If they combine their stamps, how many stamps will they have?
Allow students to attempt to solve this problem on their own. As students work, walk around asking questions about the students' strategy use. Look to see if students are using the strategies mentioned above.

After students have completed solving the problem, allow students to take turns sharing their strategy with people at their table or other small groups of students. The task should be closed with the teacher selecting students to highlight various strategies used in the classroom and again

referring to the number line or number chart if it is not one of the strategies presented by students.

FORMATIVE ASSESSMENT QUESTIONS

- Describe how you solved the problem.
- Do you think you could solve the problem another way?
- How is your strategy for solving the problem the same as your neighbor's? How is it different?
- How do you think we should record our work so that someone else could understand what we did?

DIFFERENTIATION

Extension

- Give students this problem to supplement problem 1: If popsicles come in boxes of 10, how many boxes do Mrs. Jones and Mrs. Smith need to get for their classes of 24 students? If each student gets one popsicle, how many popsicles will be left over?
- Give students this problem to supplement problem 2: Amy and Chris join their stamps together in a scrap book. If the stamp book can hold up to 100 stamps, will there be enough room for both Chris' and Amy's stamps? How do you know? How many more stamps could Chris and Amy place into the scrap book before it reaches its maximum capacity?
- Write a problem involving either the stamps or the popsicles, and ask a partner to solve it. What strategy was used?

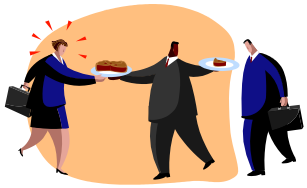
Intervention

- Some students may need to work on the second problem with partner groups. They may not be ready to utilize the addition strategies independently in this lesson. They may also need to use manipulatives to physically act out the problem.
- Some students may not be able to communicate their strategy in written form. Those students could be pulled to solve the second problem individually in an interview setting, so they may explain their process as they go.

Name: _____ Date: _____

Multi-digit Addition Strategies Revisited

Amy had a collection of 46 stamps. Her brother Chris had a stamp collection with 35 stamps. If they combine their stamps, how many stamps will they have?



SCAFFOLDING TASK: Subtraction: Modeling with Regrouping

Approximately 4-5 Days

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.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.

MCC.2.OA.2 Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.

MCC.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.

STANDARDS FOR MATHMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

****Mathematical Practices 1 - 6 should be evident in EVERY lesson.** ***

BACKGROUND KNOWLEDGE

Students should have had prior experiences and/or instruction with addition and subtraction of two-digit numbers without regrouping. Students should also have experience regrouping using base-ten blocks.

Success with this task relies on student understandings of collections of objects in sets of ten as well as their understanding of how this relates to place value. Students need to have had multiple experiences with number lines, such as Shake, Rattle, and Roll Revisited. Though this activity was not intended to introduce the strategy of regrouping to students, it was designed to give students the opportunity to use a number line to experience the "action" of addition and the "action" of subtraction and how these two actions are opposite (inverse) operations. If students have had **MANY** opportunities to play and discuss those two games, **THEN** they should be ready for further discussion of subtraction and what the concept of "regrouping" means.

ESSENTIAL QUESTIONS

- How can we model and solve subtraction problems with and without regrouping?
- Can we change the order of numbers we subtract? Why or why not?
- How can we solve problems mentally? What strategies help us with this?
- How can mental math strategies, for example estimation and benchmark numbers, help us when adding and subtracting with regrouping?

MATERIALS

- Bags of Base Ten Blocks (at least 8 Hundreds, 20 Tens, and 10 Ones per pair of students)
- Place Value Mat
- "Subtraction with Regrouping" student task sheet

GROUPING

Large group, Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Give student pairs a copy of a place value board and a plastic bag with at least 8 hundreds blocks, 20 ten blocks, and 10 ones.

