# 4th Grade Mathematics

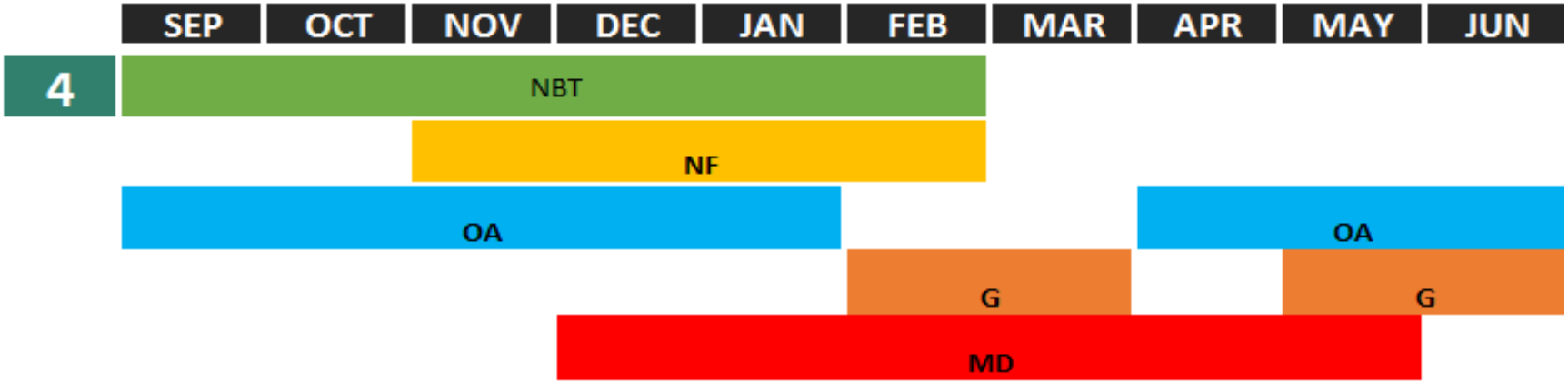
Unit 2 Curriculum Map:  Fractions and Decimals


ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

# A STORY OF UNITS




**Numbers Base Ten:** Generalize place value understanding for multi-digit whole numbers and use place value understanding and properties of operations to perform multi-digit arithmetic

**Numbers and Operations-Fractions:** Extend understanding of fraction equivalence and ordering, build fractions from unit fractions, and understand decimal notation for fractions, and compare decimal fractions

**Operations and Algebraic Thinking:** Use the four operations with whole numbers to solve problems, gain familiarity with factors and multiples, and generate and analyze patterns

**Geometry:** Draw and identify lines and angles, and classify shapes by properties of their lines and angles

**Measurment and Data:** Solve problems involving measurement and conversion of measurements, represent and interpret data, and understand concepts of angle and measure angles

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# Unit Overview

| Unit 2: Chapters 6-8 |
| --- |
| In this Unit Students will: |
| • Add and subtract unlike fractions, rename improper fractions and mixed numbers, rename whole numbers when adding and subtracting fractions, find a fraction of a set, display data involving fractions of a unit in a line plot, solve problems using a line plot.<br>• Read, write, and express decimals in expanded form, place value of decimals, patterns of decimals, compare and order decimals, round decimals, convert fractions to decimals and decimals to fractions.<br>• Add and subtract decimals with and without regrouping, solve real-world problems by adding and subtracting decimals. |
| *Essential Questions* |
| ➢ How do you decide which strategy would be the best one to use for solving a given word problem?<br>➢ How do you determine the correct operation(s) needed to solve a problem?<br>➢ How are place value patterns repeated in numbers?<br>➢ How can you represent the same number in different ways?<br>➢ How can you compare and order numbers?<br>➢ How can a fraction look different but still be the same?<br>➢ How can a fraction look different but still be the same?<br>➢ How can you use multiplication to find equivalent fractions?<br>➢ How can you write a pair of fractions as fractions with a common denominator?<br>➢ How can you use benchmarks to compare fractions?<br>➢ How can you compare fractions?<br>➢ How can you order fractions?<br>➢ How can I use models to help compare fractions?<br>➢ What patterns do you notice among numerators and denominators of equivalent fractions?<br>➢ How do fractions represent parts of a whole?<br>➢ How can you use fraction strips to add fractions?<br>➢ How can you add fractions with like denominators?<br>➢ How can you use fraction strips to subtract fractions?<br>➢ How do you subtract fractions with like denominators?<br>➢ How can you use a number line to add and subtract fractions?<br>➢ How are mixed numbers and improper fractions related?<br>➢ How do you use models to add mixed numbers?<br>➢ How do you add mixed numbers?<br>➢ How can we use addition to represent a fraction in a variety of ways?<br>➢ How can you describe a fraction using a unit fraction? |

- How can you find the product of a fraction multiplied by a whole number?
- How can you locate points for decimals on a number line?
- How can you use equivalent fractions to change a fraction to a decimal?
- What are some ways to represent decimals?
- How do you compare decimals?
- How are decimals related to money?
- How can you draw a picture to solve a problem?

*Enduring Understandings*

- Chapter 6: Fractions and Mixed Numbers
  - ✓ Add and subtract unlike fractions
  - ✓ Rename improper fractions and mixed numbers
  - ✓ Rename whole numbers when adding and subtracting fractions
  - ✓ Find a fraction of a set
  - ✓ Display data involving fractions of a unit using a line plot
  - ✓ Solve problems using a line plot

- Chapter 7: Decimals
  - ✓ Read, write, and express decimals in expanded form
  - ✓ Place value of decimals
  - ✓ Patterns of decimals
  - ✓ Compare and order decimals

- Chapter 8: Decimals
  - ✓ Add and subtract decimals with and without regrouping
  - ✓ Solve real-world problems by adding and subtracting decimals

*Common Core State Standards*

| | |
|---|---|
| 4.OA.2 | Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. |

This standard calls for students to translate comparative situations into equations with an unknown and solve. Students need many opportunities to solve contextual problems.
In a multiplicative comparison, the underling question is *what amount would be added to one quantity* in order to result in the other. In a multiplicative comparison, the underlying question is *what factor would multiply one quantity* in order to result in the other.

| |
|---|
| $6 |

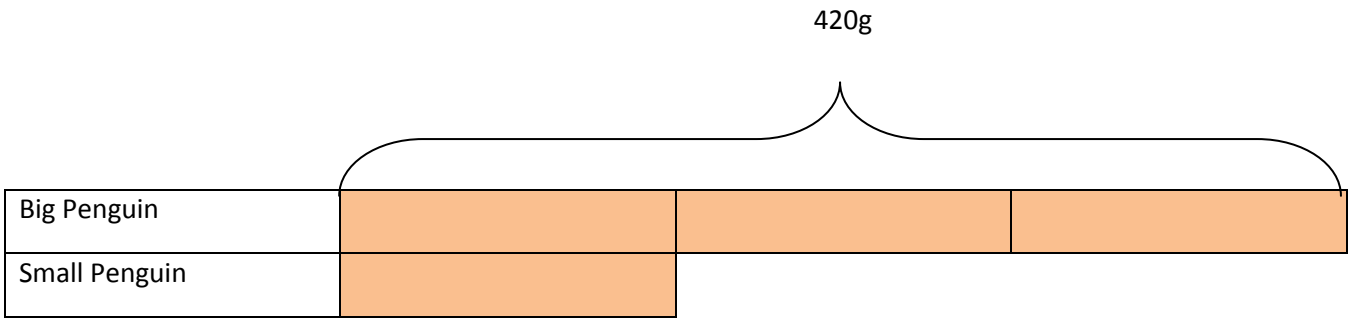
| | | |
|---|---|---|
| $6 | $6 | $6 |

**3 x *B*=*R***

**3 x $6 = $18**

A tape diagram used to solve a Compare problem

A big penguin will eat 3 times as much fish as a small penguin. The big penguin will eat 420 grams of fish. All together, how much will the two penguins eat?




B=number of grams the big penguin eats

S=number of grams the small penguin eats

3 x S=B

3 x S=420

S=140

S + B=140 + 420

=560

| | |
|---|---|
| 4.OA.5 | Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way*. |

Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations. Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features.

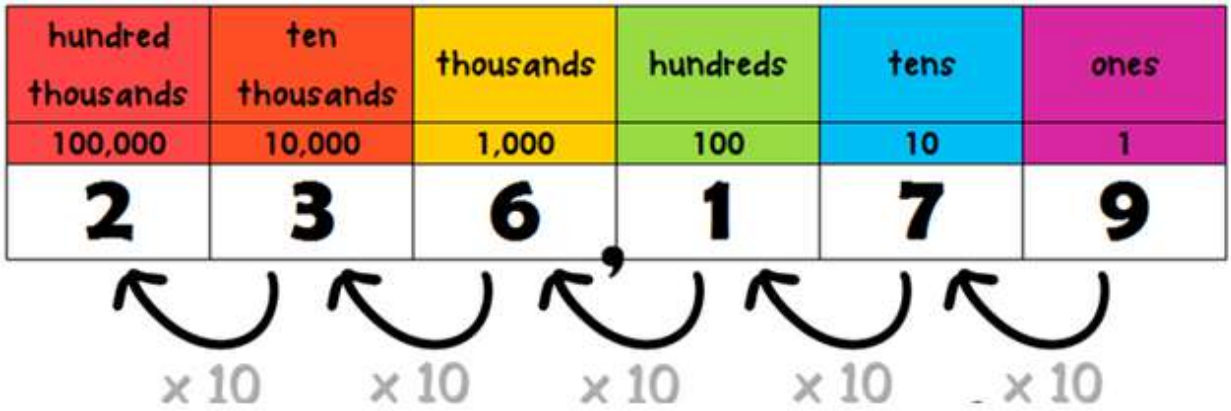
| Pattern | Rule | Feature(s) |
|---|---|---|
| 3, 8, 13, 18, 23, 28… | Start with 3, add 5 | The numbers alternately end with a 3 or 8 |
| 5, 10, 15, 20… | Start with 5, add 5 | The numbers are multiples of 5 and end with either 0 or 5. The numbers that end with 5 are products of 5 and an odd number. |

| | | |
|---|---|---|
| | | The numbers that end in 0 are products of 5 and an even number. |

After students have identified rules and features from patterns, they need to generate a numerical or shape pattern from a given rule.
Example:
Rule: Starting at 1, create a pattern that starts at 1 and multiplies each number by 3. Stop when you have 6 numbers.
Students write 1, 3, 9, 27, 81, 243. Students notice that all the numbers are odd and that the sums of the digits of the 2 digit numbers are each 9. Some students might investigate this beyond 6 numbers. Another feature to investigate is the patterns in the differences of the numbers (3 - 1 = 2, 9 - 3 = 6, 27 - 9 = 18, This standard calls for students to describe features of an arithmetic number pattern or shape pattern by identifying the rule, and features that are not explicit in the rule.

| | |
|---|---|
| 4.NBT.1 | Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division*. |

This standard calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10. In this standard, students should reason about the magnitude of digits in a number. Students should be given opportunities to reason and analyze the relationships of numbers that they are working with. In the base-ten system, the value of each place is 10 times the value of the place to the immediate right. Because of this, multiplying by 10 yields a product in which each digit of the multiplicand is shifted one place to the left.




| | |
|---|---|
| 4.NBT.2 | Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. |

This standard refers to various ways to write numbers. Students should have flexibility with the different number forms. Traditional expanded form is 285 = 200 + 80 + 5. Written form or number name is two hundred eighty-five.
However, students should have opportunities to explore the idea that 285 could also be 28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones.
To read numerals between 1,000 and 1,000,000, students need to understand the role of commas. Each sequence of three digits made by commas is read as hundreds, tens, and ones, followed by the name of the appropriate base-thousand unit (thousand, million, billion, trillion, etc.). Thus, 457,000 is read “four hundred

fifty seven thousand." The same methods students used for comparing and rounding numbers in previous grades apply to these numbers, because of the uniformity of the base-ten system.
Students should also be able to compare two multi-digit whole numbers using appropriate symbols.

| | |
|---|---|
| 4.NBT.4 | Fluently add and subtract multi-digit whole numbers using the standard algorithm. |

Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract.
This standard refers to fluency, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using a variety strategies such as the distributive property). This is the first grade level in which students are expected to be proficient at using the standard algorithm to add and subtract. However, other previously learned strategies are still appropriate for students to use.

**Computation algorithm.** A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly.

**Computation strategy.** Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another.
In mathematics, an algorithm is defined by its steps and not by the way those steps are recorded in writing. With this in mind, minor variations in methods of recording standard algorithms are acceptable.
As with addition and subtraction, students should use methods they understand and can explain. Visual representations such as area and array diagrams that students draw and connect to equations and other written numerical work are useful for this purpose. By reasoning repeatedly about the connection between math drawings and written numerical work, students can come to see multiplication and division algorithms as abbreviations or summaries of their reasoning about quantities. Students can invent and use fast special strategies while also working towards understanding general methods and the standard algorithm.
One component of understanding general methods for multiplication is understanding how to compute products of one-digit numbers and multiples of 10, 100, and 1000. This extends work in Grade 3 on products of one-digit numbers and multiples of 10. We can calculate 6 x 700 by calculating 6 x 7 and then shifting the result to the left two places (by placing two zeros at the end to show that these are hundreds) because 6 groups of 7 hundred is 6 x 7 hundreds, which is 42 hundreds, or 4,200. Students can use this place value reasoning, which can also be supported with diagrams of arrays or areas, as they develop and practice using the patterns in relationships among products such as 6 x 7, 6 x 70, 6 x 700, and 6 x 7000. Products of 5 and even numbers, such as 5 x 4, 5 x 40, 5 x400, 5 x 4000 and 4 x 5, 4 x 50, 4 x 500, 4 x 5000 might be discussed and practiced separately afterwards because they may seem at first to violate the patterns by having an "extra" 0 that comes from the one-digit product.

