An At-Home Guide for Families

4th Grade Math in North Carolina Public Schools

Course Outline

At the end of the course, my child will be able to…

- Explain that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right, up to 100,000.
- Read and write multi-digit whole numbers up to and including 100,000 using numerals, number names, and expanded form.
- Compare two multi-digit numbers up to and including 100,000 based on the values of the digits in each place, using >, =, and < symbols to record the results of comparisons.
- Solve two-step word problems involving the four operations with whole numbers.
    - Use estimation strategies to assess reasonableness of answers.
    - Interpret remainders in word problems.
    - Represent problems using equations with a letter standing for the unknown quantity.
- Add and subtract multi-digit whole numbers up to and including 100,000 using the standard algorithm with place value understanding.
- Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.
- Represent problems using equations with a letter standing for the unknown quantity.
- Find all factor pairs for whole numbers up to and including 50 to:
- Recognize that a whole number is a multiple of each of its factors.
- Determine whether a given whole number is a multiple of a given one-digit number.
- Multiply a whole number of up to three digits by a one-digit whole number, and multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations. Use models to make connections and develop the algorithm.
- Find whole-number quotients and remainders with up to three-digit dividends and one-digit divisors with place value understanding using rectangular arrays, area models, repeated subtraction, partial quotients, properties of operations, and/or the relationship between multiplication and division.
- Draw and identify points, lines, line segments, rays, angles, and perpendicular and parallel lines.
- Develop an understanding of angles and angle measurement.
- Understand angles as geometric shapes that are formed wherever two rays share a common endpoint and are measured in degrees.
- Measure and sketch angles in whole-number degrees using a protractor.
- Develop an understanding of angles and angle measurement.
    - Solve addition and subtraction problems to find unknown angles on a diagram in real-world and mathematical problems
- Classify quadrilaterals based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.
- Generate and analyze a number or shape pattern that follows a given rule.

- Classify triangles based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.
- Recognize symmetry in a two-dimensional figure and identify and draw lines of symmetry.
- Solve problems with area and perimeter.
  - Find areas of rectilinear figures with known side lengths.
  - Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
- Solve problems with area and perimeter.
  - Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas.
- Find all factor pairs for whole numbers up to and including 50 to:
  - Recognize that a whole number is a multiple of each of its factors.
  - Determine whether a given whole number is a multiple of a given one-digit number.
- Solve problems with area and perimeter.
  - Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
- Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. (Denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100)
- Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by: Reasoning about their size and using area and length models.
- Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by using benchmark fractions 0, ½, and a whole.
- Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by comparing common numerator or common denominators.
- Use decimal notation to represent fractions. Express, model and explain the equivalence between fractions with denominators of 10 and 100. Represent tenths and hundredths with models, making connections between fractions and decimals.
- Compare two decimals to hundredths by reasoning about their size using area and length models and recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole.
- Use decimal notation to represent fractions. Use equivalent fractions to add two fractions with denominators of 10 or 100.
- Understand and justify decompositions of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100.
- Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
- Decompose a fraction into a sum of unit fractions and a sum of fractions with the same denominator in more than one way using area models, length models, and equations.

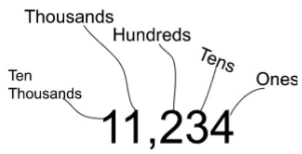
- Subtract fractions, including mixed numbers with like denominators, by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- Solve word problems involving addition and subtraction of fractions, including mixed numbers by writing equations from a visual representation of the problem.
- Apply and extend previous understandings of multiplication to model and explain how fractions can be represented by multiplying a whole number by a unit fraction and use this understanding to multiply a whole number by any fraction less than one.
- Solve word problems involving multiplication of a fraction by a whole number.
- Use decimal notation to represent fractions.
- Use equivalent fractions to add two fractions with denominators of 10 or 100.
- Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.
- Use estimation strategies to assess reasonableness of answers.
- Generate and analyze a number or shape pattern that follows a given rule.
- Represent problems using equations with a letter standing for the unknown quantity.
- Know relative sizes of measurement units. Solve problems involving metric measurement. Measure to solve problems involving metric units: centimeter, meter, gram, kilogram, Liter, milliliter.
- Know relative sizes of measurement units. Solve problems involving metric measurement. Add, subtract, multiply, and divide to solve one-step word problems involving whole-number measurements of length, mass, and capacity that are given in metric units.
- Use multiplicative reasoning to convert metric measurements from a larger unit to a smaller unit using place value understanding, two column tables, and length models.
- Solve word problems involving addition and subtraction of time intervals that cross the hour.
- Represent and interpret data using whole numbers.
- Collect data by asking a question that yields numerical data.
- Determine whether a survey question will yield categorical or numerical data.
- Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot.
- Represent and interpret data using whole numbers.
- Generate and analyze a number or shape pattern that follows a given rule.

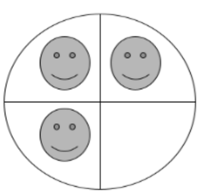
Curious what the specific standards are for 4th Grade Math in North Carolina?

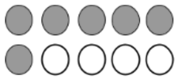
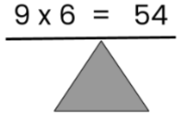
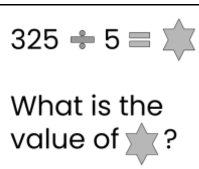
Check out the **North Carolina Standard Course of Study** to learn more. Looking for additional explanations about what students should be able to do at the end of this course? Check out **4th Grade Math unpacked contents document** aligned to the course standards.

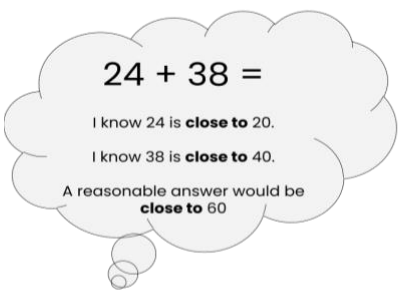
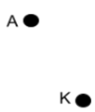
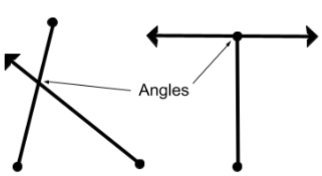
Key Vocabulary

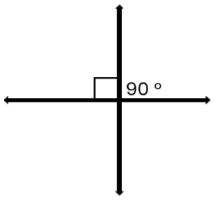
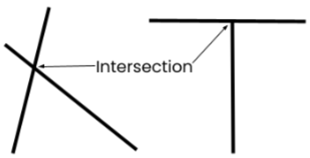
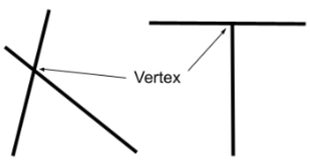
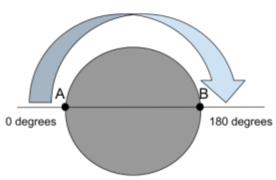
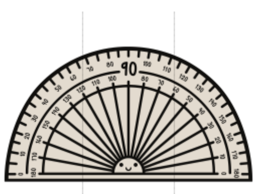
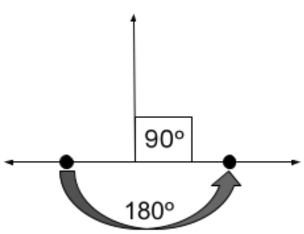
Visual	Term	Definition
0, 1, 2, 3, 4, 5, 6, 7, 8, 9	**Digit**	any of the numerals from 0 to 9, Used to