Have students place two hundred blocks on their place value mat. Each partner takes a turn rolling the dice. The student has to take away the number of ones that matches their roll. Demonstrate for students how to regroup their hundreds for tens. and their tens for ones. in order to subtract ones. Allow students to play until they reach zero ones. While students are playing, walk around and ask questions such as:

- How many (hundreds, tens, ones) do you have? What digits would be in those places? What is their value?
- How will you regroup your hundreds for tens?
- What is your new number? What digit would be in the hundreds place now? What is its value? How do you know?
- What is happening to your number? Why?
- How will you regroup your tens for ones? What digit would now be in the tens place? What would be the value of that digit? How about the ones place?
- Which place would have the largest digit in it right now? Does it also have the greatest value? How do you know?

Part II
Once students have played for a while, present them with this problem:

Lisa has $131. She has already spent $47. How much money does Lisa still have?

Ask questions such as:

- What are you trying to find out?
- How many money does Lisa have?
- How much money did Lisa already spend?
- What number do you need to represent on your place value mat first? Why?
- How many will you take away/remove? Why?
- What did you notice about the ones? What will you have to do in order to subtract? Can you regroup them in any way? How will this help?
- How many tens do you have now? What digit is now in the tens place? What is the value of that digit?
- How many ones do you have now? What digit is now in the ones place? What is the value of that digit?
- Can you explain the strategies you are using to solve this problem?
- Is there a way you can check your answer?

After students have solved the problem, pull the class together for a class discussion. Allow several students to demonstrate their processes using the smart board or the overhead projector. If it has not been done so already, demonstrate the regrouping algorithm for students. Solve several more problems with the students, using both the base ten blocks and the numerical algorithm simultaneously. Have students explain/articulate what is going on when you are performing the algorithm. Invite discussion about whether they "like it" or not and have them explain their thinking.

Part III
Give students the "Subtraction: Modeling with Regrouping Revisiting" student task sheet to solve in partner pairs using base-ten blocks and the regrouping algorithm. While students are working, circulate and question students:

- What are you trying to find out?
- What number do you need to represent on your place value mat first? Why?
- How many will you take away/remove? Why?
- What did you notice about the ones? What will you have to do in order to subtract? Can you regroup them in any way? How will this help?
- How many tens do you have now? What digit is now in the tens place? What is the value of that digit?
- How many ones do you have now? What digit is now in the ones place? What is the value of that digit?
- Can you explain the strategies you are using to solve this problem?
- Is there a way you can check your answer?

Part IV
After students have completed solving the problems, allow students to take turns sharing the strategy they used to solve each problem. Allow other classmates to make observations and ask questions.

Parts V-VII of the task should be completed the following day.

Part V
Gather students in the class meeting area and present students with this story problem:

Mr. Lundquist has a very large family. One evening he brought home some potatoes for his family of sixteen children and his wife. Each person had a potato for dinner that evening. There were 21 potatoes left. How many potatoes did Mr. Lundquist bring home?

Have several students retell the story problem and discuss what is happening in the problem.

Part VI
Split students into pairs and give each student a half sheet of chart paper to use in solving the problem. Also, have various manipulatives available for students to use as they work to solve the problem. Walk around and observe students as they are problem solving.
Ask questions such as:

- What are you trying to find out?
- How many potatoes did his family eat? How do you know?
- Can you explain the strategies you are using to solve this problem?
- How many potatoes did Mr. Lundquist have at the beginning of the story?
- Are there other ways you can solve this problem?
- Is there a way you can check your answer?

As you are walking around, find students who are using a variety of strategies. Some students may draw a picture, solve the problem with manipulatives, use benchmark numbers, or use the traditional algorithm for subtraction with regrouping.

Let several students share their different strategies and answers to the problems.
Allow the students to call on their peers to ask questions or make comments about their strategy, and the answer that was found. After students have shared various strategies, spend some additional time discussing the use of benchmark numbers. Demonstrate for students how the problem could have been solved by breaking the larger numbers into number combinations that are easier to subtract. For example with 36-18, you can take 2 from 36 and give it to 18 to change the problem to 34-20. You can then subtract 20 from 30 to get 10 and 0 from 4 to get 4. The difference would be 14. Create a list with students of various strategies students can use when solving subtraction problems.