Computation of 8x549 connected to an area model

| | 549=500 | +40 | +9 |
|---|---|---|---|
| 8 | 8 X 500=<br>8 X 5 hundreds=<br>40 hundreds | 8 X 40<br>8 X 4 tens=<br>32 tens | 8 X 9<br>=72 |

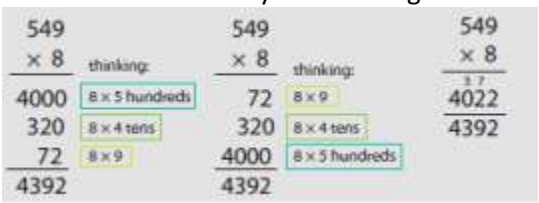
Each part of the region above corresponds t one of the terms in the computation below.

8x549=8x(500+40+9)

=8x500+8x40+8x9

This can also be viewed as finding how many objects are in 8 groups of 549 objects by finding the cardinalities of 8 groups of 500, 8 groups of 40, and 8 groups of 9, then adding them.

Computation of 8x549: Ways to record general methods




The first method proceeds from left to right, and the others from right to left. In the third method, the digits representing new units are written below the line rather than above 549, thus keeping the digits of the products close to each other, e.g., the 7 from 8x9=72 is written diagonally to the left rather than above the 4 in 549.

When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works.

3546

-928

Student explanation for this problem:

1. There are not enough ones to take 8 ones from 6 ones so I have to use one ten as 10 ones. Now I have 3 tens and 16 ones. (Marks through the 4 and notates with a 3 above the 4 and writes a 1 above the ones column to be represented as 16 ones.)
2. Sixteen ones minus 8 ones is 8 ones. (Writes an 8 in the ones column of answer.)
3. Three tens minus 2 tens is one ten. (Writes a 1 in the tens column of answer.)
4. There are not enough hundreds to take 9 hundreds from 5 hundreds so I have to use one thousand as 10 hundreds. (Marks through the 3 and notates with a 2 above it. (Writes down a 1 above the hundreds column.) Now I have 2 thousand and 15 hundreds.
5. Fifteen hundreds minus 9 hundreds is 6 hundreds. (Writes a 6 in the hundreds column of the answer).
6. I have 2 thousands left since I did not have to take away any thousands. (Writes 2 in the thousands place of answer.)

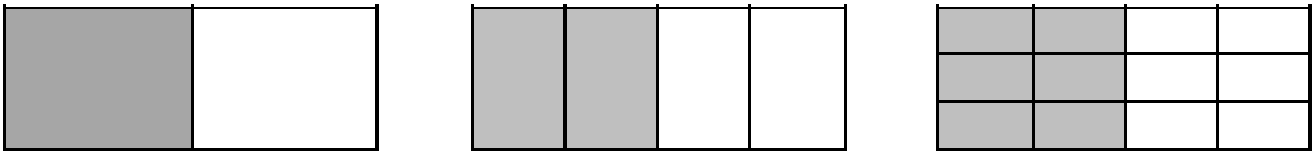
Students should know that it is mathematically possible to subtract a larger number from a smaller number but that their work with whole numbers does not allow this as the difference would result in a negative number.

| | |
|---|---|
| 4.NF.1a-b | Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.<br><br>Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. |

This standard refers to visual fraction models. This includes area models, number lines or it could be a collection/set model. This standard extends the work in third grade by using additional denominators. (5, 10, 12 and 100)

This standard addresses equivalent fractions by examining the idea that equivalent fractions can be created by multiplying both the numerator and denominator by the same number or by dividing a shaded region into various parts.

Example:



½ = 2/4 = 6/12

Students should begin to notice connections between the models and fractions in the way both the parts and wholes are counted and begin to generate a rule for writing equivalent fractions.

1/2 x 2/2 = 2/4.

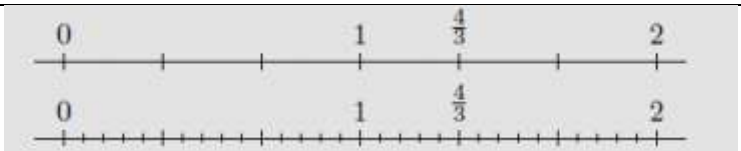
$\frac{1}{2}$

$$\frac{4}{8} = \frac{4 \times 1}{4 \times 2}\frac{2}{4} = \frac{2 \times 1}{2 \times 2}\frac{3}{6} = \frac{3 \times 1}{3 \times 2}$$

The area model to show that 2/3 = 4/3 X 2/3

The whole is the square, measured by area. On the left it Is divided horizontally into 3 rectagles of equal area, ad the shaded region is 2 of thes and so represents 2/3. On the right it is divided into 4x3 small rectangles of equal area, and the shaded area comprises 4x2 of these, and so it represents 4/4x2/3.

Using a number line to show 4/=5/5x4/3




4/3 is 4 parts when each part is 1/3, and we want to see that this is also 5x4 parts when each part is $\frac{1}{5\times3}$.
Divide each of the intervals of lenght1/3 into 5 parts of equal length. There are 5 x 3 parts of equal length in the unit interval, and 4/3 is 5 x 4 of these. Therefore 4/5=5/5 x 4/3=20/15

There is **NO** mathematical reason why fractions must be written in simplified form, although it may beconvenient to do so in some cases.

| | |
|---|---|
| 4.NF.3a-d | Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.<br><br>a) Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8*.<br><br>b) Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.<br><br>c) Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. |

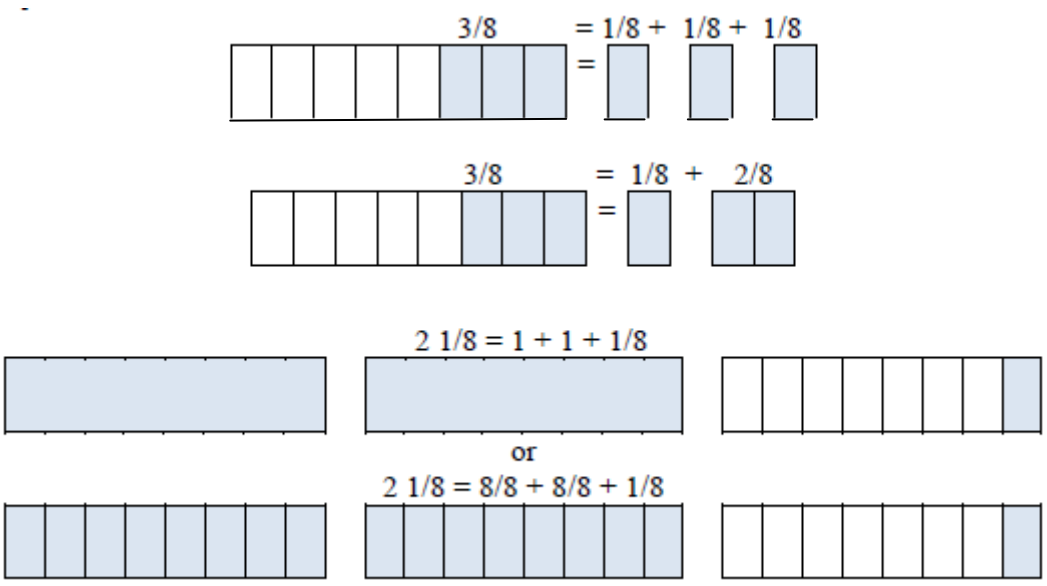
A fraction with a numerator of one is called a unit fraction. When students investigate fractions other than unit fractions, such as 2/3, they should be able to join (compose) or separate (decompose) the fractions of the same whole.
Example: 2/3 = 1/3 + 1/3
Being able to visualize this decomposition into unit fractions helps students when adding or subtracting fractions.
Students need multiple opportunities to work with mixed numbers and be able to decompose them in more than one way. Students may use visual models to help develop this understanding.

Example of word problem:
Mary and Lacey decide to share a pizza. Mary ate 3/6 and Lacey ate 2/6 of the pizza. How much of the pizza did the girls eat together?

Possible solution: The amount of pizza Mary ate can be thought of a 3/6 or 1/6 and 1/6 and 1/6. The amount of pizza Lacey ate can be thought of a 1/6 and 1/6. The total amount of pizza they ate is 1/6 + 1/6 + 1/6 + 1/6 + 1/6 or 5/6 of the whole.

Students should justify their breaking apart (decomposing) of fractions using visual fraction models. The concept of turning mixed numbers into improper fractions needs to be emphasized using visual fraction models.

Example: pizza.



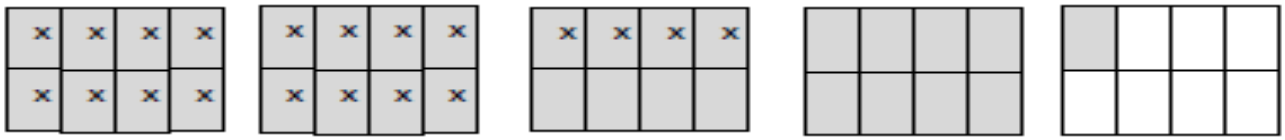

Similarly, converting an improper fraction to a mixed number is a matter of decomposing the fraction into a sum of a whole number and a number less than 1. Students can draw on their knowledge from third grade of whole numbers as fractions.
Example, knowing that 1 = 3/3, they see:

$\frac{5}{3} = \frac{3}{3} + \frac{2}{3} = 1 + \frac{2}{3} = 1\frac{2}{3}$A separate algorithm for mixed numbers in addition and subtraction is not necessary. Students will tend to add or subtract the whole numbers first and then work with the fractions using the same strategies they have applied to problems that contained only fractions.

Example:
Susan and Maria need 8 3/8 feet of ribbon to package gift baskets. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. How much ribbon do they have altogether? Will it be enough to complete the project? Explain why or why not.
The student thinks: I can add the ribbon Susan has to the ribbon Maria has to find out how much ribbon they have altogether. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. I can write this as 3 1/8 + 5 3/8. I know they have 8 feet of ribbon by adding the 3 and 5. They also have 1/8 and 3/8 which makes a total of 4/8 more. Altogether they have 8 4/8 feet of ribbon. 8 4/8 is larger than 8 3/8 so they will have enough ribbon to complete the project. They will even have a little extra ribbon left, 1/8 foot.

Example:
Trevor has 4 1/8 pizzas left over from his soccer party. After giving some pizza to his friend, he has 2 4/8 of a pizza left. How much pizza did Trevor give to his friend?
Possible solution: Trevor had 4 1/8 pizzas to start. This is 33/8 of a pizza. The x's show the pizza he has left

which is 2 4/8 pizzas or 20/8 pizzas. The shaded rectangles without the x's are the pizza he gave to his friend which is 13/8 or 1 5/8 pizzas.



Mixed numbers are introduced for the first time in Fourth Grade. Students should have ample experiences of adding and subtracting mixed numbers where they work with mixed numbers or convert mixed numbers so that the numerator is equal to or greater than the denominator.

Student 1

$$2 + 2 = 5 \; and \; \frac{3}{4} + \frac{1}{4} = 1 \; so \; 5 + 1 = 6$$

Student 2

$$3\frac{3}{4} + 2 = 5\frac{3}{4} so \; 5\frac{3}{4} + \frac{1}{4} = 6$$

Student 3

$$3\frac{3}{4} = \frac{15}{4} \; and \; 2\frac{1}{4} = \frac{9}{4} so \frac{15}{4} + \frac{9}{4} = \frac{24}{4} = 6$$

Fourth Grade students should be able to decompose and compose fractions with the same denominator.

Using the understanding gained from work with whole numbers of the relationship between addition and subtraction, they also subtract fractions with the same denominator. For example, to subtract 5/6 from 17/6, they decompose.

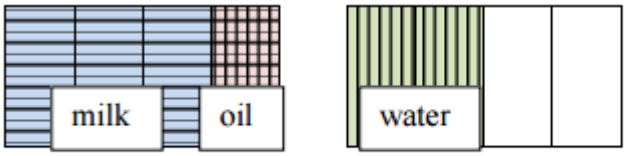
$$\frac{12}{6} + \frac{5}{6}, \quad \text{so} \quad \frac{17}{6} - \frac{5}{6} = \frac{17-5}{6} = \frac{12}{6} = 2$$

Students also compute sums of whole numbers and fractions, by representing the whole number as an equivalent fraction with the same denominator as the fraction. Example:

$$7\frac{1}{5} = 7 + \frac{1}{5} = \frac{35}{5} + \frac{1}{5} = \frac{36}{5}.$$

Students use this method to add mixed numbers with like denominators. Converting a mixed number to a fraction should not be viewed as a separate technique to be learned by rote, but simply as a case of fraction addition.

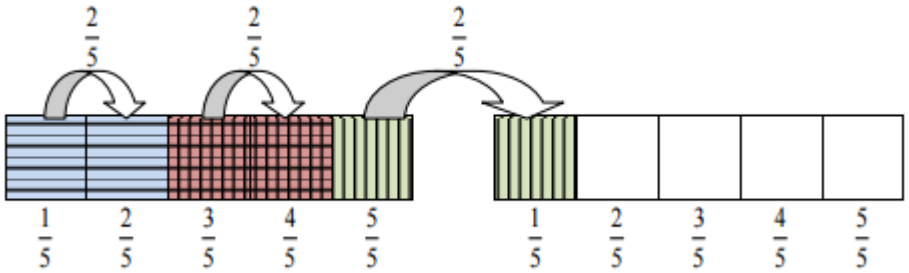
A cake recipe calls for you to use ¾ cup of milk, ¼ cup of oil, and 2/4 cup of water. How much liquid was needed to make the cake?




