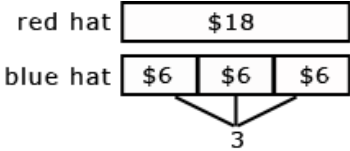


4th Grade Math

Operations and Algebraic Thinking (OA)		4. OA
Use the four operations with whole numbers to solve problems.		
Common Core Standard	Mathematical Practice	Examining the Standards
4.OA.1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.	2, 4	<p>Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times.</p>
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.	2, 4, 5, 7	<p>This standard calls for students to translate comparative situations into equations with an unknown and solve.</p> <p style="margin-left: 40px;">($\\$6 \times 3 = \square$)</p> <div style="margin-left: 100px; text-align: center;">  <p style="margin-left: 40px;">red hat \$18</p> <p style="margin-left: 40px;">blue hat \$6 \$6 \$6</p> <p style="margin-left: 100px;">└───┬───┬───┘</p> <p style="margin-left: 100px;">3</p> </div> <p style="margin-left: 40px;">A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat?</p> <p style="margin-left: 40px;">In solving this problem, the student should identify \$18 as the quantity being divided into shares of \$6.</p>
4.OA.3. Solve multistep (two or more operational steps) word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	1, 2, 4, 5, 6, 7	<p>The focus in this standard is to have students use and discuss various strategies.</p>

Gain familiarity with factors and multiples.

4.OA.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

This standard requires students to demonstrate understanding of factors and multiples of whole numbers. This standard also refers to prime and composite numbers.

Generate and analyze patterns.

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.

Creating and extending number and shape patterns.

Example:


Pattern	Rule	Feature(s)
3, 8, 13, 18, 23, 28, ...	Start with 3, add 5	The numbers alternately end with a 3 or 8

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.*

Number and Base Ten (NBT)

4.NBT

Generalize place value understanding for multi-digit whole numbers.

Common Core Standard	Mathematical Practice	Examining the Standards
<p>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.</p>	<p>2, 6, 7</p>	<p>This standard calls for students to extend their understanding of place value related to multiplying and dividing by multiples of 10.</p> <p>Example: For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.</p>
<p>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.</p>	<p>2, 4, 6, 7</p>	<p>This standard refers to various ways to write numbers.</p> <p>Traditional expanded form is $285 = 200 + 80 + 5$. Written form or number name is two hundred eighty-five. 285 could also be 28 tens plus 5 ones or 1 hundred, 18 tens, and 5 ones.</p>
<p>4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.</p>		<p>This standard refers to place value understanding, which extends beyond an algorithm or procedure for rounding.</p> <p>Example: Round 368 to the nearest hundred.</p>  <p>The number line has tick marks at 300, 350, and 400. A dot is placed at 368, which is between 350 and 400.</p>

Use place value understanding and properties of operations to perform multi-digit arithmetic.

<p>4.NBT.4 Fluently add and subtract (including subtracting across zeroes) multi-digit whole numbers using the standard algorithm.</p>		<p>Students build on their understanding of addition and subtraction.</p> $\begin{array}{r} 3892 \\ + 1567 \\ \hline \end{array}$ <p>Student explanation for this problem:</p> <ol style="list-style-type: none"> Two ones plus seven ones is nine ones. Nine tens plus six tens is 15 tens. I am going to write down five tens and think of the 10 tens as one more hundred. (notates with a 1 above the hundreds column) Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds. I am going to write the four hundreds and think of the 10 hundreds as one more
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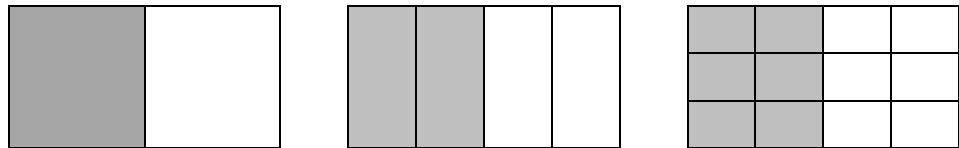
		1000. (notates with a 1 above the thousands column) 6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand.
4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	2, 3, 4, 5, 7	
4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models	2, 3, 4, 5, 7	<p>Examples: A 4th grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box?</p> <ul style="list-style-type: none"> • Using Base 10 Blocks: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50. • Using Place Value: $260 \div 4 = (200 \div 4) + (60 \div 4)$ • Using Multiplication: $4 \times 50 = 200$, $4 \times 10 = 40$, $4 \times 5 = 20$; $50 + 10 + 5 = 65$; so $260 \div 4 = 65$