Visual	Term	Definition
		form part of a number.
	**Place Value**	Place value determines the value of a digit in a number, based on the location of the digit
57	**Numeral**	A figure, symbol, or group that denotes a number.
2 8 5, 6 1 2	**Multi-Digit**	A number that has more than one digit
2 8 5, 6 1 2	**Standard Form**	A number that is represented using digits
Two hundred eighty-five thousand, six-hundred twelve	**Word Form**	A number that is represented using written words
2 hundred thousands + 8 ten thousands + 5 thousands + 6 hundreds + 1 ten + 2 ones	**Unit Form**	A way to show how many of each size unit are in a number. Example: 63 = 6 tens 3 ones
200,000 + 80,000 + 5,000 + 600 + 10 + 2	**Expanded Form**	A number that is written by adding the value of each digit. Example: 4,368= 4,000 + 300 + 60 +8
Two hundred eighty-five thousand, six-hundred twelve	**Number Name**	Writing a number in words that tells what the number is.
4,85**0** < 4,85**2**	**Less Than**	An inequality used to compare two or more quantities in which the first quantity is less than the second quantity

Visual	Term	Definition
$<$	**Less Than Symbol**	An inequality symbol that is placed between quantities indicating that the first quantity is less than the second quantity
4,521 = 4,521	**Equal**	A symbol that is placed between two quantities indicating they have the same value
$=$	**Equal Symbol**	An equality symbol that indicates that the quantities on each side are the same total amount
	Vertical	A line that goes straight up and down
8 + 4 = 12 Addends Sum	**Addend**	The numbers being added together in an addition problem
8 + 4 = 12 Addends Sum	**Sum**	The answer to an addition problem
	**Total**	The whole amount of something
$\begin{array}{r} \boxed{1} \\ 57 \\ +\ \underline{35} \\ 92 \end{array}$	**Algorithm**	A process in which specific steps are followed to find an answer

Visual	Term	Definition
10 - 6 = 4 	**Subtraction**	The mathematical process of taking one amount away from another amount
54 - 16 = 38 Minuend	**Minuend**	A quantity or number from which another amount will be subtracted.
54 - 16 = 38 Subtrahend	**Subtrahend**	The quantity or number that is being subtracted
54 - 16 = 38 Difference	**Difference**	The answer to a subtraction problem
Kalaya wrote a story about riding horses. The story had fifty-two thousand nine hundred seventeen words. If she writes one more chapter that has one thousand three hundred twelve words, how many total words will be in her book?	**Word Problem**	A mathematical problem expressed using words
9 x 6 = 54 	**Equation**	A mathematical expression indicating equality denoted by the = symbol
	**Unknown**	An amount we don't know often represented by a symbol

Visual	Term	Definition
	**Estimation**	A close calculation of the value, number, quantity, or amount of something
	**Exact**	A specific amount
	**Reasonable**	Checking to see if the answer in a mathematical calculation makes sense
	**Point**	A specific location named by a capital letter
	**Line**	A straight one-dimensional figure that extends infinitely in opposite directions with an arrow on each end. It is named by two points
	**Line segment**	A piece of a line that has two distinct endpoints
	**Ray**	A part of a line that starts at one endpoint and extends indefinitely in one direction. It is always named by the endpoint first.
	**Angle**	A figure created by two lines, line segments, or rays that share one common endpoint called a vertex

Visual	Term	Definition
	**Perpendicular**	An intersection of lines that creates a 90-degree angle
	**Parallel**	Two lines that are always the same distance apart and never intersect
	**Intersect**	A single point where two lines meet or cross each other
	**Vertex**	The point on a polygon where the where two lines, rays or line segments meet
	**Degrees**	A unit of measurement for angles. A full rotation has 360 degrees
	**Protractor**	A tool used for measuring angles
	**Benchmark**	A point of reference used to help make reasonable estimates

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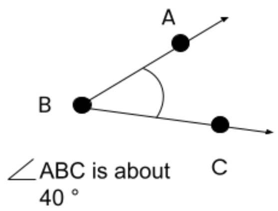
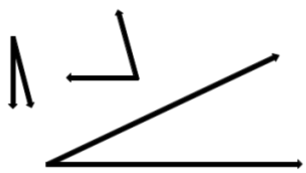
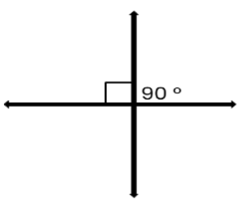
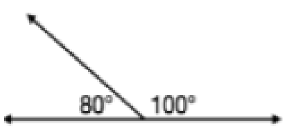
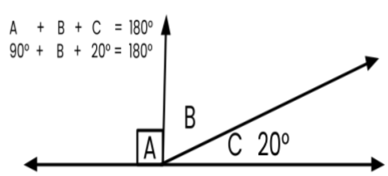
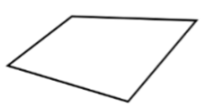
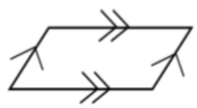
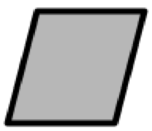
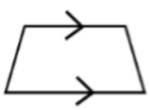
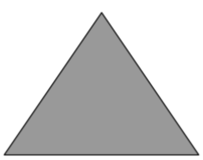
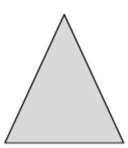
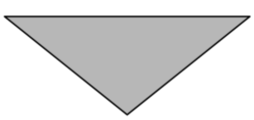
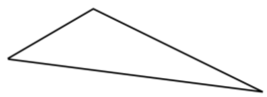
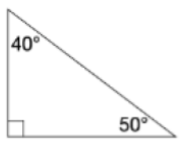
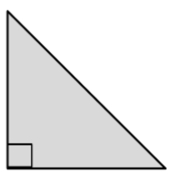
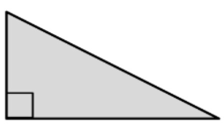
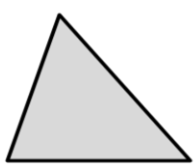
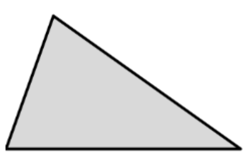
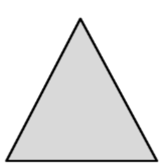
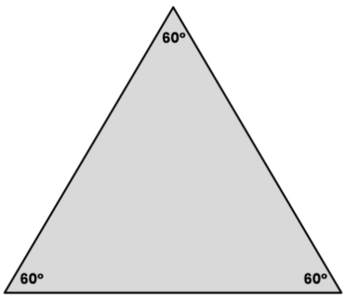
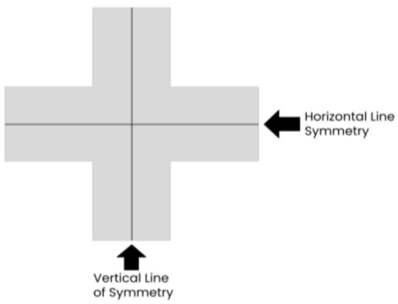
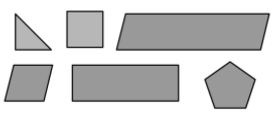
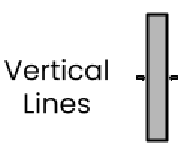
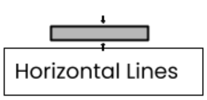
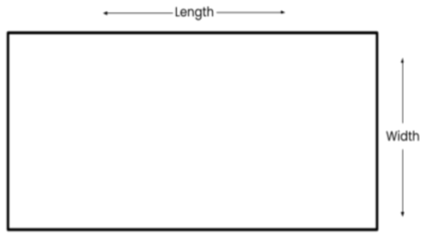
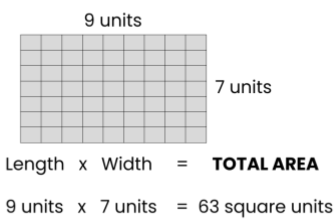
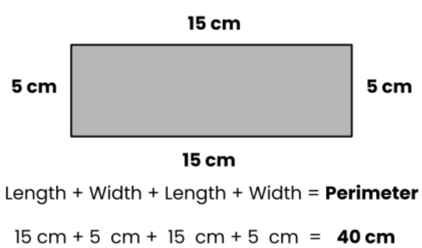
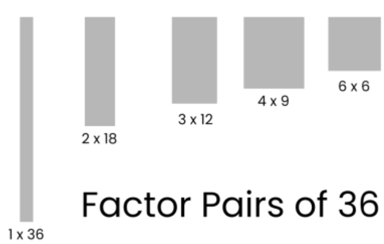
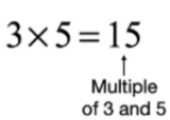
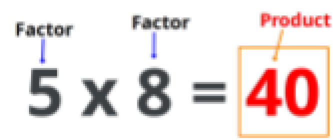
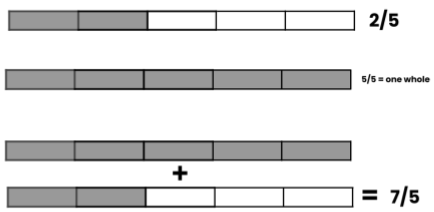
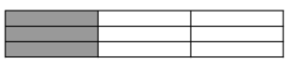
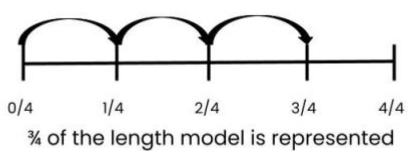
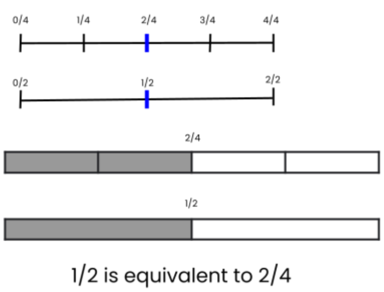
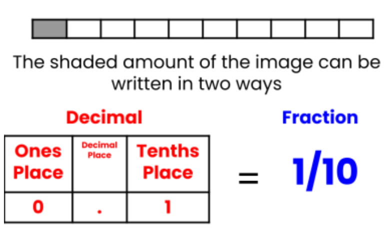
	**Estimate**	An approximate amount
	**Acute Angle**	An angle that is greater than zero degrees and less than 90 degrees
	**Right Angle**	An angle that is exactly 90 degrees
	**Obtuse Angle**	An angle that is greater than 90 degrees and less than 180 degrees
	**Straight Angle**	An angle that is exactly 180 degrees
	**Unknown Angle**	An amount that has not been calculated
	**Quadrilateral**	A closed polygon with four sides and four angles