FORMATIVE ASSESSMENT QUESTIONS

Refer to questions in each of the sections I-VI

DIFFERENTIATION

Extension

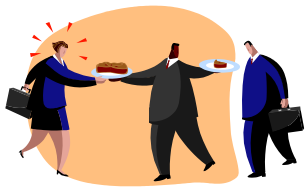
- Allow students to attempt regrouping problems with three-digits.

- Allow students to make up their own three digit subtraction story problems. They can solve their own problems or trade with a partner.

Intervention

- Some students may need additional support during the problem solving through additional questioning and scaffolding. Having them work with a partner who is very articulate about their mathematical thinking will also help.

Name: _____



Subtraction with Regrouping Problems Revisited

1. Sarah collects comic books. Her goal is to have 100 comic books. Right now she has 72. How many more comic books does she need to reach her goal?

2. Carolyn and Julia are selling pies to raise money for their club. Carolyn had 60 pies to sell. She gave some to Julia to sell. Now Carolyn has 38 pies. How many pies did Carolyn give to Julia to sell?

3. Seth has a collection of marbles. He gives 24 of his marbles to his cousin Blake. Now, Seth has 73 marbles left. How many marbles did he begin with?

CONSTRUCTING TASK: Perfect 500!

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students should have addition skills clearly in place, and strategies for larger numbers, including counting up, counting back, pairs that make ten, pairs that make 100, and compensation strategies.

Students may find this game challenging, particularly at the beginning of the year. When introducing this game, you may choose to use one of the variations of the game from the list below.

- Play just one round, the students with the sum closest to 100 wins.

- Play just one round as a class. Put the digits on the board and let students create the sum that is closet to 100.
- Discuss the relationship between pairs of 10 and pairs of 100. (i.e. 4 + 6 = 10, so 40 + 60 = 100 What about 42 + 68? Why doesn't that equal 100?

ESSENTIAL QUESTIONS

- How can I learn to quickly calculate sums in my head?
- What strategies will help me add numbers quickly and accurately?
- What strategies are helpful when estimating sums in the hundreds?

MATERIALS

- Deck of playing cards, (2 copies of the cards provided for a deck of 40 cards)
- "Perfect 500" Directions Sheet
- "Perfect 500" Student Recording Sheet

GROUPING

Partner/Small Group Game

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This game allows students to look for combinations of numbers that equal 100.

Task Directions
The goal of the game is to have a sum as close to but not over 500 at the end of five rounds. To begin, each student is dealt 5 cards. The player uses four of the cards to make 2, two-digit numbers, saving the unused card for the next round. Each player will arrange the cards so that the sum of their 2 two-digit numbers are as close as possible to 100. Students record their addition problem on the recording sheet, keeping a running total as they play.

For the second round, each player gets four cards to which they add the unused card from the first round. The students will repeat the same process as the first round, saving one card for the next round. After the end of five rounds, each player will total their sums of the five rounds. The student, who is closest to 500 without going over, after five rounds, is the winner.

FORMATIVE ASSESSMENT QUESTIONS

- What is one way to quickly find the answer? Can you think of another way?
- How do you know you will not go over 500?
- How do you decide which numbers to use? How do you choose which cards to use?