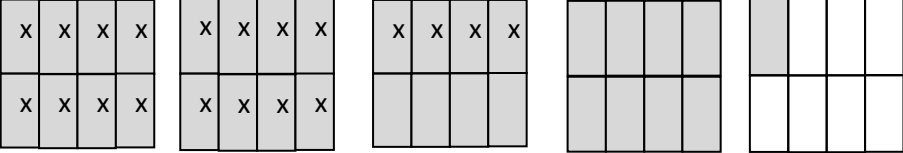
Number and Operations—Fractions (NF)

4. NF

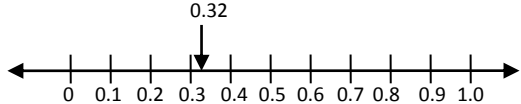
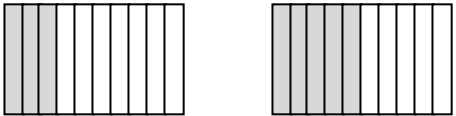
(Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12 and 100.)

Extend understanding of fraction equivalence and ordering.

Common Core Standard	Mathematical Practice	Examining the Standards
4.NF.1 Recognizing that the value of “n” cannot be 0, 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.	2, 4, 7, 8	<p>This standard refers to visual fraction models. This includes area models, number lines or it could be a collection/set model.</p>  <p style="text-align: center;">$1/2$ = $2/4$ = $6/12$</p>
4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by	2, 4, 5,7	Fractions can be compared using benchmarks, common denominators, or common numerators. Symbols used to describe comparisons include $<$, $>$, $=$.

<p>comparing to a benchmark fraction such as $\frac{1}{2}$. 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.</p>		
<p>4.NF.3 Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$.</p> <p>a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole</p> <p>b. 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 including, but not limited to: concrete models, illustrations, tape diagram, number line, area model, etc). <i>Examples:</i> $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$; $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$; $2\frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$.</p> <p>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</p>	<p>1, 2, 4, 5, 6, 7, 8</p>	<p>Example of word problem: Trevor has $4\frac{1}{8}$ pizzas left over from his soccer party. After giving some pizza to his friend, he has $2\frac{4}{8}$ of a pizza left. How much pizza did Trevor give to his friend? Solution: Trevor had $4\frac{1}{8}$ pizzas to start. This is $\frac{33}{8}$ of a pizza. The x's show the pizza he has left which is $2\frac{4}{8}$ pizzas or $\frac{20}{8}$ pizzas. The shaded rectangles without the x's are the pizza he gave to his friend which is $\frac{13}{8}$ or $1\frac{5}{8}$ pizzas.</p> 

<p>the relationship between addition and subtraction.</p> <p>d. 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.</p>		
<p>4.NF.4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.</p> <p>a. Understand a fraction a/b as a multiple of $1/b$. <i>For example, use a visual fraction model to represent $5/4$ as the product $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$.</i></p> <p>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. <i>For example, use a visual fraction model to express $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.)</i></p> <p>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. <i>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</i></p>	<p>1, 2, 4, 5, 6, 7, 8</p>	