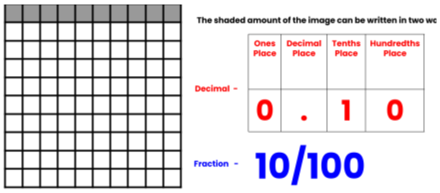
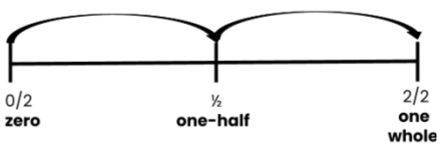
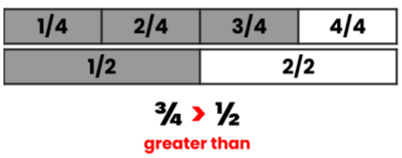
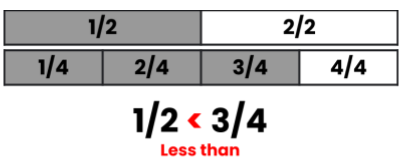
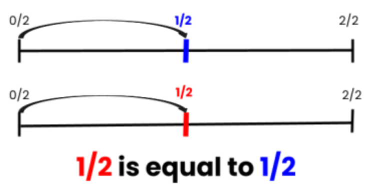
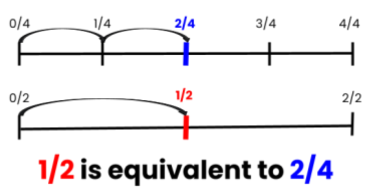
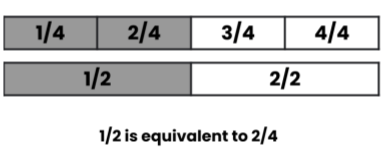
Visual	Term	Definition
	**Parallelogram**	A quadrilateral with opposite sides that are parallel
	**Rectangle**	a quadrilateral with opposite sides that are parallel and congruent that create four right angles
	**Rhombus**	a quadrilateral with opposite sides that are parallel and all sides are congruent forming two acute angles and two obtuse angles.
	**Square**	a quadrilateral with opposite sides that are parallel and all sides are congruent forming four right angles
	**Trapezoid**	a quadrilateral with one pair of parallel sides
	**Triangle**	A closed figure with three sides, three vertices, and three angles that always have a sum of 180 degrees
	**Equilateral Triangle**	A triangle with three equal length sides
	**Isosceles Triangle**	A triangle with two equal length sides
	**Scalene Triangle**	A triangle with no sides of equal length
	**Obtuse Triangle**	A triangle that has one obtuse angle and two acute angles

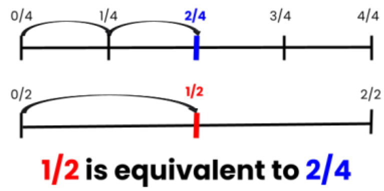
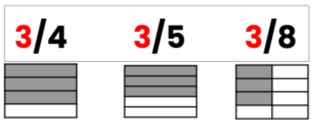
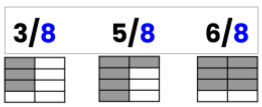
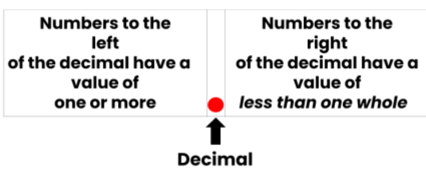
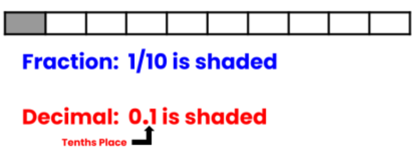
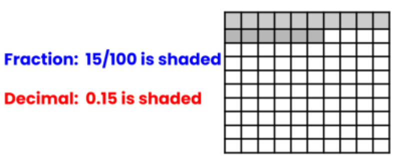
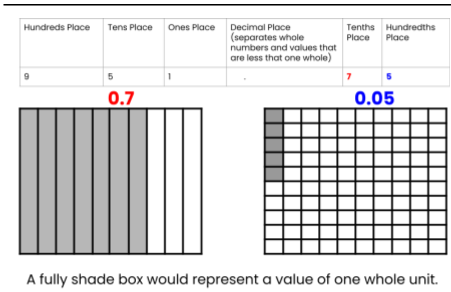
Visual	Term	Definition
	**Obtuse Scalene Triangle**	A triangle that has no sides of equal length with one obtuse and two acute angles
	**Obtuse Isosceles Triangle**	A triangle that has two sides of equal length with one obtuse and two acute angles
	**Right Triangle**	A triangle with one right angle and two acute angles
	**Right Isosceles Triangle**	A triangle with two sides of equal length, one right and two acute angles
	**Right Scalene Triangle**	A triangle with no sides of equal length, one right and two acute angles
	**Acute Triangle**	a triangle with three acute angles
	**Acute Scalene Triangle**	A triangle with no sides of equal length and three acute angles
	**Acute Isosceles Triangle**	A triangle with two sides of equal length and three acute angles

Visual	Term	Definition
	**Acute Equilateral Triangle**	A triangle that has three sides of equal length, and three acute angles, each measuring 60 degrees
	**Symmetry**	A two-dimensional shape that is divided by a line that creates mirror images
	**Polygon**	A two-dimensional shape that is closed with at least three sides.
	**Regular Polygon**	A polygon with congruent sides and angles
	**Non-Regular Polygon**	A polygon in which not all sides and angles have equal measures
	**Vertical**	Straight up and down
	**Horizontal**	parallel to level ground or the horizon