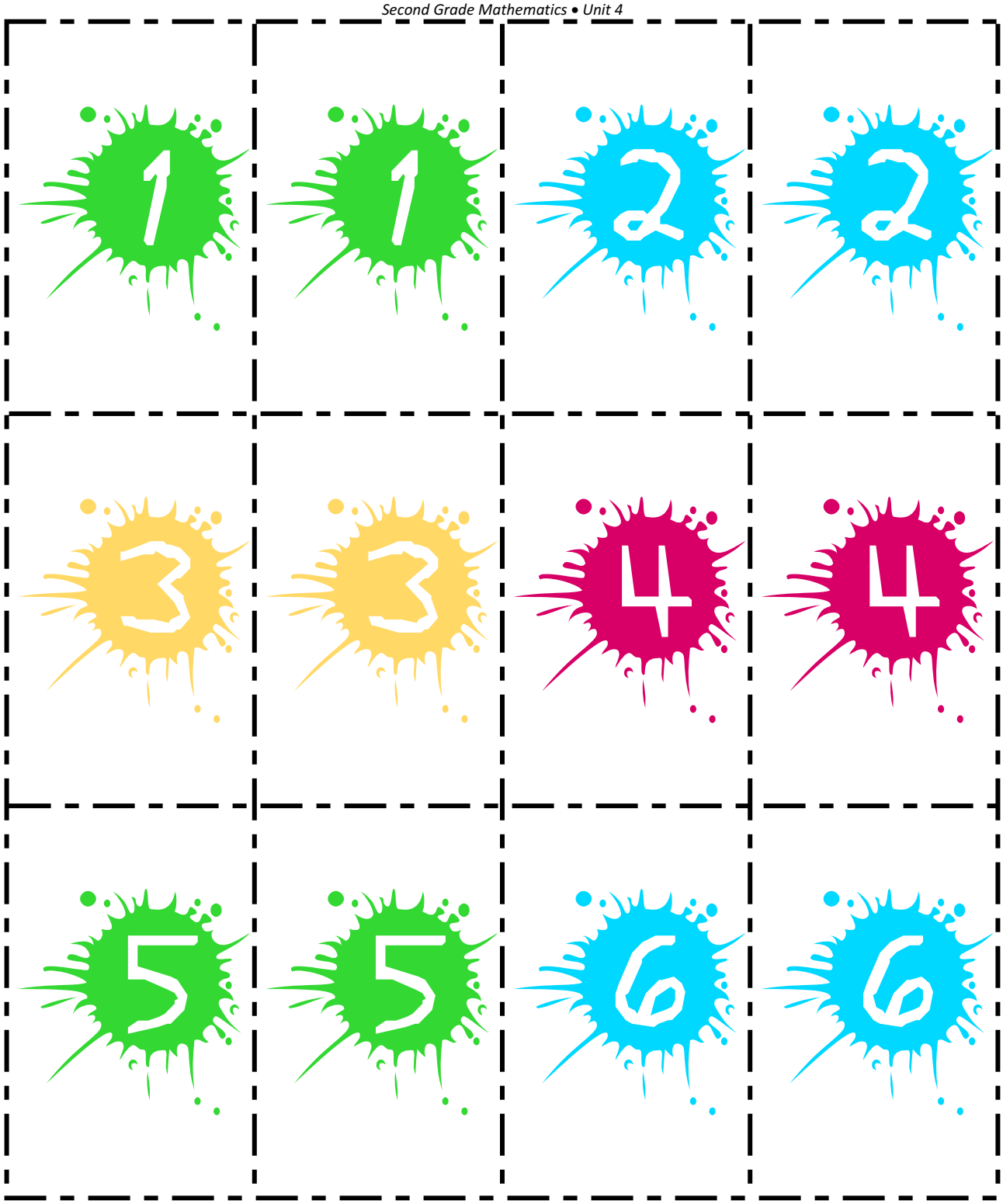
DIFFERENTIATION

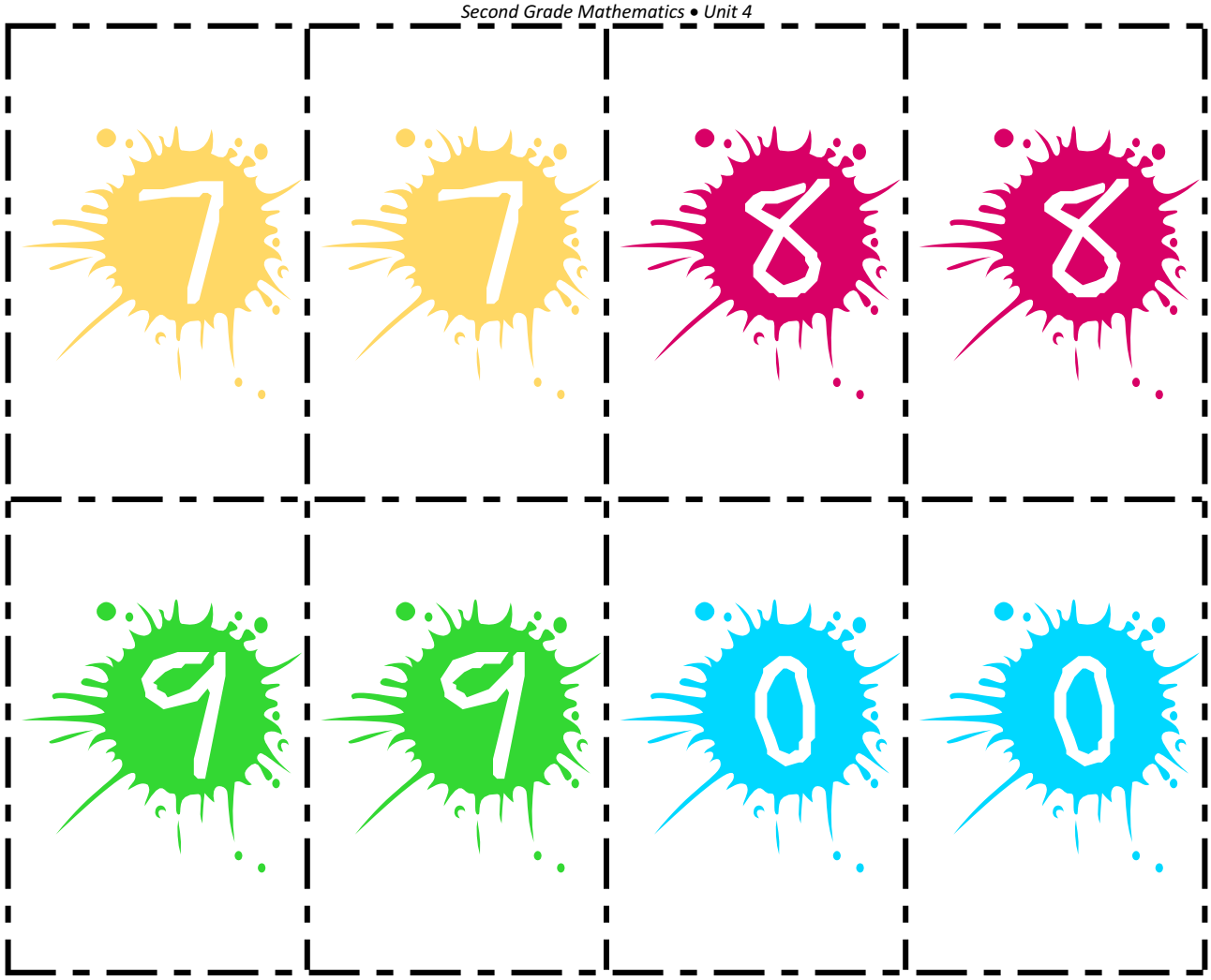
Extension

- Students can play "Perfect 5,000" during which each player draws 7 cards and uses 6 to make 2, three-digit numbers whose sum is close to 1,000. After 5 rounds, the player with the sum closest to 5,000, without going over, is the winner.

Intervention

- Plan for students with like abilities to play against each.
- Students can play "Perfect 100" during which each player draws 4 cards and adds the numbers on three cards to find a sum as close as possible to 20. After 5 rounds, the player with the sum closest to 100, without going over, is the winner.





Name _____ Date _____

Perfect 500

Number of Players: 2 or 3

Materials: One deck of 40 cards (4 each of the numbers 0-9)

Directions:

1. To begin, each student is dealt 5 cards.
2. Use four of the cards to make 2, two-digit numbers. Arrange these 2, two-digits numbers so that they will create a sum as close to 100 when added together. This will leave one card for the next round.
3. Record your addition problem on the recording sheet, keeping a running total as you play.
4. For the second round, each player gets four cards to which they add the unused card from the first round.
5. Repeat the same steps as the first round, saving one card for the next round.
6. After the end of five rounds, each player will total their sums of the five rounds.

The student, who is closest to 500 without going over, after five rounds, is the winner.

Perfect 500!