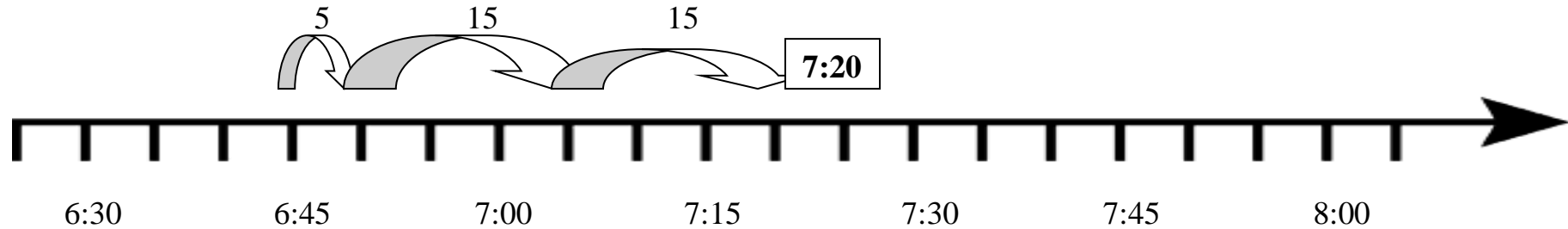
<p><i>beef will be needed? Between what two do you expect your answer to lie?</i></p>														
<p>4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.²</p>	<p>2, 4, 5, 7</p>	<p>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).</p> <p><i>For example, express $3/10$ as $30/100$, and add $3/10 + 4/100 = 34/100$.</i></p>												
<p>4.NF.6 Use decimal notation for fractions with denominators 10 or 100.</p> <p><i>For example, rewrite 0.62 as $62/100$; describe a length as 0.62 meters; locate 0.62 on a number line diagram.</i></p>		<p>Students make connections between fractions with denominators of 10 and 100 and the place value chart.</p> <p>Example: 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.</p> <table border="1" data-bbox="961 574 1787 656"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> <th>•</th> <th>Tenths</th> <th>Hundredths</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>•</td> <td>3</td> <td>2</td> </tr> </tbody> </table> 	Hundreds	Tens	Ones	•	Tenths	Hundredths				•	3	2
Hundreds	Tens	Ones	•	Tenths	Hundredths									
			•	3	2									
<p>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.</p>		<p>Example:</p> <ul style="list-style-type: none"> 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. 												

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

Common Core Standard	Mathematical Practice	Examining the Standards																								
<p>4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; mm; kg, g; mg; 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.</p>	<p>2, 5, 7</p>	<p>Example: 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), ...</p> <table border="1" data-bbox="1125 415 1829 651"> <tr> <td>kg</td><td>g</td><td>ft</td><td>in</td><td>lb</td><td>oz</td> </tr> <tr> <td>1</td><td>1000</td><td>1</td><td>12</td><td>1</td><td>16</td> </tr> <tr> <td>2</td><td>2000</td><td>2</td><td>24</td><td>2</td><td>32</td> </tr> <tr> <td>3</td><td>3000</td><td>3</td><td>36</td><td>3</td><td>48</td> </tr> </table>	kg	g	ft	in	lb	oz	1	1000	1	12	1	16	2	2000	2	24	2	32	3	3000	3	36	3	48
kg	g	ft	in	lb	oz																					
1	1000	1	12	1	16																					
2	2000	2	24	2	32																					
3	3000	3	36	3	48																					
<p>4.MD.2 Use the four operations to solve word problems involving</p> <ul style="list-style-type: none"> • Intervals of time • Money • Distances, • Liquid volumes • Masses of objects <p>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.</p>	<p>1, 2, 4, 5, 6</p>	<p>This standard includes multi-step word problems (measurements) (e.g., feet to inches, meters to centimeter, and dollars to cents).</p> <p>Example:</p> <p>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?</p> <p>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</p> <p>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</p> <p>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.</p>																								

Example:

Tonya wakes up at 6:45 a.m. It takes her 5 minutes to shower, 15 minutes to get dressed, and 15 minutes to eat breakfast. What time will she be ready for school?