**3/4 + 1/4 + 2/4 = 6/4 = 1 2/4**

| | |
|---|---|
| 4.NF.4a-c | Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).<br>Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)<br><br>Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?<br><br>*Area Model*<br><br>$\frac{1}{6}$ $\frac{2}{6}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{5}{6}$ $\frac{6}{6}$<br><br>Students should see a fraction as the numerator times the unit fraction with the same denominator.<br><br>Example:<br><br>$\frac{7}{5} = 7 \times \frac{1}{5}$, $\frac{11}{3} = 11 \times \frac{1}{3}$. |

This standard extended the idea of multiplication as repeated addition. For example, 3 x (2/5) = 2/5 + 2/5 + 2/5 = 6/5 = 6 x (1/5). Students are expected to use and create visual fraction models to multiply a whole number by a fraction.

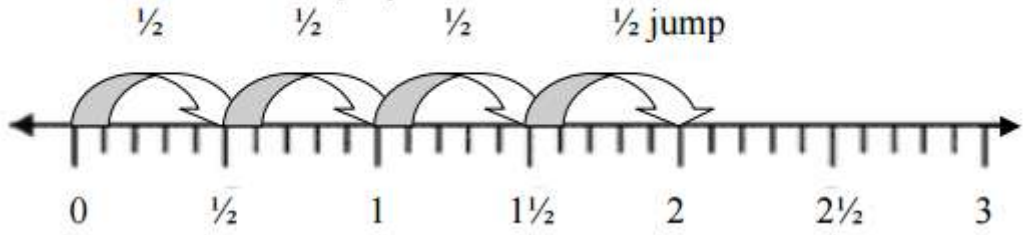



The same thinking, based on the analogy between fractions and whole numbers, allows students to give meaning to the product of whole number and a fraction. Example:

$$3 \times \frac{2}{5} \quad \text{as} \quad \frac{2}{5} + \frac{2}{5} + \frac{2}{5} = \frac{3 \times 2}{5} = \frac{6}{5}.$$

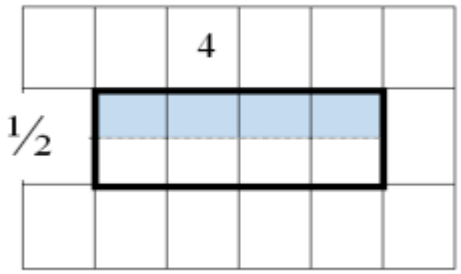
When introducing this standard make sure student use visual fraction models to solve word problems related to multiplying a whole number by a fraction. Example: In a relay race, each runner runs ½ of a lap. If there are 4 team members how long is the race?

Student 1
Draws a number line shows 4 jumps of ½



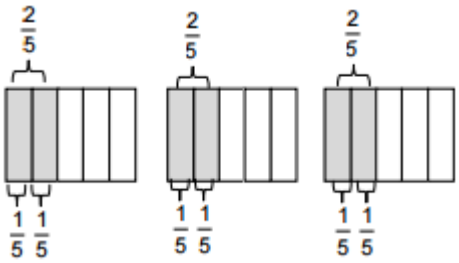

Student 2 Draws an area model showing 4 pieces of ½ joined together to equal 2.


Student 3 Draws an area model representing 4 x ½ on a grid, dividing one row into ½ to represent the multiplier

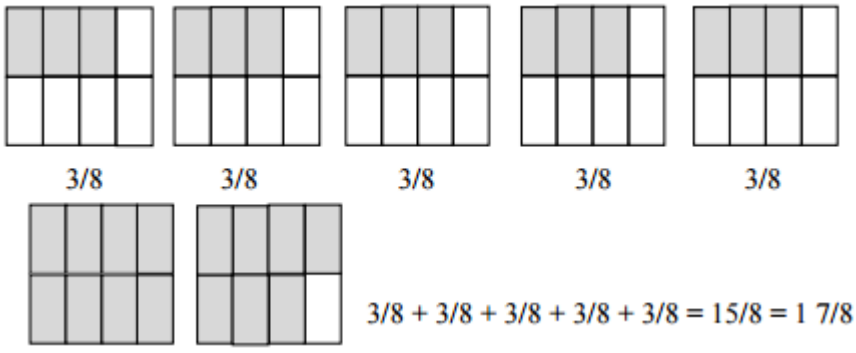



Example: Heather bought 12 plums and ate 3 1 of them. Paul bought 12 plums and ate 4 1 of them. Which statement is true? Draw a model to explain your reasoning. a. Heather and Paul ate the same number of plums. b. Heather ate 4 plums and Paul ate 3 plums. c. Heather ate 3 plums and Paul ate 4 plums. d. Heather had 9 plums remaining. Example: Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns.

Examples: 3 x (2/5) = 6 x (1/5) = 6/5




If each person at a party eats 3/8 of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie? A student may build a fraction model to represent this problem:

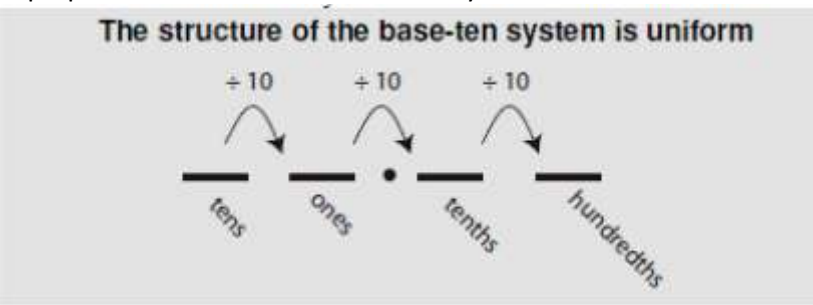



Students solve word problems involving multiplication of a fraction by a whole number. Example: If a bucket holds 2 3/4 gallons and 43 buckets of water fill a tank, how much does the tank hold? The solution 43 x 2 3/4 gallons, one possible way to solve problem.

$$43 \times \left(2 + \frac{3}{4}\right) = 43 \times \frac{11}{4} = \frac{473}{4} = 118\frac{1}{4} \text{ gallons}$$

| | |
|---|---|
| 4.NF.5 | Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100*. |

This standard continues the work of equivalent fractions by having students change fractions with a 10 in the denominator into equivalent fractions that have a 100 in the denominator. In order to prepare for work with decimals (4.NF.6 and 4.NF.7), experiences that allow students to shade decimal grids (10x10 grids) can support this work. Student experiences should focus on working with grids rather than algorithms.
Students can also use base ten blocks and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100.
Students in fourth grade work with fractions having denominators 10 and 100. Because it involves partitioning into 10 equal parts and treating the parts as numbers called one tenth and one hundredth, work with these fractions can be used as preparation to extend the base-ten system to non-whole numbers.

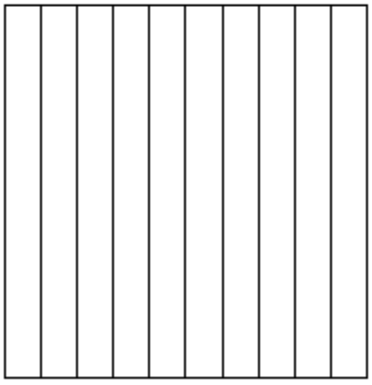



This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade.

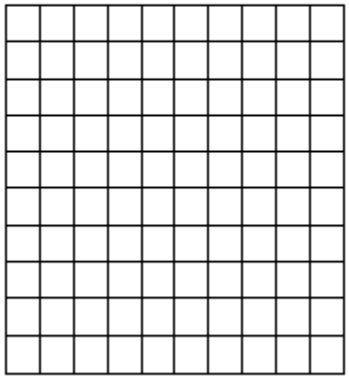
Example:

| Ones | . | Tenths | Hundredths |
|---|---|---|---|

**Tenths Grid**



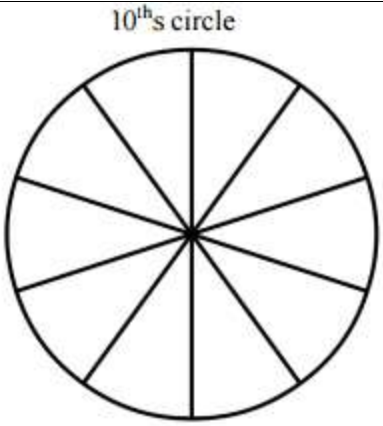
**Hundredths Grid**

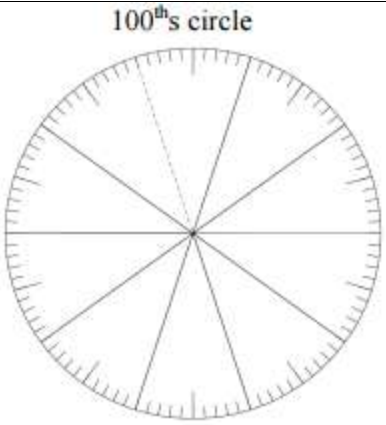


**.3 = 3 tenths = 3/10**

**.30 = 30 hundredths = 30/100**

Example: Represent 3 tenths and 30 hundredths on the models below.



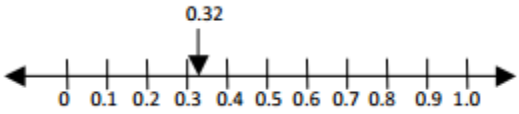




| | |
|---|---|
| 4.NF.6 | Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. |

Decimals are introduced for the first time. Students should have ample opportunities to explore and reason about the idea that a number can be represented as both a fraction and a decimal.
Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say 32/100 as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model as shown below.

| Hundreds | Tens | Ones | • | Tenths | Hundredths |
|---|---|---|---|---|---|
| | | | • | 3 | 2 |

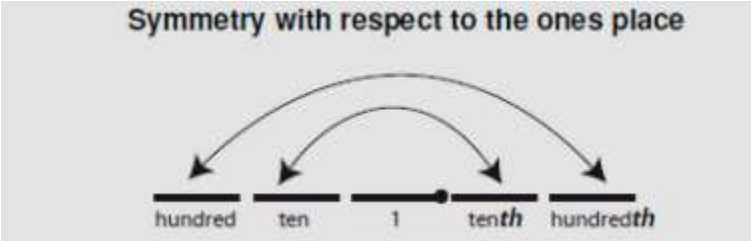
Students represent values such as 0.32 or 32/100 on a number line. 32/100 is more than 30/100 (or 3/10) and less than 40/100 (or 4/10). It is closer to 30/100 so it would be placed on the number line near that value.



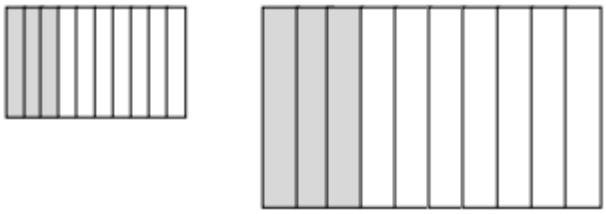

| | |
|---|---|
| 4.NF.7 | Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. |

Students should reason that comparisons are only valid when they refer to the same whole. Visual models include area models, decimal grids, decimal circles, number lines, and meter sticks.
The decimal point is used to signify the location of the ones place, but its location may suggest there should be a "oneths" place to its right in order to create symmetry with respect to the decimal point. However, because one is the basic unit from which the other base ten units are derived, the symmetry occurs instead with respect to the ones place. Ways of reading decimals aloud vary. Mathematicians and scientists often read 0.15 aloud as "zero point one five" or "point one five." (Decimals smaller than one may be written with or without a zero before the decimal point.)Decimals with many non-zero digits are more easily read aloud in this manner. (For example, the number $\pi$, which has infinitely many non-zero digits, begins 3.1415 . ..)
Other ways to read 0.15 aloud are "1 tenth and 5 hundredths" and "15 hundredths," just as 1,500 is sometimes read "15 hundred" or "1 thousand, 5 hundred." Similarly, 150 is read "one hundred and fifty" or "a hundred fifty" and understood as 15 tens, as 10 tens and 5 tens, and as 100 + 50. Just as 15 is understood as 15 ones and as 1 ten and 5 ones in computations with whole numbers, 0.15 is viewed as 15 hundredths and as 1 tenth and 5

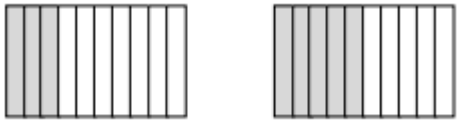
hundredths in computations with decimals. It takes time to develop understanding and fluency with the different forms. Layered cards for decimals can help students become fluent with decimal equivalencies such as three tenths is thirty hundredths.




Students build area and other models to compare decimals. Through these experiences and their work with fraction models, they build the understanding that comparisons between decimals or fractions are only valid when the whole is the same for both cases. Each of the models below shows 3/10 but the whole on the right is much bigger than the whole on the left. They are both 3/10 but the model on the right is a much larger quantity than the model on the left.



When the wholes are the same, the decimals or fractions can be compared. Example: Draw a model to show that 0.3 < 0.5. (Students would sketch two models of approximately the same size to show the area that represents three-tenths is smaller than the area that represents five-tenths.



| | |
|---|---|
| 4.MD.1 | Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft. is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* |

The units of measure that have not been addressed in prior years are cups, pints, quarts, gallons, pounds, ounces, kilometers, millimeter, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass (metric and customary systems), liquid volume (metric only), and elapsed time. Students did not convert measurements. Students develop benchmarks and mental images about a meter (e.g., about the height of a tall chair) and a kilometer (e.g., the length of 10 football fields including the end zones, or the distance a person might walk in about 12 minutes), and they also understand that "kilo" means a thousand, so 3000 m is equivalent to 3 km.