Player 1 _____ **Date** _____

Round						Running Total
1		+		=		
2		+		=		
3		+		=		
4		+		=		
5		+		=		
					Total	

Perfect 500!

Player 2 _____ **Date** _____

Round						Running Total
1		+		=		
2		+		=		
3		+		=		
4		+		=		
5		+		=		
					Total	

CONSTRUCTING TASK: I Have a Story, You Have a Story

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

MCC2.NBT.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Students should be familiar with the concept of solving word problems in math and with seeing symbols for unknowns, such as squares or triangles.

Some students will have difficulty with ____ + 8 = 75 simply because they are so accustomed to seeing a number first. Students need to understand that they may subtract the given number from 75 or count up from 8 to 75 to find the value of the missing number. We also want students to

recognize that ___ + 8 yields the same sum as 8 + ___ due to the commutative property of addition.
Students need experiences with many different addition and problem types. See the examples in Strategies for Teaching and Learning section of this Unit. Provide students with opportunities to solve a variety of problems presented in varying contexts. Then allow students to write similar stories providing experiences in both creating and solving many types of problems.

ESSENTIAL QUESTIONS

- How can I use what I understand about addition and subtraction in word problems?
- What is a number sentence and how can I use it to solve word problems?

MATERIALS

- White board, overhead projector, or interactive white board for whole group instruction
- Student Task Sheets for small group or cooperative learning groups

GROUPING

Whole/Small Group/Partner Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students write and solve story problems.

Comments

When students make up their own number stories, teachers gain insight into the students' understanding of the problem solving process. Simplify or extend these situations to help students grasp how to solve addition problems with the use of subtraction. This is also intended to give students practice with adding and subtracting amounts since they form important benchmarks (5s, 10s, 25s, & 50s) that will also be used in multiplication and division.
Before students solve the problems in partners or small groups, model the process of solving and writing a similar story problem with the whole class (or rotating with small groups). Use a missing addend problem similar to those on the student sheet.

Task Description

Students will solve two story problems and write two similar story problems.

Here is my story:

I had 8 dimes in my pocket. I spent 50 cents at a bubble gum machine. When I got home, I found a hole in my pocket and only one dime is left in my pocket.
How much money fell through the hole in my pocket? How do you know?

1. Now write a similar story about having dimes in your pocket and later finding a hole in your pocket.
   How much money fell through the hole in your pocket? How do you know?

2. Here is another story:

   I have some dollars in my piggy bank. For my 8th birthday, Jacob gave me 25 dollars now I have 85 dollars. How much money did I have in my piggy bank to begin with? How could you solve this problem?

   Ask students to write number sentences and explain their work. Expect number sentences such as: □ + 15 = 75. If students do not introduce this sentence to the class, use this opportunity to introduce unknowns. This will be very useful to complete this task. Continue questioning the questions such as: What number goes in the box? How do you know?

3. Write a story for this number sentence:
   18 + □ = 61.
   What number goes in the box? How do you know?

FORMATIVE ASSESSMENT QUESTIONS

- How much money was there at the beginning?
- What do you know? What do you need to find out? How can you find it out?
- What is a number sentence and what must it include?
- What information will you give in your story? What information needs to be found?
- What strategies did you use to solve the problem?
- How do you know your answer is correct?

DIFFERENTIATION

Extension

- For the first problem on the student sheet, have students determine the value of the money that fell through the pocket. For the third problem, have students find the value of 85 quarters. Also, the stories students create can be extended in a similar manner.
- Have students create their own subtraction stories where the minuend is unknown. (In the subtraction problem 5 – 3 = 2, 5 is the minuend, 3 is the subtrahend, and 2 is the difference.)

Intervention

- Provide a story frame to assist students in organizing and writing a number story.
- Some students may have difficulty with ____ + 8 = 85 simply because they are accustomed to seeing a number first, rather than an unknown quantity. They may need additional experiences with this format to understand that subtracting an addend

from the sum will give the remaining addend. Students also should understand that ___ + 8 yields the same sum as 8 + ___ due to the commutative property of addition.