4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

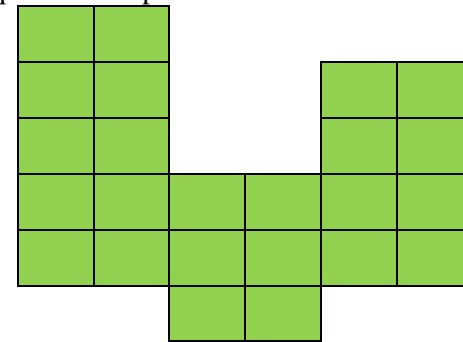
For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

2, 4, 5, 6, 7

Example:

Mr. Rutherford is covering the miniature golf course with an artificial grass. How many 1-foot squares of carpet will he need to cover the entire course?

1-foot square of carpet



(Progressions for the CCSSM, Geometric Measurement, CCSS Writing Team, June 2012, page 22)

Represent and interpret data.

4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

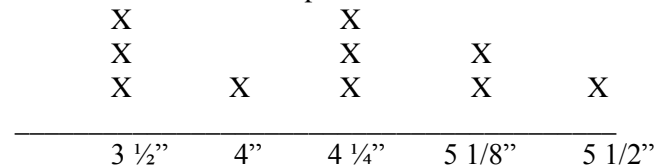
For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

2, 4, 5, 6, 7

This standard provides a context for students to work with fractions by measuring objects to an eighth of an inch.

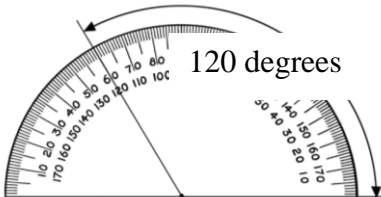
Example:

Ten students in Room 31 measured their pencils at the end of the day. They recorded their results on the line plot below.



Possible questions:










- What is the difference in length from the longest to the shortest pencil?
- If you were to line up all the pencils, what would the total length be?
-

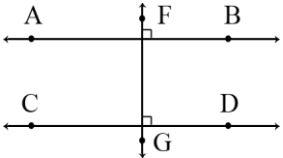
Geometric measurement: understand concepts of angle and measure angles.		
<p>4. MD.5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:</p> <p>a. An angle that turns through n one-degree angles is said to have an angle measure of n degrees</p>		<p>This standard brings up a connection between angles and circular measurement (360 degrees).</p>
<p>4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure</p>	<p>2, 5, 6</p>	<p>Students should measure angles and sketch angles</p>  <p style="text-align: center;">(Progressions for the CCSSM, Geometric Measurement, CCSS Writing Team, June 2012, page 23)</p>
<p>4.MD.7 Recognize angle measure is additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve the addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</p> <p>Example: Find the missing angle using an equation.</p>	<p>2,5,6</p>	

Geometry

4G

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Common Core Standard	Mathematical Practice	Examining the Standards
<p>4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.</p>	<p>4, 5</p>	<p>This standard asks students to draw two-dimensional geometric objects and to also identify them in two-dimensional figures.</p> <p>This is the first time that students are exposed to rays, angles, and perpendicular and parallel lines. Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. ly identify lines and rays because they are more abstract.</p> <p>right angle </p> <p>acute angle </p> <p>obtuse angle </p> <p>straight angle </p> <p>segment </p> <p>line </p> <p>ray </p> <p>parallel lines </p> <p>perpendicular lines </p>

<p>4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.</p>		<p>Students should become familiar with the concept of parallel and perpendicular lines.</p> <p>Parallel and perpendicular lines are shown below:</p> 
<p>4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry</p>	<p>4, 5, 6, 7</p>	<p>This standard only includes line symmetry not rotational symmetry.</p> <p>Example: For each figure, draw all of the lines of symmetry. What pattern do you notice?</p> 