Expressing larger measurements in smaller units within the metric system is an opportunity to reinforce notions

of place value. There are prefixes for multiples of the basic unit (meter or gram), although only a few (kilo-, centi-, and milli-) are in common use. Tables such as the one below are an opportunity to develop or reinforce place value concepts and skills in measurement activities. Relating units within the metric system is another opportunity to think about place value. For example, students might make a table that shows measurements of the same lengths in centimeters and meters. Relating units within the traditional system provides an opportunity to engage in mathematical practices, especially "look for and make use of structure" and "look for and express regularity in repeated reasoning" For example, students might make a table that shows measurements of the same lengths in feet and inches.

| Super- or subordinate unit | Length in terms of basic unit |
|---|---|
| kilometer | $10^3$ or 1000 meters |
| hectometer | $10^2$ or 100 meters |
| decameter | $10^1$ or 10 meters |
| meter | 1 meter |
| decimeter | $10^{-1}$ or $\frac{1}{10}$ meters |
| centimeter | $10^{-2}$ or $\frac{1}{100}$ meters |
| millimeter | $10^{-3}$ or $\frac{1}{1000}$ meters |

**Centimeter and meter equivalences**

| cm | m |
|---|---|
| 100 | 1 |
| 200 | 2 |
| 300 | 3 |
| 500 | |
| 1000 | |

**Foot and inch equivalences**

| feet | inches |
|---|---|
| 0 | 0 |
| 1 | 12 |
| 2 | 24 |
| 3 | |
| | |

Students need ample opportunities to become familiar with these new units of measure and explore the patterns and relationships in the conversion tables that they create. Students may use a two-column chart to convert from larger to smaller units and record equivalent measurements. They make statements such as, if one foot is 12 inches, then 3 feet has to be 36 inches because there are 3 groups of 12. Example: Customary length conversion table

| Yards | Feet |
|---|---|
| 1 | 3 |
| 2 | 6 |
| 3 | 9 |
| ***n*** | ***n*** x 3 |

Foundational understandings to help with measure concepts:
Understand that larger units can be subdivided into equivalent units (partition).
Understand that the same unit can be repeated to determine the measure (iteration).
Understand the relationship between the size of a unit and the number of units needed (compensatory principal).
These Standards do not differentiate between weight and mass. Technically, mass is the amount of matter in an object. Weight is the force exerted on the body by gravity. On the earth's surface, the distinction is not important (on the moon, an object would have the same mass, would weigh less due to the lower gravity).

| | |
|---|---|
| 4.MD.2 | Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in |

| | |
|---|---|
| | terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. |

This standard includes multi-step word problems related to expressing measurements from a larger unit in terms of a smaller unit (e.g., feet to inches, meters to centimeter, and dollars to cents). Students should have ample opportunities to use number line diagrams to solve word problems.

Example:

Charlie and 10 friends are planning for a pizza party. They purchased 3 quarts of milk. If each glass holds 8oz will everyone get at least one glass of milk?

possible solution: Charlie plus 10 friends = 11 total people

11 people x 8 ounces (glass of milk) = 88 total ounces

1 quart = 2 pints = 4 cups = 32 ounces

Therefore 1 quart = 2 pints = 4 cups = 32 ounces

2 quarts = 4 pints = 8 cups = 64 ounces

3 quarts = 6 pints = 12 cups = 96 ounces

If Charlie purchased 3 quarts (6 pints) of milk there would be enough for everyone at his party to have at least one glass of milk. If each person drank 1 glass then he would have 1- 8 oz glass or 1 cup of milk left over.

Additional Examples with various operations:

Division/fractions: Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get?

Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.)

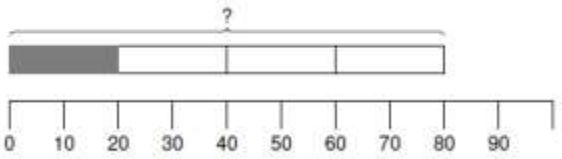
Addition: Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran?

Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back?

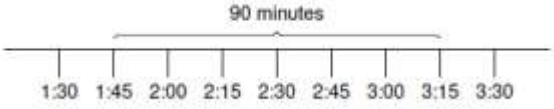
Multiplication: Mario and his 2 brothers are selling lemonade. Mario brought one and a half liters, Javier brought 2 liters and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have?

Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure onthe side of the container.

Juan spent ¼ of his money on a game. The game cost $20. How much money did he have at first?



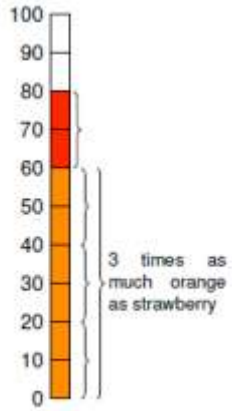

What time does Maria have to leave to be at her friend's house by a quarter after 3 if the trip takes 90 minutes?




Using a number line diagram to represent time is easier if students think of digital clocks rahter than round clocks. In the latter case, placing the numbers on the number line involves considering movements of the an minute hands.

Students also combine competencies from different domains as they solve measurement problems using all four arithmetic operations, addition, subtraction, multiplication, and division. Example: "How many liters of juice does the class need to have at least 35 cups if each cup takes 225 ml?" Students may use tape or number line diagrams for solving such problems. Example:

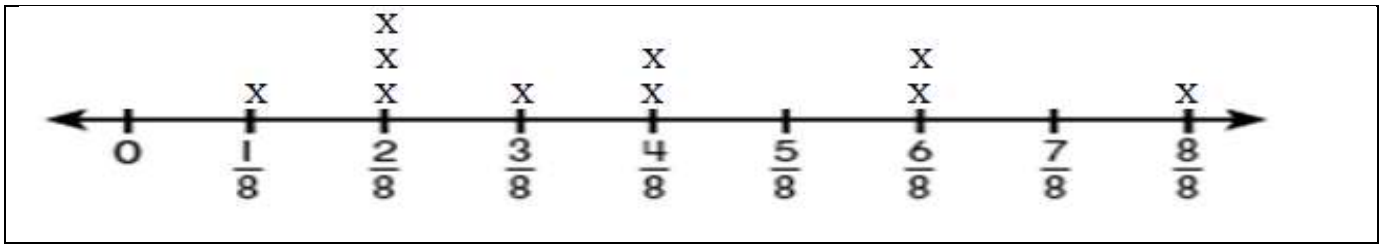
Lisa put two flavors of soda in a glass. There were 80 ml of soda in all. She put three times as much orange drink as strawberry. How many ml of orange did she put in?




Example: At 7:00 a.m. Candace wakes up to go to school. It takes her 8 minutes to shower, 9 minutes to get dressed and 17 minutes to eat breakfast. How many minutes does she have until the bus comes at 8:00 a.m.? Use the number line to help solve the problem.


| | |
|---|---|
| 4.MD.4 | Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*. |

This standard provides a context for students to work with fractions by measuring objects to an eighth of an inch. Students are making a line plot of this data and then adding and subtracting fractions based on data in the line plot.
Example:
Students measured objects in their desk to the nearest 1/2, 1/4 or1/8 inch. They displayed their data collected on a line plot. How many objects measured an inch? If you put all the objects together end to end what would be the total length of all the objects?




M : Major Content S: Supporting Content A : Additional Content

## 21st Century Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

# MIF Lesson Structure

| | LESSON STRUCTURE | RESOURCES | COMMENTS |
|---|---|---|---|
| PRE TEST | **Chapter Opener**<br>Assessing Prior Knowledge<br><br>*The Pre Test serves as a diagnostic test of readiness of the upcoming chapter* | **Teacher Materials**<br>Quick Check<br>Pretest (Assessm't Bk)<br>Recall Prior Knowledge<br><br>**Student Materials**<br>Student Book (Quick Check); Copy of the Pre Test; Recall prior Knowledge | Recall Prior Knowledge (RPK) can take place just before the pre-tests are given and can take 1-2 days to front load prerequisite understanding<br><br>Quick Check can be done in concert with the RPK and used to repair student misunderstandings and vocabulary prior to the pre-test ; Students write Quick Check answers on a separate sheet of paper<br><br>Quick Check and the Pre Test can be done in the same block *(See Anecdotal Checklist; Transition Guide)*<br><br>Recall Prior Knowledge – Quick Check – Pre Test |
| DIRECT ENGAGEMENT | **Direct Involvement/Engagement**<br>Teach/Learn<br><br>*Students are directly involved in making sense, themselves, of the concepts – by interacting the tools, manipulatives, each other, and the questions* | **Teacher Edition**<br>5-minute warm up<br>Teach; Anchor Task<br><br>**Technology**<br>Digi<br><br>**Other**<br>Fluency Practice | • The Warm Up activates prior knowledge for each new lesson<br>• Student Books are CLOSED; Big Book is used in Gr. K<br>• Teacher led; Whole group<br>• Students use concrete manipulatives to explore concepts<br>• A few select parts of the task are explicitly shown, but the majority is addressed through the hands-on, constructivist approach and questioning<br>• Teacher facilitates; Students find the solution |
| GUIDED LEARNING | **Guided Learning and Practice**<br>Guided Learning | **Teacher Edition**<br>Learn<br><br>**Technology**<br>Digi<br>**Student Book**<br>Guided Learning Pages<br>Hands-on Activity | Students-already in pairs /small, homogenous ability groups; Teacher circulates between groups; Teacher, anecdotally, captures student thinking<br><br>**Small Group w/Teacher circulating among groups**<br>Revisit Concrete and Model Drawing; Reteach<br>Teacher spends majority of time with struggling learners; some time with on level, and less time with advanced groups<br>Games and Activities can be done at this time |

| | | | |
|---|---|---|---|
| INDEPENDENT PRACTICE | **Independent Practice**<br><br>*A formal formative assessment* | **Teacher Edition**<br>Let's Practice<br><br>**Student Book**<br>Let's Practice<br><br>**Differentiation Options**<br>All: Workbook<br>Extra Support: Reteach<br>On Level: Extra Practice<br>Advanced: Enrichment | **Let's Practice** determines readiness for Workbook and small group work and is used as formative assessment; Students not ready for the Workbook will use Reteach. The Workbook is continued as Independent Practice.<br><br>Manipulatives **CAN** be used as a communications tool as needed.<br><br>Completely Independent<br><br>On level/advance learners should finish all workbook pages. |
| ADDITIONAL PRACTICE | **Extending the Lesson** | Math Journal<br>Problem of the Lesson<br>Interactivities<br>Games | |
| | **Lesson Wrap Up** | Problem of the Lesson<br><br>Homework (Workbook , Reteach, or Extra Practice) | Workbook or Extra Practice Homework is only assigned when students fully understand the concepts (as additional practice)<br><br>Reteach Homework (issued to struggling learners) should be checked the next day |
| POST TEST | **End of Chapter Wrap Up and Post Test** | **Teacher Edition**<br>Chapter Review/Test<br>Put on Your Thinking Cap<br><br>**Student Workbook**<br>Put on Your Thinking Cap<br><br>**Assessment Book**<br>Test Prep | Use Chapter Review/Test as "review" for the End of Chapter Test Prep. Put on your Thinking Cap prepares students for novel questions on the Test Prep; Test Prep is graded/scored.<br><br>The Chapter Review/Test can be completed<br>• Individually (e.g. for homework) then reviewed in class<br>• As a 'mock test' done in class and doesn't count<br>• As a formal, in class review where teacher walks students through the questions<br><br>Test Prep is completely independent; scored/graded<br><br>Put on Your Thinking Cap (green border) serve as a capstone problem and are done just before the Test Prep and should be treated as Direct Engagement. By February, students should be doing the Put on Your Thinking Cap problems on their own. |

**TRANSITION LESSON STRUCTURE (No more than 2 days)**

- **Driven by Pre-test results, Transition Guide**
- **Looks different from the typical daily lesson**

| **Transition Lesson – Day 1**<br><br>**Objective:** | |
|---|---|
| **CPA Strategy/Materials** | **Ability Groupings/Pairs (by Name)** |
| **Task(s)/Text Resources** | **Activity/Description** |