TECHNOLOGY CONNECTION

- http://www.cdli.ca/CITE/math_problems.htm Provides teachers with resources for a variety of word problems at different levels

Name _____ Date _____

I Have a Story, You Have a Story

1. Here is my story: I had 8 dimes in my pocket. I spent 50 cents at a soda machine. When I got home, I found a hole in my pocket and only have one dime left in my pocket. How many dimes fell through the hole in my pocket? How do you know?	2. Now write a similar story about having dimes in your pocket and later finding a hole in your pocket. How many coins fell through the hole in your pocket? How do you know?
3. Here is another story: I had some dollars in my piggy bank. For my allowance, my dad gave me $15. Now I have $85. Here is a number sentence for my story. □ + $15 = $75 What number goes in the box? How do you know?	4. Write a story for this number sentence: 18 + □ = 61. What number goes in the box? How do you know?

CULMINATING TASK: Money in My Pocket

Approximately 1 Day

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

MCC2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

MCC.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?*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Mathematical Practices 1 and 6 should be evident in EVERY lesson. ***

BACKGROUND KNOWLEDGE

Based on their choices from the Tic Tac Toe chart students will have the opportunity to demonstrate many of the following concepts:

- continue to develop their understanding of and facility with addition and subtraction
- add up to 4 two digit numbers
- demonstrate fluency with addition and subtraction
- recognize and use place value to manipulate numbers
- continue to develop their understanding of and facility with money
- count with pennies, nickels, dimes, and dollar bills
- represent a money amount with words or digits and symbols (either cent or dollar signs)
- represent and interpret data in picture and bar graphs

ESSENTIAL QUESTIONS

- Why is it important to be able to count amounts of money?

- What are the different ways we can represent an amount of money?
- How do we know if we have enough money to buy something?

MATERIALS

- Coin stamps
- Coins
- Construction paper

GROUPING

Small Group, Partners, or Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

While this task may serve as a summative assessment, it will also be useful to guide the teaching and learning in your classroom. It is important that all elements of the task be addressed throughout the learning process so that students understand what is expected of them.

Display the Coins in My Pocket story on the overhead or smart board. Read through it with students. Post the sheet somewhere in the room so students can refer back to it.

Be sure to allow several days for students to work on this task. It could be placed in a center or station for several days, or it could be presented to the class as a project that they work on independently (or with a partner or in small groups) over a given period of time. However you decide to use this task, be sure to allow students enough time to complete 3 of the 9 activities. Remind them to pay attention to the fact that their choices must connect three squares in a row. The activities students complete may be made into a "Coins In My Pocket" book that can be shared with classmates.

Coins In My Pocket

I just pulled my raincoat out of the closet. It hasn't been worn since the last time it rained. I reached into my pocket and found 10 coins.

Without looking at them, I try to guess how much money I have.

A sample of a Tic-Tac-Toe board that could be used with this activity is shown below:

Coins In My Pocket
Tic-Tac-Toe

List two of your combinations. Write the value of each combination. List the possible things you could buy with those amounts of money.	**Use coin stamps or drawings** to make a visual of at least three different groups of coins you could have found. Label each group with its total value.	**Create** a pocket and coins out of construction paper to represent the combination of coins found in your pocket. Label your pocket with the amount of money.
Write a song / rap/ poem about your money. It should tell the combination of coins and have the total amount of money in the song.	**Make a picture graph** to show one combination of coins. Develop three questions that could be answered using your data. Make sure to include the answers to your questions.	**Make a pattern** with the coins that you found in your pocket. Create another pattern if possible. Draw your patterns on a piece of paper and label them with the amount of money represented.
Create a table to organize possible combinations that you discover.	**Make a bar graph** to show one combination of coins. Develop three questions that could be answered using your data. Make sure to include the answers to your questions.	**Write a story** about the coins you found, the amount of money, and how you spent your money.

FORMATIVE ASSESSMENT QUESTIONS

- Why is it important to be able to count amounts of money?
- What are the different ways we can represent an amount of money?
- How do we know if we have enough money to buy something?

DIFFERENTIATION

Extension

- Students may complete more than 3 activities.

Intervention

- Have students work with a partner to complete 3 of the tasks.