Visual	Term	Definition
	**Two-Dimensional Figure**	a figure that has both length and width
	**Rectilinear Figure**	A figure in which all sides meet to form right angles
	**Area**	The measure of space inside a figure measured in square units
	**Perimeter**	The distance around the outside of a shape measured in linear units
	**Factor Pair**	A set of two factors, which, when multiplied together, give a specific product
	**Multiple**	The number you get when you multiply one whole number by another whole number

Visual	Term	Definition
	**Factor**	The numbers being multiplied together to find a product
	**Fraction**	An amount that is broken into equal size pieces that can have a value of less than one whole, equivalent to one whole, or greater than one whole. The numerator represents the number of equal parts, and the denominator represents the total parts needed to make one whole unit.
	**Area Model-Fractions**	A model that uses area to represent the total amount of a fraction
	**Length Model-Fractions**	A model that uses distance to represent the total amount of a fraction
	**Equivalent Fraction**	When compared to the same whole, fractions that represent the same amount, even though they have different size pieces.
	**Tenths**	One of ten equal parts that make one whole

Visual	Term	Definition
	**Hundredths**	One of one hundred equal parts that make up one whole
	**Benchmark Fractions**	Common fractions that we can use to help when comparing or ordering other fractions
	**Greater Than**	An inequality used to compare two or more quantities in which one is more than the other
	**Less Than**	An inequality used to compare two or more quantities in which the first quantity is less than the second quantity
	**Equal**	Two amounts that are identical in all ways
	**Equivalent**	Two amounts that are identical in one way
	**Area Model- Compare Fractions**	A model that uses area to show the amount of one or more fractions

Visual	Term	Definition
	**Length Model-Compare Fractions**	A model that uses distance to show the size of one or more fractions
	**Common Numerator**	Two or more fractions that have a numerator that is the same amount
	**Common Denominator**	Two or more fractions that have a denominator that is the same amount
	**Decimal**	A symbol that separates whole numbers from values that are less than one whole
	**Tenths Place**	The first place to the right of the decimal
	**Hundredths Place**	The second place to the right of the decimal
	**Place Value Chart**	A chart that shows the value of a digit based on its place

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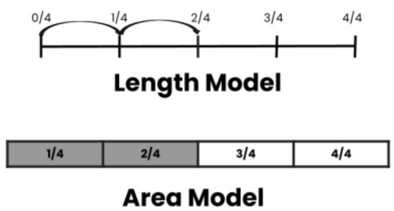
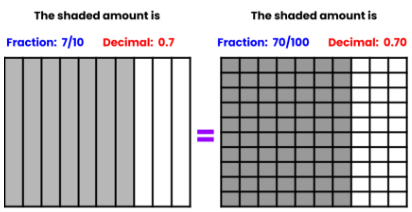
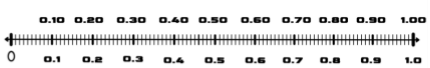
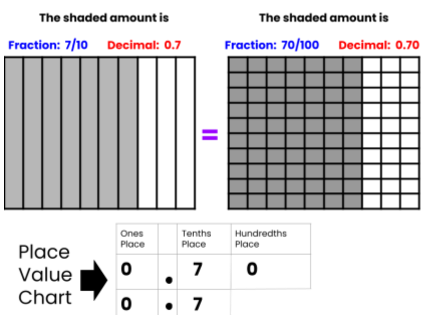
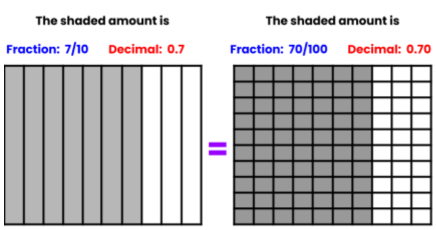
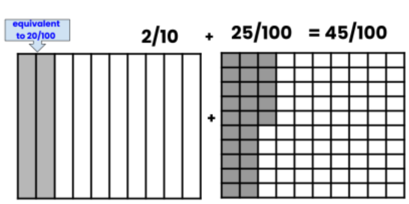
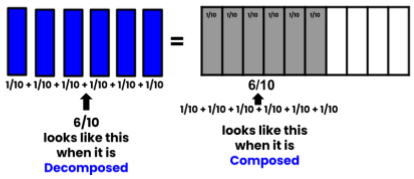
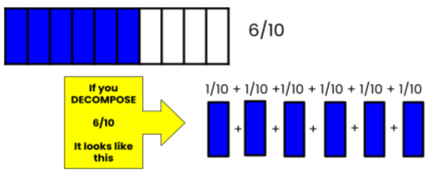
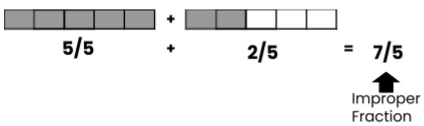
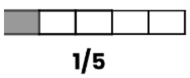
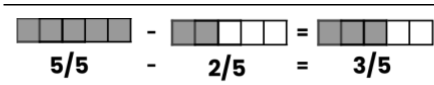
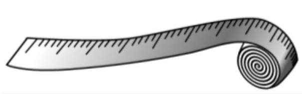
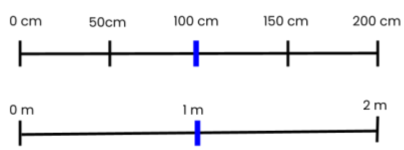
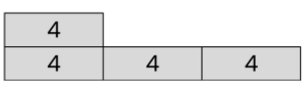
North Carolina Department of Public Instruction

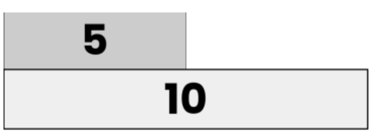
Visual	Term	Definition
	**Visual Model**	A model that represents an amount using visual images
	**Tenths - Hundredths Equivalent - Area Model**	One tenth is equivalent to ten hundredths
	**Tenths - Hundredths Equivalent - Length Model**	One tenth is equivalent to ten hundredths
	**Place Value**	A chart that shows the value of a digit based on its place
	**Fraction-Decimal representation**	Amounts in the tenths and hundredths can b represented using fractions or decimals by removing the denominator and placing the numerator on a base ten place value chart
	**Addition 10ths/100ths**	The process of finding and equivalent in order to combine amounts with unlike denominators

Visual	Term	Definition
	**Compose**	To create a larger value by adding smaller values together
	**Decompose**	To take a large amount and break it into smaller units
5 ¾	**Mixed Number**	A number that is composed of a whole number and a fraction
1, 2, 3, 4, 5, 6, 7, 8, 9	**Whole Number**	A number that does not have a fraction
	**Improper Fraction**	A fraction with a value of greater than one. A fraction in which the numerator is greater than the denominator
	**Unit Fraction**	A fraction whose numerator is 1
2 ¾ = 11/4	**Convert**	The changing of a value or expression from one form to another
	**Addition (of fractions with like denominators)**	An increase in the total resulting from the combination of parts
	**Subtraction (of fractions with like denominators)**	The mathematical process of taking one amount away from another amount
Jennifer ran ⅘ of a mile every day for seven days. What two whole numbers is the total distance Jennifer ran between?	**Word Problem**	A mathematical problem expressed using words
	**Length**	The distance from one point to another point

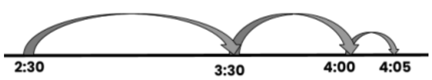
Visual	Term	Definition
	**Weight**	How heavy an object is
	**Capacity**	The maximum amount that something can hold
	**Metric System**	A system used for measuring length, weight and capacity
	**Meter**	A unit of length in the metric system that is roughly equivalent to 39 inches. One meter is equivalent to one hundred centimeters
	**Centimeter**	1/100 of a meter. One hundred centimeters is equivalent to one meter
	**Gram**	A unit of weight in the metric system that weighs about the same as a regular size paper clip or a one dollar bill. One gram is 1/1,000 of a kilogram
	**Kilogram**	A unit of weight in the metric system that is equivalent to 2.20 pounds. One kilogram is equivalent to 1,000 grams.
	**Liter**	A unit of capacity in the metric system. One liter is equivalent to 1,000 milliliters and about the same as 34 ounces