# MIF Pacing Guide

| Activity | Common Core Standards | Estimated Time (# of block) | Lesson Notes |
|---|---|---|---|
| Chapter 6 Pretest- Fractions and Mixed Numbers | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 1 Block | Exclude questions 1,2,4 |
| Prior to chapter 6, review lessons on equivalent fractions. | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 2 Blocks | Review lessons on equivalent fractions should be completed. Can use chapter 14.3 in 3rd grade text. Students have not multiplied to find equivalent fractions. |
| Module 4.NF.1-2 | 4.NF.1-2 | | Use as needed Module 4.NF.1-2 |
| 6.1 Adding Fractions | 4.NF.1, 4.NF.3a | 1 Block | You may want to use Fraction Strips (TRD28) or Fraction Circles(TRD29) with small groups to model reviewing equivalent fractions, before teaching this lesson. |
| 6.2 Subtracting Fractions | 4.NF.1, 4.NF.3a | 1 Block | Throughout this lesson have students identify similarities and differences between the addition and subtraction of fractions. Guide students to recognize that the procedures are similar because both require common denominators. |
| Mini Assessment #4 | 4.NF.1-2 | 1/2 Block | |
| Review | | 2 blocks | Review/Reteach concepts that need to be readdressed |
| 6.3 Mixed Numbers Day 1 | 4.MD.1, 4.NF.3a | 1 Block | For Hands-On-Activities, you will need to make copies of (TRD29). Advanced learners can use Fraction Circles (TR29). |
| 6.3 Mixed Numbers Day 2 | 4.MD.1, 4.NF.3a | 1 Block | You may wish to review finding common factors, taught in Lesson 2.2, before teaching students how to simplify fractions. |
| 6.4 Improper Fractions Day 1 | 4.NF.3a-b, 4.NF.4a | 1 Block | Point out that a fraction with a numerator less than its denominator is now as a proper fraction. Throughout the lesson have students identify examples of proper fractions, mixed numbers, and improper fractions, and explain how they arrived at their answers. |

| | | | |
|---|---|---|---|
| 6.4 Improper Fractions Day 2 | 4.NF.3a-b, 4.NF.4a | 1 Block | |
| 6.5 Renaming Improper Fractions and Mixed Numbers Day 1 | 4.NF.3b, 4.NF.4a | 1 Block | As students rename improper fractions and mixed numbers, encourage them to check that the denominator in the mixed number is always the same as the denominator in the improper fraction before they simplify the fraction. |
| 6.5 Renaming Improper Fractions and Mixed Numbers Day 2 | 4.NF.3b, 4.NF.4a | 1 Block | |
| Mini Assessment #5 | 4.NF.3 | 1/2 Block | |
| Review | | 2 blocks | Review/Reteach concepts that need to be readdressed |
| 6.6 Renaming Whole Numbers When Adding and Subtracting Fractions Day 1 | 4.NF.1, 4.NF.3a, 4.NF.3c | 1 Block | Throughout this lesson, students rename whole numbers with different denominators. Before beginning the lesson, provide opportunities for students to name wholes in a variety of ways using different denominators. For example, rename 1 whole with denominators of 4, 6, and 8. |
| 6.6 Renaming Whole Numbers When Adding and Subtracting Fractions Day 2 | 4.NF.1, 4.NF.3a, 4.NF.3c | 1 Block | |
| 6.7 Fraction of a Set Day 1 | 4.nf.4.b-c | 1 Block | Direct students to look for similarities and differences as they find fractional parts of sets and numbers. Guide students to understand that fractional parts of sets or numbers are always less than the original set or number. |
| 6.7 Fraction of a Set Day 2 | 4.nf.4.b-c | 1 Block | |
| 6.8 Real -World Problems: Fractions Day 1 | 4.NF.3d, 4.NF.4c, 4.OA.2 | 1 Block | |
| 6.8 Real -World Problems: Fractions Day 2 | 4.NF.3d, 4.NF.4c, 4.OA.2 | 1 Block | For additional practice in this lesson, after completing each Guided Learning with the class, have students replace the numbers in each problem with new numbers following the same procedure. |
| 6.9 Line Plots with Fractions of a Unit | 4.MD.4 | 1 Block | Students may forget to label the number lines. Remind them that |

| | | | |
|---|---|---|---|
| | | | the purpose of a graph is to clearly communicate data. If the label is missing, people will not know what data is shown. |
| Authentic Assessment #4 Raising Money | 4.NF1-2 | 1/2 Block | |
| Chapter Wrap Up/Review | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 2 Blocks | Review Chapter Wrap Up with students. Reinforce and consolidate chapter skills and concepts. |
| Chapter 6 Test Prep Fractions and Mixed Numbers | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 1 Block | |
| Doubling a Recipe | 4.NF1-4c | Home Project | Project Idea (Optional)<br>Great project for Holiday vacation. |
| Mini Assessment #6 | 4.NF.4 | 1/2 Block | |
| Review | | 2 blocks | Review/Reteach concepts that need to be readdressed |
| Pre-Test 7 Decimals | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7. 4.OA.5, 4.MD.1, 5.NF.5 | 1/2 Block | Exclude questions 2 and 3 |
| Chapter 7 Decimals Opener/Recall Prior Knowledge | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7, 4.OA.5, 4.MD.1, 5.NF.5 | 1/2 Block | Use, "Quick Check," on page 3(Book B) as a review/quiz grade **before** Chapter Test 7. |
| 7.1 Understanding Tenths Day 1a<br>(Broken down into two days/blocks) | 5.NF.5, 4.NF.6 | 1 Block | 7.1 Day 1a Teach reading and writing tenths in decimal and fractional forms. |
| 7.1 Understanding Tenths Day 1b | 5.NF.5, 4.NF.6 | 1 Block | 7.1b Teach representing and interpreting tenths models. |
| 7.1 Understanding Tenths Day 2 | 5.NF.5, 4.NF.6 | 1 Block | Some students may have difficulty changing mixed numbers to decimals. Remind students that a mixed number consists of two parts-a whole number and a fraction. Similarly, a decimal consists of two parts-a whole number and a decimal fraction. |
| 7.2 Understanding Hundredths Day 1a<br>(Broken down into two days) | 4.NF.5, 4.NF.6 | 1 Block | Teach reading and writing hundredths in decimal and fractional forms. |
| 7.2 Understanding Hundredths Day 1b | 4.NF.5, 4.NF.6 | 1 Block | Teach representing and interpreting hundredths models. |
| 7.2 Understanding Hundredths Day 2 | 4.NF.5, 4.NF.6 | 1 Block | |
| 7.2 Understanding Hundredths Day 3 | 4.NF.5, 4.NF.6 | 1 Block | Students may have difficulty assigning value to unlabeled marks on the number lines. Remind students to use the numbers |

| | | | |
|---|---|---|---|
| | | | already provided to determine what each mark represents. |
| 7.3 Comparing Decimals Day 1a (Broken down into two days) | 4.NF.7, 4.OA.5 | 1 Block | Teach comparing decimals, tenths and hundredths, example .34 to .5. |
| 7.3 Comparing Decimals Day 1b | 4.NF.7, 4.OA.5 | 1 Block | |
| 7.5 Fractions and Decimals | 4.NF.1, 4.NF.3a, 4.NF.6, 4.NF.7 | 1 Block | Tenths and hundredths. |
| Authentic Assessment #5 Chocolate Bar Fractions | 4.NF.2, 4.NF.4 | 1/2 Block | |
| Chapter Wrap Up/Review | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7. 4.OA.5, 4.MD.1, 5.NF.5 | 1 Block | Review Chapter Wrap Up with students .Reinforce and consolidate chapter skills and concepts. |
| Chapter 7 Test Decimals | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7. 4.OA.5, 4.MD.1, 5.NF.5 | 1 Block | |
| Authentic Assessment #6 Cynthia's Perfect Punch | 4.NF.b.3.c | 1/2 Block | |
| Mini Assessment #7 | 4.NF.5-6 | 1/2 Block | |
| Mosaic Art Project | | | Project Idea (Optional)<br>Mosaic Math<br>Great for bulletin boards. |
| Review | | 1 block | Review/Reteach concepts that need to be readdressed |
| Mini Assessment #8 | 4.NF.7 | 1/2 Block | |

# Resources for Special Needs and English Language Learners

## Chapter 6

### Additional Support

#### For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words.

For example, have students

- add vocabulary words to the student-made dictionary that includes terms, definitions, and examples organized by chapter
- draw pictures to illustrate the vocabulary
- answer yes/no questions about terms and definitions
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

#### For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- use manipulatives to represent fractions and mixed numbers
- draw pictures to illustrate the addition and subtraction of fractions
- tell stories involving the addition and subtraction of fractions
- create new examples showing the division rule and multiplication rule, using those in the chapter as models
- use manipulatives, such as unit cubes, to model a fraction of a set

See also pages 276–277.

## Chapter 7

### Additional Support

#### For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add terms, definitions, and examples to the Word Wall
- create a chart of common equivalent fractions
- label place values on a place-value chart
- discuss the Chapter Wrap Up, encouraging students to use the chapter vocabulary

#### For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- model decimals using money
- use grid paper to compare decimals
- use a place-value chart
- use a number line for representing decimals

If necessary, review:

- Chapter 1 (Working with Whole Numbers)
- Chapter 6 (Fractions and Mixed Numbers)

## Chapter 8

# Additional Support

### For English Language Learners

Select activities that reinforce the chapter vocabulary and the connections among these words, such as having students

- add terms, definitions, and examples to the Word Wall
- create a place-value chart that shows hundreds through hundredths with the decimal point and the *-ths* highlighted

### For Extra Support

Select activities that go back to the appropriate stage of the Concrete-Pictorial-Abstract spectrum, such as having students

- use grid paper to perform operations with decimals
- use manipulatives to regroup ones, tenths, and hundredths
- use play money to model addition and subtraction of decimals
- use a place-value chart

If necessary, review:

- Chapter 1 (Working with Whole Numbers)
- Chapter 6 (Fractions and Mixed Numbers)

# NOVEMBER

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | 1 | *2* | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | *10* | 11 | 12 |
| 13 | 14 Chapter 6 Pre-Test | 15 | 16 12:30 Dismissal | 17 | 18 | 19 |
| 20 | 21Mini Assessment #4 | 22 | 23 12:30 Dismissal | 24 No School | 25 No School | 26 |
| 27 | 28 | 29 | 30 | | | |

# Pacing Calendar

| DECEMBER | | | | | | |
|---|---|---|---|---|---|---|
| **Sunday** | **Monday** | **Tuesday** | **Wednesday** | **Thursday** | **Friday** | **Saturday** |
| | | | | **1** | **2** | **3** |
| **4** | **5** | **6 Mini Assessment #5** | **7** | **8** | **9** | **10** |
| **11** | **12** | **13** | ***14*** | **15** | ***16 Authentic Assessment #4*** | **17** |
| **18** | ***19*** | **20** | **21 Chapter 6 Test** | **22 Mini Assessment #6** | ***23 12:30 Dismissal*** | **24** |
| **25** | **26 No School** | **27 No School** | **28 No School** | **29 No School** | **30 No School** | **31** |

# JANUARY

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| 1 | 2 No School | 3 Chapter 7 Pre-Test | *4* | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | *12* | 13 | 14 |
| 15 | 16 No School | 17 | 18 | 19 | 20 Authentic Assessment #5 | 21 |
| 22 | 23 | 24 Chapter 7 Test | 25 12:30 Dismissal Authentic Assessment #6 | 26 12:30 Dismissal Mini Assessment #7 and 8 | 27 | 28 |
| 29 | 30 | | | | | |
| 31 | | | | | | |

# Unit 2 Math Background

During their elementary mathematics education, students were exposed to the following:

- Understand the meanings and uses of fractions, not including fraction of a set.
- Understand that the size of a fractional part is relative to the size of the whole.
- Compare fractions using models, and number lines.
- Recognize equivalent fractions through the use of models, multiplication, division, ad number lines.
- Write whole numbers as fraction, and recognize fractions that are equivalent to whole numbers.
- Use the dollar sign and decimal point in money amounts.
- Add and subtract like fractions.
- Add and subtract money amounts.

In this unit, the students extend their learning to the following:

- Recognize, write, name and illustrate mixed numbers and improper fractions in various forms.
- Find a fraction of a set.
- Generate equivalent fractions.
- Compare nonequivalent fractions by creating common denominators or numerators, or by comparing with benchmark fractions. Use <, >, = symbols.
- Convert among mixed numbers and improper fractions.
- Model decimals using tenths and hundredths.
- Understand decimal notation through hundredths as an extension of the base-ten system.
- Read and write decimals that are greater than or less than 1.
- Compare and order decimals.
- Identify equivalent decimals.
- Identify equivalent fractions and decimals.
- Add and subtract unlike fractions.
- Add and subtract decimals.
- Solve problems with addition and subtraction of decimals.

# Transition Guide References:

| **Chapter 6: Fractions and Mixed Numbers** | | | | |
|---|---|---|---|---|
| **Transition Topic: Fractions** | | | | |
| **Grade 4**<br>**Chapter 6**<br>**Pre Test Items** | **Grade 4**<br>**Chapter 6**<br>**Pre-Test Item Objective** | **Additional Support for the Objective:**<br>**Grade 3 Reteach** | **Additional Support for the Objective:**<br>**Grade 3**<br>**Extra Practice** | **Grade 3**<br>**Teacher Edition Support** |
| Item 3 | Use models to identify equivalent fractions. | 3B pp. 85-86 | Lesson 14.2 | 3B Chapter 14 Lesson 1 |
| Item 3; 5 | Use a number line to identify equivalent fractions. | 3B p. 88 | Lesson 14.2 | 3B Chapter 14 Lesson 2 |
| Item 3 | Use multiplication and division to find equivalent fractions. | 3B pp. 89-96 | Lesson 14.3 | 3B Chapter 14 Lesson 3 |
| Item 2; 6; 7 | Write fractions in simplest form. | 3B pp. 92-96 | Lesson 14.3 | 3B Chapter 14 Lesson 3 |
| | Compare and order fractions. | 3B pp. 97-106 | Lesson 14.4 | 3B Chapter 14 Lesson 4 |
| Items 1; 7; 10 | Add two or three like fractions with sums of 1. | 3B pp. 107-110 | | 3B Chapter 14 Lesson 5 |
| Items 1; 7; 11 | Subtract a like fraction from another like fraction or one whole. | 3B pp. 110-112 | | 3B Chapter 14 Lesson 5 |
| Item 8 | Read, write and identify fractions of a set. | 3B pp. 113-114 | Lesson 14.5 | 3B Chapter 14 Lesson 6 |
| Items 4; 9 | Find the number of items in a fraction of a set. | 3B pp. 115-116 | Lesson 14.5 | 3B Chapter 14 Lesson 6 |

| **Chapter 7: Decimals and Chapter 8: Adding and Subtracting Decimals** | | | | |
|---|---|---|---|---|
| **Transition Topic: Money and Decimals** | | | | |
| **Grade 4**<br>**Chapter 7-8**<br>**Pre Test Items** | **Grade 4**<br>**Chapter 7-8**<br>**Pre Test Item**<br>**Objective** | **Additional Support for the Objective: Grade 4**<br>**Reteach** | **Additional Support for the Objective: Grade 4**<br>**Extra Practice** | **Grade 4**<br>**Teacher Edition Support** |
| | Use rounding to estimate sums and differences | 3A pp. 31-34 | Lesson 2.4 | 3A Chapter 2 Lesson 4 |
| Chapter 7Items 2; 3 | Identify numerator and denominator. | 3B p. 84 | Lesson 14.1 | 3B Chapter 14 Lesson 1 |
| Chapter 7<br>Item 1 | Use models to identify equivalent fractions. | 3B p. 85-87 | Lesson 14.2 | 3B Chapter 14 Lesson 3 |
| | Use a number line to identify equivalent fractions. | 3B p. 88 | Lesson 14.2 | 3B Chapter 14 Lesson 2 |
| Chapter 7Items 11-14 | Use multiplication and division to find equivalent fractions. | 3B p. 89-96 | Lesson 14.3 | 3B Chapter 14 Lesson 3 |
| Chapter 7Items 15-16 | Compare and order fractions. | 3B p. 97-106 | Lesson 14.4 | 3B Chapter 14 Lesson 4 |