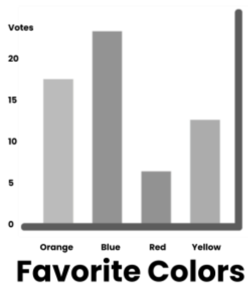
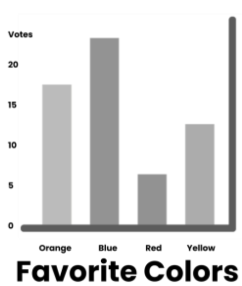
<table>
<tr><th>Visual</th><th>Term</th><th>Definition</th></tr>
<tr><td>
</td><td>Milliliter</td><td>1/1000 of a liter. One milliliter is about the same as 15-20 drops of water</td></tr>
<tr><td><table><tr><th>Meters</th><th>Centimeters</th></tr><tr><td>1</td><td>100</td></tr><tr><td>2</td><td>200</td></tr><tr><td>3</td><td>300</td></tr><tr><td>4</td><td>400</td></tr><tr><td>5</td><td>500</td></tr><tr><td>6</td><td>600</td></tr></table></td><td>Convert</td><td>The changing of a value or expression from one form to another</td></tr>
<tr><td>

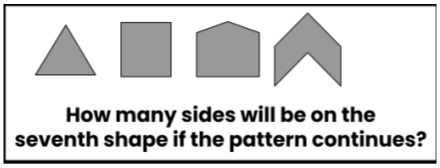
1 meter is equivalent to 100 centimeters</td><td>Length Model</td><td>A model that uses distance to represent the total amount</td></tr>
<tr><td><table><tr><th>Meters</th><th>Centimeters</th></tr><tr><td>1</td><td>100</td></tr><tr><td>2</td><td>200</td></tr><tr><td>3</td><td>300</td></tr><tr><td>4</td><td>400</td></tr><tr><td>5</td><td>500</td></tr><tr><td>6</td><td>600</td></tr></table></td><td>Two column table</td><td>A table that has two columns used to organize information</td></tr>
<tr><td>

The bottom bar is three times as much as the top bar</td><td>Multiplicative Comparison</td><td>A situation in which one quantity is multiplied by a specified number to get another quantity (an example:, “a is n times as much as b”</td></tr>
<tr><td>

The bottom bar is five more than the top bar</td><td>Additive Comparison</td><td>The relationship between two amounts comparing how much more or how much less one is compared to the other</td></tr>
<tr><td><table><tr><th>Meters</th><th>Centimeters</th></tr><tr><td>1</td><td>100</td></tr><tr><td>2</td><td>200</td></tr><tr><td>3</td><td>300</td></tr><tr><td>4</td><td>?</td></tr><tr><td>5</td><td>500</td></tr><tr><td>6</td><td>600</td></tr></table></td><td>Unknown</td><td>A number we do not know</td></tr>
</table>

<table>
<tr><th>Visual</th><th>Term</th><th>Definition</th></tr>
<tr><td></td><td>Hour</td><td>A unit of time that is equivalent to sixty minutes. One day is equivalent to twenty-four hours</td></tr>
<tr><td></td><td>Minute</td><td>A unit of time that is equivalent to sixty seconds. One hour is equivalent to sixty minutes</td></tr>
<tr><td></td><td>Elapsed Time</td><td>The amount of time something takes</td></tr>
<tr><td><table><tr><th>Starting Time</th><th>Elapsed Time</th><th>End Time</th></tr><tr><td>5:15</td><td>1 hour</td><td>6:15</td></tr><tr><td>6:15</td><td>50 minutes</td><td>7:05</td></tr></table></td><td>Elapsed Time- Three Column Table</td><td>A table that has three columns used to organize information</td></tr>
<tr><td></td><td>Elapsed Time - Timeline</td><td>A line that is labeled and used to calculate elapsed time.</td></tr>
<tr><td></td><td>Data</td><td>facts about something that can be used for calculating and making decisions</td></tr>
<tr><td></td><td>Numerical Data</td><td>Data that uses numbers instead of words</td></tr>
<tr><td></td><td>Categorical data</td><td>Data that uses categories instead of numbers</td></tr>
</table>

<table>
<tr><th>Visual</th><th>Term</th><th>Definition</th></tr>
<tr><td></td><td>Survey</td><td>Data that is collected by having people answer questions</td></tr>
<tr><td>Frequency Table
<table>
<tr><th>Category</th><th>Tally Marks</th><th>Frequency</th></tr>
<tr><td>Pepperoni</td><td>|||</td><td>3</td></tr>
<tr><td>Sausage</td><td>||</td><td>2</td></tr>
<tr><td>Onion</td><td>||||</td><td>4</td></tr>
</table></td><td>Frequency Table</td><td>A three-column table that lists items and shows the number of times each occurs by using tally marks and numbers</td></tr>
<tr><td>
</td><td>Bar Graph</td><td>a graph that represents data using rectangular columns to show the total amount for each category</td></tr>
<tr><td></td><td>Line Plot</td><td>a graph that displays data using X’s above a number line to show the frequency for each value</td></tr>
<tr><td><table>
<tr><th>Meters</th><th>Centimeters</th></tr>
<tr><td>1</td><td>100</td></tr>
<tr><td>2</td><td>200</td></tr>
<tr><td>3</td><td>300</td></tr>
<tr><td>4</td><td>400</td></tr>
<tr><td>5</td><td>500</td></tr>
<tr><td>6</td><td>600</td></tr>
</table></td><td>Table</td><td>A graph that displays data in an organized way</td></tr>
<tr><td>
</td><td>Chart</td><td>A picture representing data. Often in the form of a bar graph or pie chart</td></tr>
</table>

Visual	Term	Definition
3, 6, 12, 24, 48, ___ ___ ___ What are the next three numbers in the pattern?	**Number Pattern**	A set of numbers that changes in a consistent pattern or sequence
	**Shape Pattern**	A set of shapes that changes in a consistent pattern or sequence

Learning in Action: Grade Level Skills

Examples of Grade Level Skills

Example 1 -Read and write multi-digit whole numbers up to and including 100,000 using numerals, number names, and expanded form.   Compare two multi-digit numbers up to and including 100,000 based on the values of the digits in each place, using >, =, and < symbols to record the results of comparisons.

Problem: Juan will graduate from high school when he is one hundred fifty-seven thousand, sixty-eight hours old. Geoff will graduate from high school when he is 100,000 + 60,000 +100 + 80 + 4 hours old. Write both numbers in standard form and compare them using <, >, or =.

Solve: This question requires students to rewrite numbers from word and expanded form into standard form and then to use their understanding of place value to compare them. Both numbers have a value of zero in one of the places. In order to rewrite the number from word to standard form students should first write the value in the thousands period as 157. The word thousand is replaced with a comma to separate the thousands and ones period. Then they need to recognize that the hundreds place needs a zero and will fill the ones period with the digits 068 giving a final value of 157,068. Stacking and adding the values is a good way to change expanded form into standard form. See the example below.

$$\begin{array}{r} \mathbf{100{,}000} \\ \mathbf{60{,}000} \\ \mathbf{100} \\ \mathbf{80} \\ \underline{+\quad \mathbf{4}} \\ \mathbf{160{,}184} \end{array}$$

After rewriting the numbers into standard form students need to use their understanding of place value to compare. If they begin in the ones place, they will see that 8 is greater than 4 and incorrectly respond. In order to compare two numbers, you begin in the greatest place value. Both numbers have 100,000 in the hundred thousands place. They should then look in the ten thousands place and will see that 50,000 is less than 60,000 and can then write the final answer showing that 157,068 is less than 160,184.

Answer: 157,068 < 160,184

Example 2 - Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.

Problem: Li has 24 cookies. Kamala has 8 cookies. How many times more cookies does Li have than Kamala?

Solve: This question is asking **how many *times* more**, which means you use multiplication or division to set up and solve the problem. It requires you to understand that division and multiplication are inverse operations and that you need a variable for the unknown amount. A variable can be a letter or a symbol. In this example we will use the letter C to represent the unknown value. You would write the equation C x 8 = 24, but in order to solve this problem you would rewrite it as a division equation: 24 ÷ 8 = C

Answer: C = 3, so Li has 3 times as many cookies as Kamala

Example 3 - Explain that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right, up to 100,000.

Problem: Lea raked 4,815 leaves into a pile. Her friend Zoe raked 8,514 leaves into a pile. Which digit in Zoe's number has a value that is ten times greater than a digit in Lea's number?

Solve: This question is helping students understand the basic concept of our Base 10 math system. When you use the same digit and move it to the next highest place the value is ten times greater. The most basic example is when you put a 1 in the ones place it has a value of 1. A 1 in the tens place is ten times greater in value. When you move the 1 from the tens place to the hundreds place the value is again ten times greater. In the problem Lea has an 8 in the hundreds place and Zoe has an 8 in the thousands place. Because 800 x 10 = 8,000 the answer is 8. The digit is the same digit and it moves to the next highest place which are the two things students need to recognize. It helps to see this by stacking the numbers. See below.

Zoe: **8**,514
Lea: 4,**8**15

Students may make the mistake of looking for just the same digit in the same place which you see in the tens place. They may also just look for a digit that is the same, but not know that the value is only ten times greater when it is the next highest place. This can be seen with the 4 and the 5.

Answer: 8

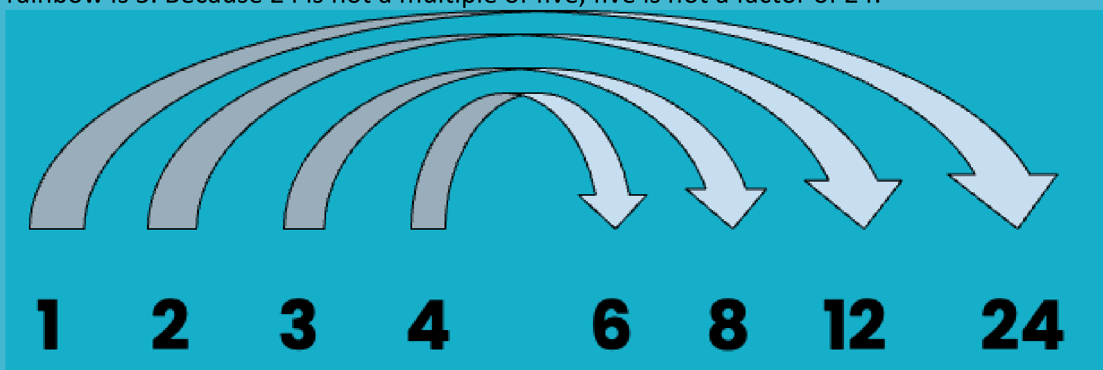
Example 4 - Find all factor pairs for whole numbers up to and including 50 to:

- **Recognize that a whole number is a multiple of each of its factors.**
- **Determine whether a given whole number is a multiple of a given one-digit number.**

Problem: What are all the factor pairs for 24?

Solve: Factor pairs are any two whole numbers that can be multiplied to equal 24. Every factor of 24 has 24 as a multiple.

1. Every number has one as a factor, so you always begin with 1 and the number you are given, in this case it is 24.
2. Using a factor rainbow is a strategy you can use. The only value that is left as you close the rainbow is 5. Because 24 is not a multiple of five, five is not a factor of 24.



3. To check your work you can write multiples of each factor to see if 24 is a multiple
   Multiples of 2: 2 , 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, **24**
   Multiples of 3: 3, 6, 9, 12, 15, 18, 21, **24**
   Multiples of 4: 4, 8, 12, 16, 20, **24**
   Multiples of 6: 6, 12, 18, **24**
   Multiples of 8: 8, 16, **24**
   Multiples of 12: 12, **24**

Answer: The number 24 has four factor pairs.
They are 1 x 24, 2 x 12, 3 x 8 and 4 x 6

Example 5 - Determine if the number is prime or composite.

Problem: There are five players on a basketball team. Their jersey numbers are 1, 2, 6, 9, and 12. Which jersey numbers are prime numbers?

Solve: Composite numbers have three or more different factors, and prime numbers have two different factors. Find the factor pairs for each number and decide if it is prime or composite.

1 x 1 = 1 - factors of 1: 1

1x 2 = 2 - factors of 2: 1, 2

1 x 6 = 6 and 2 x 3 = 6 - factors of 6: 1, 2, 3, 6

1 x 9 = 9 and 3 x 3 = 9 - factors of 9: 1, 3, 9

1 x 12 = 12, 2 x 6 = 12, 3 x 4 = 12 - factors of 12: 1, 2, 3, 4, 6, 12

Answer:
One only has one factor, so it is **NOT prime or composite**.

Two has two different factors, so it is prime. Two is the only even prime number
Six has four different factors so it is composite

Nine has three different factors. You don't count the three twice because it is the same value, but composite numbers only have to have three or more different factors, which means nine is composite.

Twelve has six factors so it is composite

Example 6 -Multiply a whole number of up to three digits by a one-digit whole number, and multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations. Use models to make connections and develop the algorithm.

Problem: Use two different ways to find the product of 35 x 12?
Solve: Open Array Model

	30 +	**5**
10 +	30 x 10 = **300**	5 x 10 = **50**
2	30 x 2 = **60**	5 x 2 = **10**

$$\begin{array}{r} 300 \\ 50 \\ 60 \\ +\underline{10} \\ \mathbf{420} \end{array}$$

$$\boxed{\mathbf{35 \times 12 = 420}}$$

Solve: Distributive Property

$$(30 + 5) \times (10 + 2)$$

$$
\begin{aligned}
30 \times 10 &= 300 \\
30 \times 2 &= 60 \\
5 \times 10 &= 50 \\
5 \times 2 &= \underline{10} \\
\\
\mathbf{35 \times 12} &= \mathbf{420}
\end{aligned}
$$

Answer: 35 x 12 was broken into the four equations that it represents in order to find the product of 420.

Example 7 -Find whole-number quotients and remainders with up to three-digit dividends and one-digit divisors with place value understanding using rectangular arrays, area models, repeated subtraction, partial quotients, properties of operations, and/or the relationship between multiplication and division.

Problem: Find the quotient for 336 ÷ 2 using two different strategies.

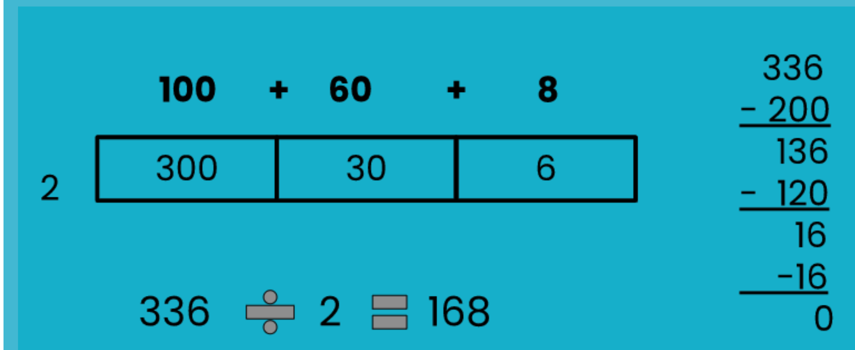
Solve: Partial Quotients

$336 \div 2 =$

$$
\begin{array}{r|l}
2 \overline{)336} & \\
\underline{200} & \times \mathbf{100} \\
136 & \\
\underline{120} & \times \mathbf{60} \\
16 & \\
\underline{16} & \times \mathbf{8} \\
0 &
\end{array}
$$

$\mathbf{336 \div 2 = 168}$

Solve: Area Model



Answer: Three hundred thirty-six divided by two was solved by using values that were easily divisible by the divisor and moving the remaining amount to the next lower place in the dividend and adding it to what is already there. By using the value of each digit in the dividend students are able to understand what is happening in the division process.