PARCC Assessment Evidence/Clarification Statements

| | Evidence Statement | Clarification | Math Practices |
|---|---|---|---|
| 4.OA.2 | Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. | i) See the OA Progression document, especially p. 29 and Table 2, Common Multiplication and Division situations on page 89 of NJSLS. ii) Tasks sample equally the situations in the third row of Table 2 on page 89 of NJSLS. | MP.2, MP.4 |
| 4.OA.5 | Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way. | i) Tasks do not require students to determine a rule; the rule is given. ii) 75% of patterns should be number patterns. | MP.8 |
| 4.NBT.1 | Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that 700 70 10 ÷ = by applying concepts of place value and division. | None | MP.8 |
| 4.NBT.2 | Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using > =, , and | i) Tasks assess conceptual understanding, e.g. by including a mixture (both within and between items) of expanded form, number names, and base ten numerals. | MP.7 |
| 4.NBT.4.1 | Fluently add multi-digit whole numbers using the standard algorithm. | The given addends are such as to require an efficient/standard algorithm (e.g., 7263 + 4875). Addends in the task do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 16,999 + 3,501). i) Tasks do not have a context. ii) Grade 4 expectations in NJSLS are limited to whole numbers less than or equal to 1,000,000; for purposes of assessment, both of the given numbers should have 4 digits. | MP.7 |

| | | | |
|---|---|---|---|
| 4.NBT.4.2 | Fluently subtract multi-digit whole numbers using the standard algorithm. | The given subtrahend and minuend are such as to require an efficient/standard algorithm (e.g. 7263 4875 − or 7406 4637). − The subtrahend and minuend do not suggest any obvious ad hoc or mental strategy (as would be present for example in a case such as 7300 6301. − ). i) Tasks do not have a context. ii) Grade 4 expectations in NJSLS are limited to whole numbers less than or equal to 1,000,000; for purposes of assessment, both of the given numbers should have 4 digits. | MP.7 |
| 4.NF.1a-b | 1 Apply conceptual understanding of fraction equivalence and ordering to solve simple word problems requiring fraction comparison. | i) Tasks have “thin context.” ii) Tasks do not require adding, subtracting, multiplying, or dividing fractions. iii) Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. iv) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 | MP.1, MP.4, MP.5 |
| 4.NF.3.a | Understand a fraction a b/ with a > 1 as a sum of fractions 1/ b . a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. | i) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. | MP.2, MP.7, MP.8 |
| 4.NF.3.b | Understand a fraction a/b with a > 1 as a sum of fractions 1/ b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. | i) Only the answer is required (methods, representation, etc. are not assessed here). ii) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. (NJSLS footnote, p. 30). iii) Tasks may include fractions that equal whole numbers. | MP.7, MP.8 |
| 4.NF.3.c | Understand a fraction a b/ with a >1 as a sum of fractions 1/ b. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. | i) Tasks do not have a context. ii) Denominators are limited to grade 3 possibilities (2, 3, 4, 6, 8) so as to keep computational difficulty lower (NJSLS footnote, p. 24). | MP.8 |
| 4.NF.4.a | Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a /b as a multiple of 1/ b. For example, use a visual fraction model to represent 5/4 as the product 1 5 , 4 × recording the conclusion by the equation 5 1 5 . 4 4 | i) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 | MP.5, MP.7 |

| | | | |
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| 4.NF.4.b.1 | Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. b. Understand a multiple of a b/ as a multiple of 1/ b. | i) Tasks do not have a context. ii) Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. iii) Tasks involve expressing a multiple of a b/ as a fraction. iv) Results may equal fractions greater than 1 (including those equal to whole numbers). v) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 | MP.5, MP.7 |
| 4.NF.4.b.2 | Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. b. Use the understanding that a multiple of a b/ is a multiple of 1/ b to multiply a fraction by a whole number. | i) Tasks do not have a context. ii) Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. iii) Tasks involve expressing a multiple of a/b as a fraction. iv) Results may equal fractions greater than 1 (including fractions equal to whole numbers). v) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 | MP.5, MP.7 |
| 4.NF.4.c | Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? | i) Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. ii) Situations are limited to those in which the product is unknown (situations do not include those with an unknown factor). iii) Situations involve a whole number of fractional quantities, not a fraction of a whole-number quantity. iv) Results may equal fractions greater than 1 (including fractions equal to whole numbers). v) Tasks are limited to denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100 | MP.1, MP.4, MP.5 |
| .4.NF.5 | Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 30/100= | i) Tasks do not have a context. | MP.7 |
| 4.NF.6 | Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. | i) Measuring to the nearest mm or cm is equivalent to measuring on the number line. | MP.7 |

| | | | |
|---|---|---|---|
| 4.NF.7 | Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols > =, , or | i) Tasks have "thin context" or no context. ii) Justifying conclusions is not assessed here. iii) Prompts do not provide visual fraction models; students may at their discretion draw visual fraction models as a strategy. | MP.5, MP.7 |
| 4.MD.1 | Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12) , (2, 24) , and (3, 36) ,… | None | MP.5, MP.8 |
| 4.MD.2.1 | Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, in problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. | i) Situations involve whole-number measurements and require expressing measurements given in a larger unit in terms of a smaller unit. ii) Tasks may present number line diagrams featuring a measurement scale. iii) Tasks may include measuring to the nearest cm or mm | MP.4, MP.5 |
| 4.MD.2.2 | Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, in problems involving simple fractions or decimals. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. | i) Situations involve two measurements given in the same units, one a whole-number measurement and the other a non-whole number measurement (given as a fraction or a decimal). ii) Tasks may present number line diagrams featuring a measurement scale. iii) Tasks may include measuring distances to the nearest cm or mm. | MP.4, MP.5 |
| 4.MD.4.1 | Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). | None | MP.5 |
| 4.MD.4.2 | Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection. | None | MP.4, MP.5 |

# Connections to the Mathematical Practices

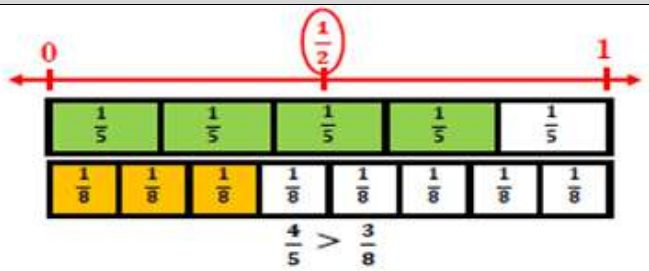
| | |
|---|---|
| **1** | **Make sense of problems and persevere in solving them** |
| | Mathematically proficient students in grade 4 know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers. |
| **2** | **Reason abstractly and quantitatively** |
| | Mathematically proficient fourth graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts. |
| **3** | **Construct viable arguments and critique the reasoning of others** |
| | In fourth grade mathematically proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking. |
| **4** | **Model with mathematics** |
| | Mathematically proficient fourth grade students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense. |
| **5** | **Use appropriate tools strategically** |
| | Mathematically proficient fourth graders consider the available tools(including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units. |
| **6** | **Attend to precision** |
| | As fourth graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot. |
| **7** | **Look for and make use of structure** |
| | In fourth grade mathematically proficient students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the multiplication principal of counting. They generate number or shape patterns that follow a given rule. |
| **8** | **Look for and express regularity in repeated reasoning** |
| | Students in fourth grade should notice repetitive actions in computation to make generalizations Students use models to explain calculations and understand how algorithms work. They also use models to examine |

| | |
|---|---|
| | patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions. |

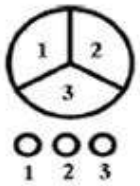
# Visual Vocabulary

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

## benchmark fractions



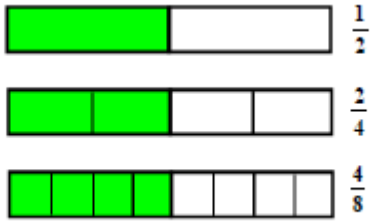

## denominator




$\frac{1}{3}$

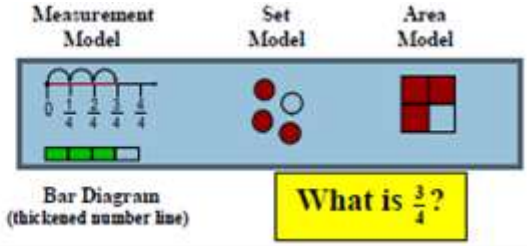
- Equal parts described in fraction
- Equal parts in the whole

## equivalent fractions




Fractions that have the same value.

## fraction




## fraction bar

$\frac{2}{3}$

A horizontal bar that separates the numerator and the denominator.

## fraction greater than one

$\frac{5}{3}$ ← numerator is greater than denominator

**fraction less than one**

$\frac{3}{5}$ ← numerator is less than denominator

**like denominators**

$\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$

**like numerators**

$\frac{3}{4}$ $\frac{3}{5}$ $\frac{3}{8}$

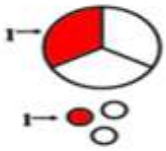
**lowest terms**


$\frac{4}{8}$ in lowest terms is $\frac{1}{2}$.

**mixed number**

$3\frac{3}{7}$

**numerator**



$\frac{1}{3}$

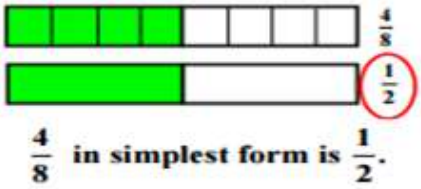
- Equal parts described in fraction
- Equal parts in the whole

**order**

$\frac{2}{8}$ $\frac{2}{6}$ $\frac{2}{4}$

In order from least to greatest.

**simplest form**




$\frac{4}{8}$ in simplest form is $\frac{1}{2}$.

**simplify**


**unit fraction**

$\frac{1}{2}$

**unlike denominators**

$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$

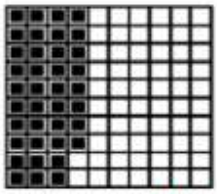
**unlike numerators**

$\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$

**decimal**

$29.45 53.0 0.02

**decimal fraction**



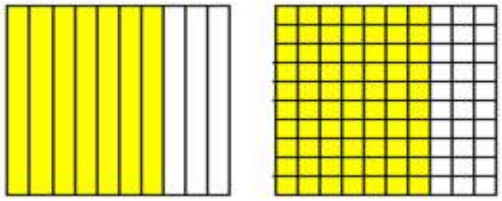
$0.38 = \frac{38}{100}$

**decimal point**

$1.55 3.2

decimal point

**equivalent decimals**

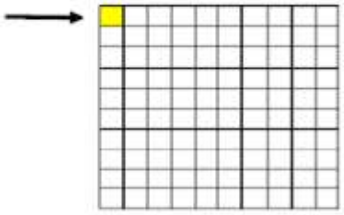


0.7 = 0.70

**greater than**


5 > 3

**hundredth**



One of the equal parts when a whole is divided into 100 equal parts.

**hundredths**

4.38

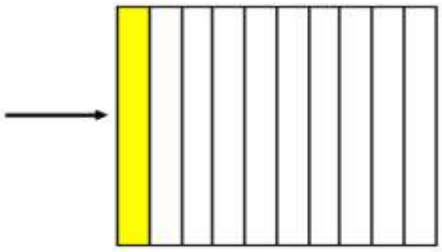
In the decimal numeration system, hundredths is the name of the next place to the right of tenths.

**order**

$\frac{2}{8}$ $\frac{2}{6}$ $\frac{2}{4}$

In order from least to greatest.

**tenth**



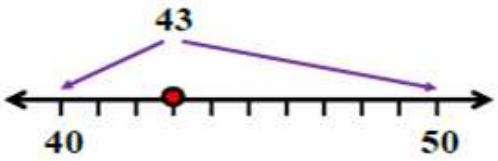
One of the equal parts when a whole is divided into 10 equal parts.

**tenths**

4.3

In the decimal numeration, tenths is the name of the place to the right of the decimal point.

**round a whole number**



Potential Student Misconceptions

**Chapter 6**

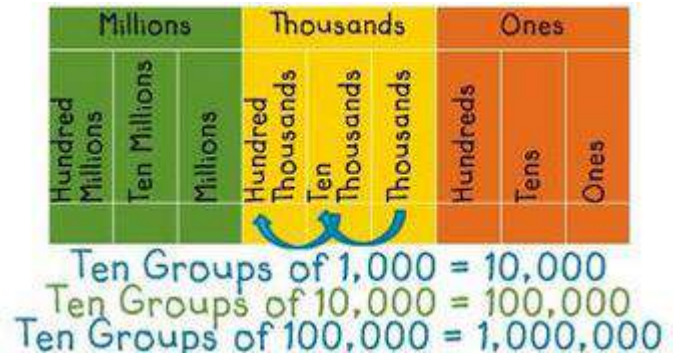
- When adding fractions students may try to add both the numerators and the denominators
- When solving a real-world problem, for which a difference is required, student may not know whether to express the difference as 1/2- 3/8 or 3/8 –1/2.
- Students may order the improper fractions based on the numerators, thus writing 24/12 as the last number on the number line.
- Students may multiply the numerator by the whole number and then add the denominator when renaming mixed numbers as improper fractions.
- Students may not always write their answers in simplest form.
- Students may not model finding the fractional part of each number correctly.
- Students often choose the wrong operation when solving real-world problems.
- Students may forget to label number lines.