Example 8 - Interpret remainders in word problems.

Problem: Mr. Sanchez is taking his class on a field trip. He has37 students and one car can hold a total of 5 students.

Solve: This problem requires you to divide. Students need to look for keywords in questions to help them understand how to interpret and use the remainder.

37	÷	5	=	7	r 2
Total number of students		One full car		Total cars full of students	Students

Three possible questions with answers.:

*How many cars will he need in order to bring **ALL** of the students on the field trip?*

He will need 8 cars in order to bring all of the students.
In this case he needs to add one to the quotient to include the remainder. Don't add the remainder itself, just increase the quotient by one. You are adding a car to include the remaining students.

*How many cars will be **FULL**?*

There will be 7 full cars. In this case he ignores the remainder and is only concerned with to total full cars

*How many students will be in the car that is **NOT full?***

There will be 2 students in the car that is not full. In this case the remainder is the answer.

Example 9 - Classify quadrilaterals based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.

Problem: Tatyana drew a parallelogram, a rectangle, a trapezoid and a square. Which shape always has four perpendicular intersections, two pairs of parallel sides, and all sides are congruent?

Solve: In order to solve this students need to know the meaning of parallel, perpendicular and congruent. Parallel lines are the same distance apart and never intersect. Perpendicular lines intersect to form right angles, and congruent means the same size and shape. They can rule out a parallelogram because it is defined as having two pairs of parallel sides which means a square, rectangle, and rhombus are parallelograms. A rectangle does have four perpendicular intersections and opposite sides are parallel, but all sides don't have to be congruent. A trapezoid has only one pair of parallel sides. A square is the same as a rectangle, but it has the added qualifier that all sides are congruent, or the same length.

Answer: Square

Example 10 - Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Problem: Chen is going to create a rectangular shaped garden with a total area of 24 square feet. He will need to build a fence around it. If it costs one dollar for every foot of fence, what length and width should he make his garden in order to spend the least amount of money?

Solution: Students need to understand the formula for area is length times width. In order to determine every possible set of dimensions they will need to use their understanding of factors and find all factor pairs that have a product of 24. The possible factors are 1 x 24, 2 x 12, 3 x 8, and 4 x 6. Now they need to determine the total perimeter using each set of dimensions by finding the sum of all four sides.
The dimensions, perimeter and total cost are below:

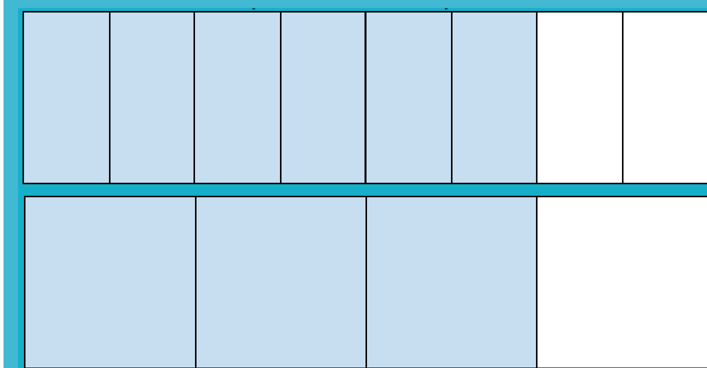
Dimensions	Perimeter	Total Cost
1 x 24	1 + 24 + 1 + 24 = 50 ft	$50
2 x 12	2 + 12 + 2 + 12 = 28 ft	$28
3 x 8	3 + 8 + 3 + 8 = 22 ft	$22
4 x 6	4 + 6 + 4 + 6 = 20 ft	$20

Answer:
The length and width that would be least expensive are 4 x 6 because the total cost would be $20.

Example 11 -Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. (Denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100)

Problem: Malakai and Christopher both bought the same size candy bar. Malakai's candy bar was equally divided into 8 pieces, and he ate the same total amount as Christopher. Christopher's candy bar was equally divided into 4 pieces, and he ate 3 of them. How many pieces would Malakai have to eat in order to eat an equivalent amount as Christopher?

Solution: Malakai ate part of the 8 pieces of his candy bar. In order to determine the equivalent amount he ate compared to Christopher, who ate 3/4, a visual model and an equation can be used.



Six-eighths of the candy bar was eaten by Malaqui

Three-fourths of the candy bar was eaten by Christopher

$$\frac{3}{4} = \frac{x}{8}$$

Because you multiply 4 x 2 to get the equivalent denominator of 8 you must multiply numerator by the same amount to find an equivalent amount. The numerator also is multiplied by two which gives us the conclusion that 3/4 is equivalent to 6/8

Answer: 6

Example 12 - Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by using benchmark fractions 0, ½, and a whole.

Problem: Jennifer ate 2/4 of her ice cream bar; Andy ate 3/8 of his ice cream bar, and Ian ate 6/10 of his ice cream bar. Each ice cream bar was the same total size. List the amounts eaten from least to greatest.

Solution: Each fraction can be compared to ½ to determine if it is less than, equivalent to, or greater than ½. This benchmark fraction can be used to order them. The numerator represents the parts and the denominator represents the total parts in the whole.

- Jennifer ate 2 of the 4 total parts that make up the whole. Two is half of four, so Jennifer ate an equivalent to ½.
- Andy ate 3 of the 8 total parts that make up the whole.
  Four is half of eight, so he ate less than ½.
- Ian ate 6 of the 10 total parts that make up the whole.
  Five is half of ten, so Ian ate more than ½.

Answer: 3/8, 2/4, 6/10

Example 13 - Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. 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 by comparing common numerator or common denominators.

Problem: Compare 3/8 and 2/12 using a common denominator.

Solution: Because both 3/8 and 2/12 are both less than ½ students will need to find equivalent fractions for both fractions by finding a common denominator. A common denominator can be found by using any common multiple of the two denominators.
Multiples of 8: 8, 16, **24**, 32, 40, **48**
Multiples of 12: 12, **24**, 36 **48**

The least common multiple is 24, so we will find equivalent fractions (shown in example 11) by using 24 as our common denominator.

$$\frac{3\,(\times 3)}{8\,(\times 3)} = \frac{9}{24}$$

$$\frac{2\,(\times 2)}{12\,(\times 2)} = \frac{4}{24}$$

Because 9/24 is greater than 4/24 we know that their equivalents will have the same comparison, so 3/8 is greater than 2/12

Answer: Because 9/24 > 4/24 we know that 3/8 > 2/12

Example 14 - Compare two decimals to hundredths by reasoning about their size using area and length models, and recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole.

Problem: Desi measured how much her plant grew each week for three weeks. The first week it grew 0.35 inches, the second week it grew 0.9 inches and the third week it grew 0.17 inches. Which week did it grow the most?

Solution: Students need to use their understanding of equivalent fractions and transfer that to place value to respond to this question. A common error is to look at 0.9, 0.17, and 0.35 and think of them as whole numbers. That would result in students putting 0.35 as the answer. The first place to the right of the decimal is the tenths place. Therefore, the value 0.9 is equivalent to the fraction 9/10. A number that is two places to the right of the decimal is in the hundredths place, so 0.17 is equivalent to 17/100 and 0.35 is equivalent to 35/100.