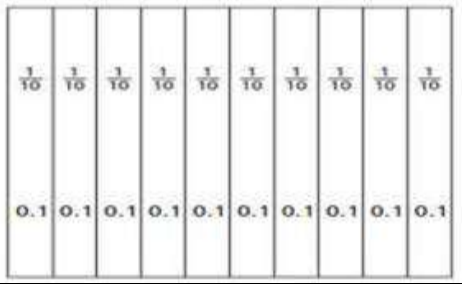
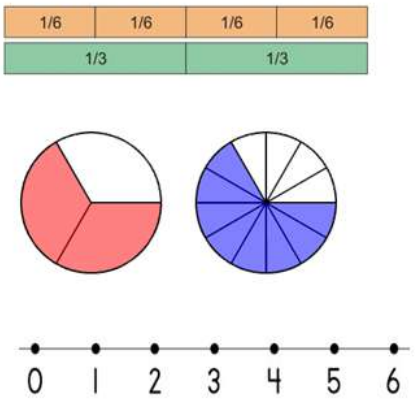
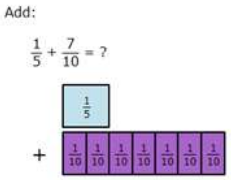
**Chapter 7**

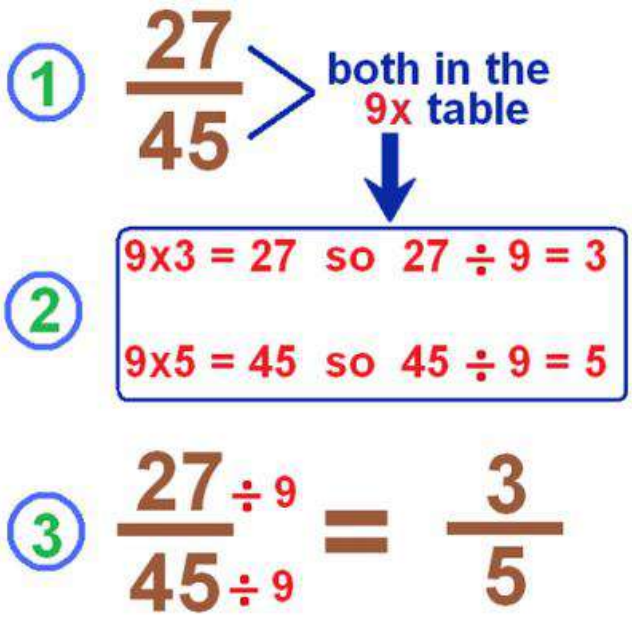
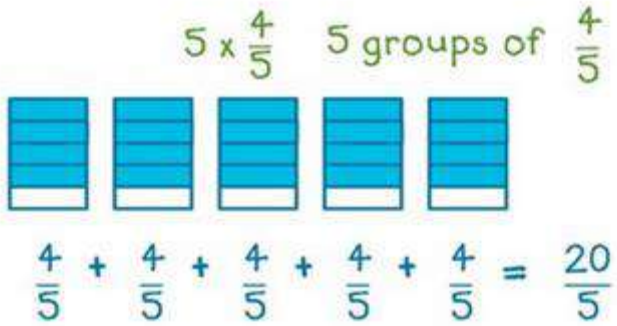
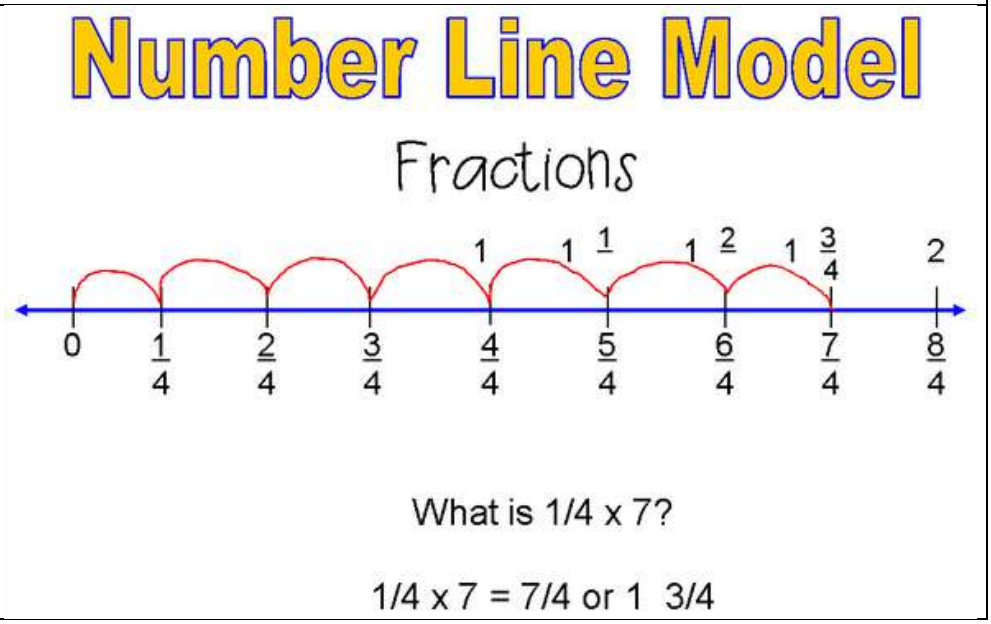
- Students may have difficulty assigning value to unlabeled marks on the number lines.
- Students may have difficulty differentiating > from <.
- Students may choose the incorrect rounding place.
- Students may forget to express their answers in simplest form.

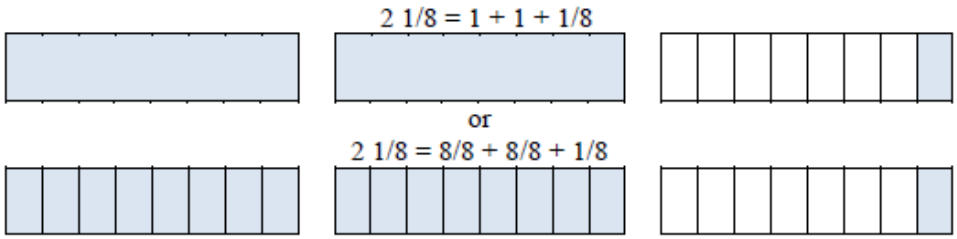
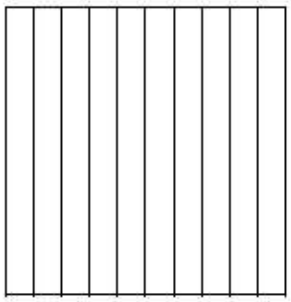
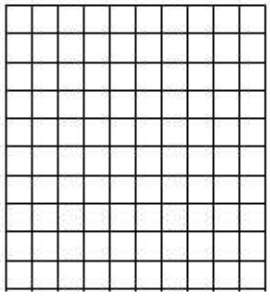
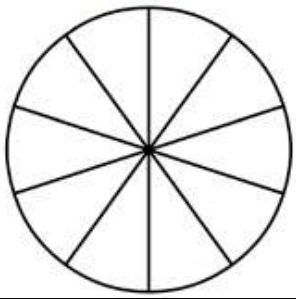
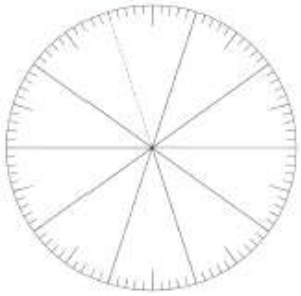
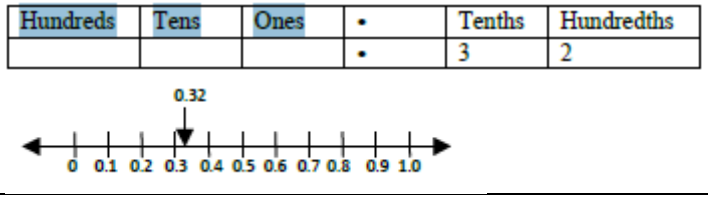
**Teaching Multiple Representations**

# Multiple Representations Framework

| | |
|---|---|
| Multiplicative Comparison<br>What factor would multiply<br>Multiplicative Comparison<br>*What factor would multiply one quantity in order to result in the other?* | **A tape diagram used to solve a Compare problem**<br><br>**A big penguin will eat 3 times as much fish as a small penguin. The big penguin will eat 420 grams of fish. All together, how much will the two penguins eat?**<br><br>**420g**<br><br>Big penguin<br>Small penguin<br><br>**B=number of grams the big penguin eats**<br><br>**S=number of grams the small penguin eats**<br><br>**3 x S=B**<br><br>**3 x S=420**<br><br>**S=140**<br><br>**S + B=140 + 420**<br><br>**=560** |
| Understanding a digit in one place represents ten times what it represents in the place to its right. |  |

| | |
|---|---|
| Fractional Strips |   |
| Equal Partitioning and Unitizing<br>*Using Visual Fraction Models*<br>• Fraction Strips<br>• Fraction Circles<br>• Number line |     |
| Bar Model  | Leticia read 7 ½ books for the read-a-thon. She wants to read 12 books in all. How many more books does she have to read?   12-7 ½=? Or 7 ½ + ?=12 so Leticia needs to read 4 ½ more books. |
| Equivalent Fractions |   |

| | |
|---|---|
| Simplifying Fractions |  |
| Benchmark Fractions | 1/2, 1/3, 1/4, 1/5, 1/6. 1/8, 1/10 |
| Multiply Fraction by a Whole Number |  |
| Multiply Fraction by a Whole Number |  |

| | |
|---|---|
| Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an Equation. |  |
| Represent a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. | Example:<br>Ones . Tenths Hundredths<br>Tenths Grid<br>Hundredths Grid<br>  <br>  <br>.3 = 3 tenths = 3/10<br>.30 = 30 hundredths = 30/100<br>Example:<br>Represent 3 tenths and 30 hundredths on the models below.<br>10ths circle<br>  <br>100ths circle<br>  |
| Decimal notation for fractions with denominators 10 or 100.<br>• Place Value Chart<br>• Number line |  |

## Assessment Framework

| Unit 2 Assessment / Authentic Assessment Framework | | | | |
|---|---|---|---|---|
| **Assessment** | | **Estimated Time** | **Format** | **Graded** |
| *Pre Test 6* | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 30 minutes | Individual | Y |
| *Mini Assessment #4* | 4.NF.1-2 | 30 minutes | Individual | Y |
| *Test Prep 6* | 4.NF.1, 4.NF.3a-d, 4.NF.4a-c, 4.MD.1, 4.MD.4. 4.OA.2 | 1 Block | Individual | Y |
| *Authentic Assessment #5 Raising Money* | 4.NF.1-2 | 30 minutes | Individual | Y |
| *Doubling a Recipe* | 4.NF.1-4c, Individual | Home Project | Individual | Optional |
| *Mini Assessment #5* | 4.NF.3 | 30 minutes | Individual | Y |
| *Pre Test 7* | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7, 4.OA.5, 4.MD.1, 5.NF.5 | 30 minutes | Individual | Y |
| *Chapter Test/Review 7 w/TP* | 4.NF.1, 4.NF.3a, 4.NF.5, 4.NF.6, 4.NF.7, 4.OA.5, 4.MD.1, 5.NF.5 | 1 Block | Individual | Y |
| *Authentic Assessment#6 Chocolate Bar Fractions* | 4.NF.2, 4.NF.4 | 30 minutes | Individual | Y |
| *Mini Assessment #6* | 4.NF.4 | 30 minutes | Individual | Y |
| *Chapter Test* | 4.NBT.1-2, 4.NBT.4, 4.NF.5, 4.MD1-2 | 1 Block | Individual | Y |
| *Authentic Assessment #7 Cynthia's Perfect Punch* | 4.NF.b.3.c | 30 minutes | Individual | Y |
| *Mini Assessment#7* | 4.NF.5-6 | 30 minutes | Individual | Y |
| *Mosaic Art* | 5.NF.5, 4.NF.5-7 | 1 Block or Home Project | Individual | Optional |
| *Mini Assessment #8* | 4.NF.7 | 30 minutes | Individual | Y |

| | **PLD** | **Genesis Conversion** |
|---|---|---|
| **Rubric Scoring** | PLD 5 | 100 |

| | | |
|---|---|---|
| | PLD 4 | 89 |
| | PLD 3 | 79 |
| | PLD 2 | 69 |
| | PLD 1 | 59 |

Name:_____

# Raising Money

The bicycle, track and band clubsare all trying to raise money for new uniforms. The principal wants to make sure all the clubs get an equal amount of money from the school. The principal has decided to give money to each club based on the number of students they have participating in the club. The bicycle club will get a total of $\frac{2}{5}$ of the money. The track club will get $\frac{4}{10}$ and the band club will get $\frac{30}{100}$. Did the principal share the money equally among all three clubs why or why not?

Solve the problem by using either bars, number lines or shapes to show the fractional parts.

**4.NF.1:**Explain why a fraction $a/b$ is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

**4.NF.2:**Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

**Mathematical Practice:** 1, 3, 6

**Type**: Individual or Individual w/Interview

| **SOLUTION:** **See below** | | | | |
|---|---|---|---|---|
| **Level 5: Distinguished Command** | **Level 4: Strong Command** | **Level 3: Moderate Command** | **Level 2: Partial Command** | **Level 1: No Command** |
| Students used representation to find equivalents fractional benchmarks. Students were able to use benchmarks to help estimate the size of the number and compare fractions to see if they were equal. Students were able to develop and use benchmarks that relates to different forms of representation of rational numbers (for example, 25 out of 100 is the same as ¼). By doing so, students were able to determine that two out of the three fractions were equal and 30/100 would give the band club less money. Students showed their work and gave a clear explanation of the answer to their problem. | | Students did not use benchmarks to solve the problem, however, they were able to determine that two out of the three fractions were equal and 30/100 would give the band club less money. Students showed their work and gave a clear explanation of the answer to their problem. | Students attempted to compare the fractions using representation; however, their answer did not come up with the correct solution. An understanding of using benchmark fractions was not evident in their work. | Does not address task, unresponsive, unrelated or inappropriate. |

| | | | | |
|---|---|---|---|---|
| Response includes an **efficient** and logical progression of steps.<br><br>Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions with common denominators, comparing to a benchmark fraction and generating equivalent fractions<br><br>Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison. | Response includes a **logical** progression of steps<br><br>Compares fractions, with like or unlike numerators and denominators, by creating equivalent fractions with common denominators, comparing to a benchmark fraction and generating equivalent fractions<br><br>Demonstrates the use of conceptual understanding of fractional equivalence and ordering when solving simple word problems requiring fraction comparison. | Response includes a **logical but incomplete** progression of steps. Minor calculation errors.<br><br>Given a visual model and/or manipulatives, compares fractions, with like or unlike numerators and denominators, by **creating equivalent fractions with common denominators** and comparing to a benchmark fraction. | Response includes an **incomplete or Illogical** progression of steps.<br><br>Given a visual model and/or manipulatives, compares fractions, with like or unlike numerators and denominators, by **creating equivalent fractions with common denominators** and comparing to a benchmark fraction. | The student shows no work or justification |

Name:_____

A. John is giving out chocolate to his friends. If he wants to give each friend $\frac{2}{3}$ of a chocolate bar and he has 13 friends, how many chocolate bars will he need to buy? Use words, a model, or an equation to justify your answer

B. William buys 4 chocolate bars and each bar weighs $\frac{1}{4}$pound. Mary buys 2 chocolate bars and each one weighs $\frac{1}{2}$pound. William claims that the chocolate weighs the same amount. Mary disagrees. Who is correct? Use a model and words to justify your answer.

## Chocolate Bar Fractions

4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify conclusions, e.g. by using a visual fraction model

4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number.

Mathematical Practice: 1,3,4,6,and 7

**SOLUTION:**

**A. 9 candy bars**

**B. William is correct because 4/4 is equivalent to 2/2**

**Level 5: Distinguished Command**

Student correctly multiplies 13 by 2/3 to arrive at a correct product of 26/3. Student correctly interprets 26/3 as 8 and 2/3 and recognizes that John requires 9 candy bars to share among his friends. Student uses an appropriate strategy such as a number line, visual fraction model, or algorithm to multiply the fraction by the whole number and explains that John needs 9 candy bars because he cannot buy 8 and 2/3 candy bars. Student correctly identifies that 4/4 and 2/2 are equivalent and states that William is correct. Student includes a model and justifies answer using reasoning such as: • 4 pieces that are each ¼ make one whole and 2 pieces that are each ½ make one whole because in both cases we have all of the pieces or one whole, so 4/4=2/2 • 2/2 x 2/2 equals 4/4 or 4/4 x (½)/(½) equals 2/2 • If you have 2 pieces that are each a half and you cut the two halves into two equal pieces you get fourths. Since both halves belonged to you because you had 2/2, now you have 4/4, or the same amount. Student makes sense of the problem and applies knowledge of fractions to provide an accurate solution. Student uses clear language to communicate written responses. In written explanations, student refers to labels, quantities, and units precisely such as referring correctly to units as either chocolate bars in part 1 or pounds of chocolate in part 2. Models including number lines or area models are appropriate, clearly reflecting the problem situation. The student supports his/her responses with logical and appropriate reasoning.

**Level 4: Strong Command**

Student correctly multiplies 13 by 2/3, with a correct product of 26/3. Student may not interpret 26/3 as 8 and 2/3 or may not recognize that John requires 9 candy bars to share among his friends. Student uses an appropriate strategy such as a number line, visual fraction model, or algorithm to multiply the fraction by the whole number. Student correctly identifies that 4/4 and 2/2 are equivalent. Student explains answer in words or uses a diagram such as a number line, area model, or an equation. Reasoning is generally correct, though explanation may be limited. Student makes sense of the problem and applies knowledge of fractions and operations to provide an accurate solution. Student uses clear language to communicate written responses. In written explanations, student refers to labels, quantities, and units. Models are appropriate, reflecting the problem situation. The student supports his/her responses with reasoning.

**Level 3: Moderate Command**

Student attempts to multiply 13 by 2/3, with an incorrect product or a number line, visual fraction model, or algorithm that indicates a conceptual error. Student may add 2/3 repeatedly or try to partition 13 into 3 equal groups, with limited success. Student is unable to identify either the number of candy bars that John intends to distribute (8 and 2/3) or the number he needs to buy (9). Student attempts to explain why fractions are/are not equivalent using an appropriate strategy, but may incorrectly multiply ½ by 2 or ¼ by 4. Student communicates an incomplete argument with unclear reference to quantities, units, and labels. The student may generally describe fractional equivalence. Student may apply an algorithm inappropriately or with limited evidence of understanding.

**Level 2: Partial Command**

Student attempts to solve the problem, but work demonstrates major conceptual flaws. Student provides very limited evidence of understanding the operations required to solve the problem such as being unable to generate the correct weight of the chocolate or demonstrate fractional equivalence. Work may include an answer such as “William” or “Mary” with no work or justification or an incorrect justification that indicates a major conceptual error.

**Level 1: No Command**

The student shows no work or justification.

Name:_____

Cynthia is making her famous "Perfect Punch" for a party. After looking through the recipe, Cynthia knows that she needs to mix $4\frac{5}{8}$ gallons of fruit juice concentrate with $3\frac{7}{8}$ gallons of sparkling water.

a. Just as she is about to get started she realizes that she only has one 10-gallon container to use for mixing. Will this container be big enough to hold all the ingredients?

b. How much punch will this recipe make?

# Cynthia's Perfect Punch

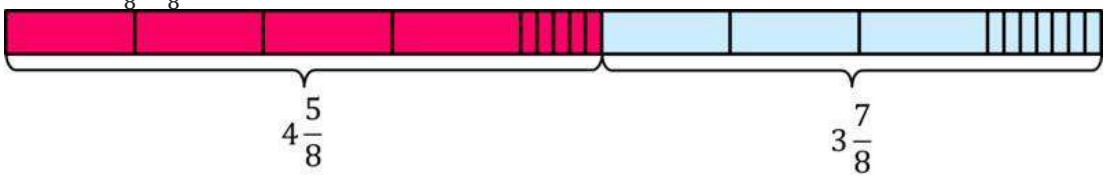
4.NF.B.3.c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

## Mathematical Practice: 1 and 6

**SOLUTION:**

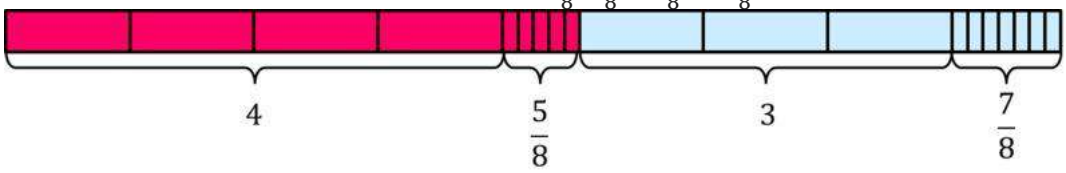
The container is large enough to hold all of the ingredients. Perhaps the easiest way to see this is by observing that $4\frac{5}{8}$ is less than 5 and $3\frac{7}{8}$ is less than 4, so $4\frac{5}{8}+3\frac{7}{8}$ is less than 9. Since there are less than 9 gallons of ingredients altogether they will certainly all fit in a 10-gallon container.

To see how much total punch is made we need to add the amount of lemon lime soda to the amount of fruit juice. The picture below represents $4\frac{5}{8}+3\frac{7}{8}$



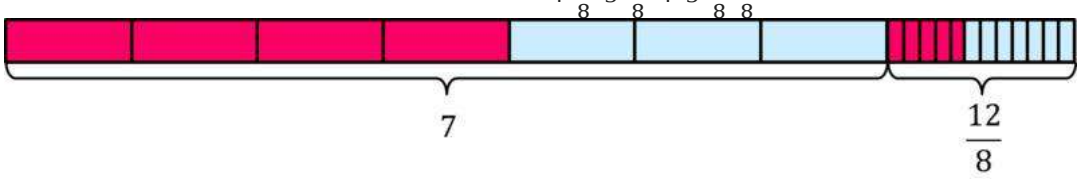

We can write the mixed numbers as a sum of a whole number and a fraction.

$$4\frac{5}{8}+3\frac{7}{8}=(4+\frac{5}{8})+(3+\frac{7}{8})$$




Since addition is commutative and associative, we can add the numbers in any order we wish. Let's add the whole numbers together and the fractions together.

$$4+\frac{5}{8}+3+\frac{7}{8}=4+3+\frac{5}{8}+\frac{7}{8}$$

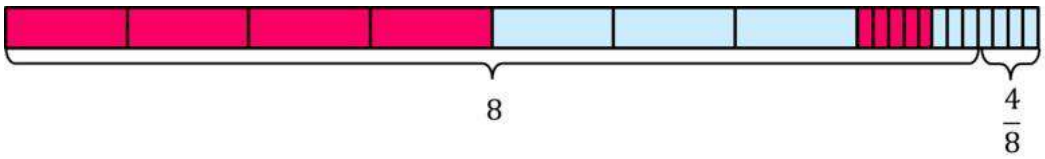



$$4+3+\frac{5}{8}+\frac{7}{8}=7+5+\frac{7}{8}=7+\frac{12}{8}$$

Next we can re-write $\frac{12}{8}$ as a mixed number...

$$7+\frac{12}{8}=7+\frac{8+4}{8}=7+\frac{8}{8}+\frac{4}{8}=7+1+\frac{4}{8}$$

and add the whole numbers once again.




$7+1+\frac{4}{8}=8+\frac{4}{8}$

Since $\frac{4}{8}=\frac{1}{2}$, we can write the sum as $8\frac{1}{2}$. So we see that this recipe makes $8\frac{1}{2}$ gallons of punch.

| **Level 5: Distinguished Command** | **Level 4: Strong Command** | **Level 3: Moderate Command** | **Level 2: Partial Command** | **Level 1: No Command** |
|---|---|---|---|---|
| Student correctly answers both questions and clearly constructs and communicates a complete response based on explanations/reasoning using :<br>• Properties of Operations<br>• Relationship between addition and subtraction<br>• Equivalent Fractions using mixed numbers<br><br>Response includes an **efficient** and logical progression of steps. | Student correctly answers both questions and clearly constructs and communicates a complete response based on explanations/reasoning using :<br>• Properties of Operations<br>• Relationship between addition and subtraction<br>• Equivalent Fractions using mixed numbers<br><br>Response includes a **logical** progression of steps. | Student correctly answers one question and clearly constructs and communicates a complete response based on explanations/reasoning using :<br>• Properties of Operations<br>• Relationship between addition and subtraction<br>• Equivalent Fractions using mixed numbers<br><br>Response includes a **logical but incomplete** progression of steps. | Student correctly answers one question and clearly constructs and communicates a complete response based on explanations/reasoning using :<br>• Properties of Operations<br>• Relationship between addition and subtraction<br>• Equivalent Fractions using mixed numbers<br><br>Response includes a i**llogical or incomplete** progression of steps. | The student shows no work or justificatio n |

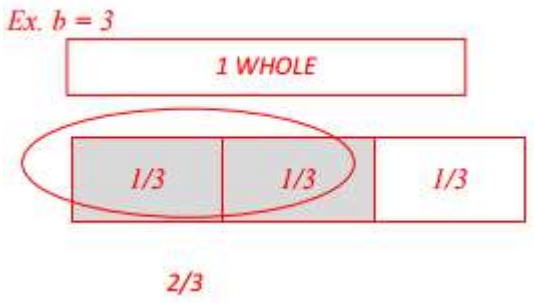
**Additional Assessment Resources**

**Literature**

Literature Fractions and Decimals Made Easy, by Rebecca Wingard-Nelson Fun Food Word Problems Starring Fractions, by Rebecca Wingard-Nelson
The Hershey's Milk Chocolate Fractions Book, by Jerry Pallotta
Jump, Kangaroo, Jump!, by Stuart J. Murphy Polar Bear
Math: Learning About Fractions from Klondike and Snow, by Ann Whitehead Nagda
The Wishing Club: A Story About Fractions, by Donna Jo Napoli
Working With Fractions, by David A. Adler

**Project Ideas**:
Doubling A Recipe
Mozaic Art

# NJDOE 3rd -5th Grade Mathematics Revisions

| Grade level | Standard | Revised Standard |
|---|---|---|
| 3 | 3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. | 3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe and/or represent a context in which a total number of objects can be expressed as 5 × 7. |
| 3 | 3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. | 3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. |
| 3 | 3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b | 3.NF.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.<br>  |
| 3 | 3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. | 3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/b on a |

| | | |
|---|---|---|
| | Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. | number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line. b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.<br>*Ex. $a = 4$; $b = 7$*<br>  <br> |
| 3 | 3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). | 3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). |
| 4 | 4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two - column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), | 4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ... |
| 5 | 5.MD.5b. Apply the formulas V = l × w × h and V = b × h for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems | 5.MD.5b Apply the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems |
| 5 | 5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. | 5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units. |