Using that understanding and the understanding of equivalent fractions students can mathematically prove that 9/10 is equivalent to 90/100 in the same way that 9 dimes and 90 pennies are equivalent in value. With this foundation they can change 0.9 to 0.90 and compare all three values using a common place.

Answer: The greatest amount of growth occurred during the second week when it grew 0.9 inches

Resources

Online resources to allow you to support your child's learning.

- Math Games
- Math Learning Center
- Khan Academy
- Study Jams
- Math Antics
- Open Up Resources K-5 Math - Student Resources
- Math Chimp
- 4th grade math resource IXL
- Virtual Nerd - 4th grade
- You Cubed
- Virtual Manipulatives

At-Home Connections

Tell me how statements

- Tell me how you solved a problem in math class today
- Tell me how your teacher taught you to (insert skill here)
- Tell me about what you are learning in math class

- Tell me what is still confusing to you
- What are some jobs you think might require you to use addition and subtraction?
- Let's have a scavenger hunt to see if we can find word form and standard form on a label in our house, or in the grocery store!
- Use your place value chart and understanding of unit form to figure out how much money you would have if you earned 9 ten thousands + 2 thousands + 8 hundreds + 5 tens + 3 ones. What would you do with that much money?
- Tell me the largest/smallest number you can make using the digits 8, 5, 1, 9, 3, and 7
- Tell me the difference between factors and multiples. Find the area of your bedroom, or a tabletop and see if you can find all the factors that give you that area
- Tell me a strategy you use to find the factors of (any number between 1-50)
- Tell me what you understand about prime and composite numbers. How many numbers on a calendar with 31 days are prime numbers?
- What numbers that are less than 10 are prime numbers
- Is it possible for a number to not be prime or composite?
- Tell me two ways you can solve the multiplication problem 34 x 65. Measure our kitchen counter and tell me how many square feet it is.
- Tell me two strategies you can use to divide 128 pieces of candy up equally with yourself and three friends.
- Tell me what you are learning about interpreting remainders. If you invited 38 people to your birthday party and one pack of plates had 5 plates in it, how many full packs would you need to buy for everyone? How many leftover plates would you have? How many plates would be in the pack that is not full?
- How can you use ½ as a benchmark fraction to help you order and compare fractions? If you were running a race and got to pick a head start would you get a head start of 3/5, 1/3 , or 5/10?
- How do you use multiples to help you find common denominators and common numerators?
- If we had a race, I had a head start 5/6, your best friend had a head start of 11/12, and you had a head start 7/8 of the way down the track, who would be closer to the finish line? How do you know?
- How many different types of quadrilaterals always have two pairs of parallel sides? have four perpendicular intersections? Have both obtuse and acute angles? Can you find a road sign that is a square, a rectangle, and another that is a rhombus? What about a trapezoid?
- If you start school at 7:30 and stay there for 8 hours 45 minutes, what time would you get to come home?
- If you go to the store and buy a 2-liter bottle of soda, how many milliliters would it be? What about running a 10-kilometer race, how many meters would that be? Would your weight be a bigger number if you weighed yourself in kilograms, or grams?

Parent connections to course content

- What are some jobs you think might require you to use multiplication and division? Addition and subtraction?
- What are some real-life situations in which you might need to find out all the factor pairs in a number? For example, if you built a dog pen and wanted to use the least fencing with an area of 36 square feet, you would find all the factor pairs to find dimensions.
- If I were to buy twelve bottles of soda and each bottle had 32 ounces, how many total ounces of soda would I have? Can you solve it in more than one way?
- If I get the same total amount of soda, is it less expensive to buy a pack of 6 sodas that each cost $1.34 or 12 sodas that each cost 63 cents? How much money will I save by buying the less expensive pack?
- If you had 175 slices of pizza and one box could hold 7 slices, how many boxes would you need? Can you solve it in more than one way?
- How would you use your division skill that requires you to interpret remainders if you had a bag with 45 pieces of candy in it and wanted to share it equally with 7 people and yourself?
- Look at fractions in a recipe and find ways to determine which are greater or less than ½. Compare different fractional amounts by finding common denominators. Convert mixed numbers into improper fractions.
- Your soccer game starts at 10:30 Saturday morning. It will take 30 minutes to drive there, 25 minutes to get dressed, 25 minutes to eat breakfast, and 30 minutes to pack lunch. What time will we need to leave in order to get there on time? When should we leave if we want to arrive 20 minutes early?

Challenges to Anticipate

It is hard to watch our children struggle but this is an important part of the learning process. Be supportive and encouraging when struggles happen. It is proven that struggling can better develop a deeper understanding in math. Here are some videos that might help you and your child recognize how normal it is to struggle

"The Importance of Struggle"
Mind Boosting Videos

- Try the problem even if it is wrong. Remember that learning is a process and that mistakes help us better understand the problem.
- Ask your child to explain an example they understood to help build confidence. Explaining to you will help with their understanding.
- Try reversing roles and let your child be the teacher and you be the student. This will allow them to process their thinking out loud.
- Take a short break to come back to the problem with a clear head.

- Remind your child not to compare themselves to others. Everyone can learn math, but not everyone learns it at the same pace. Perseverance is the key to success
- Try finding a math game to make learning more fun! Use this link to help you find one that matches the math skill that your child is struggling with: Math Games
- Remind your child that grades don't measure intelligence, they measure understanding
- Students need to enter fourth grade with a solid mastery of single digit multiplication from 0 x 0 up to 9 x 9. You can use patterns to learn 75 of the 100 facts. For example, any number times zero is zero and any number times one equals the largest factor. With 2's facts you can use double addition facts, and with 5's facts you can easily skip count by five. Nines have some simple tricks that can be found online. After that there are only 15 total facts that need to be memorized with the understanding of the commutative property. Six times seven and seven times six both equal 42, so you don't have to memorize them separately. In fourth grade we don't instruct students and spend a lot of time practicing the facts, we do use them on almost everything though.
    - Without the mastery of facts your child will struggle with area, factors, multiples, multiplication of 2 digit by 2-digit numbers and 1 digit by up to 3 digit numbers, division, equivalent fractions, converting fractions, multiplying fractions, and multiplicative comparison just to name the big ones. It takes less time to practice and learn the facts than it does to complete assignments if you don't know them.
- Remember that your child will learn how math works before they learn the algorithm. In fourth grade they will use area models to learn division and multiplication, which is not what you learned. Please remember to be supportive of these strategies. In fifth grade they learn the algorithms.
- Most of fourth grade math instruction is centered around fractions. In fact, about ⅓ of fourth grade math standards are about fractions. The most important foundational skill is understanding how fractions numerators represent parts and how the denominator represents a whole. Thinking of fractions as one whole unit broken into parts of a region or parts of a set will allow us to develop skills for fractions that are greater than one whole. A good way to talk about fractions is to use food. Ask questions like, what fraction of the pizza did you eat, what fraction of the candy in a pack is red pieces, what fraction of ingredients goes into a recipe?
- Try to find examples of parallel and perpendicular lines, and acute, obtuse, and right angles in the real world. Fourth grade geometry requires students to know shapes by a description. For example, a shape has four perpendicular intersections and two sets of parallel lines with opposite sides being congruent. That is a lot of vocabulary! The more comfortable they are with the vocabulary the easier geometry will be. Oh, and the shape, it's a rectangle. Creating art on grid paper with instructions that require an understanding of geometric vocabulary can also be a fun way to learn.

Communicating with Your Child's Teacher

Still feeling stuck? Reach out to your child's teacher to discuss what you can do further your child's learning. Some questions that might guide your discussion:

- What resources would you suggest I use to support my child?
- Where do you see my child struggling? What can we do together to help?

- What should my child practice at home?
- What collective message can we send together to help my child learn?

Need Technical Help?
Reach out to your student's home school for technical assistance. Include the type of device (PC, Mac, Chromebook, etc.) and browser (Chrome, Firefox, Safari, etc.).

Citations:

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