south dakota
DEPARTMENT OF EDUCATION
Learning. Leadership. Service.

South Dakota Mathematics Standards Instructional Guide

Grades 3-5

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3rd Grade Mathematics Standards Instructional Guide

Numbers

Place Value

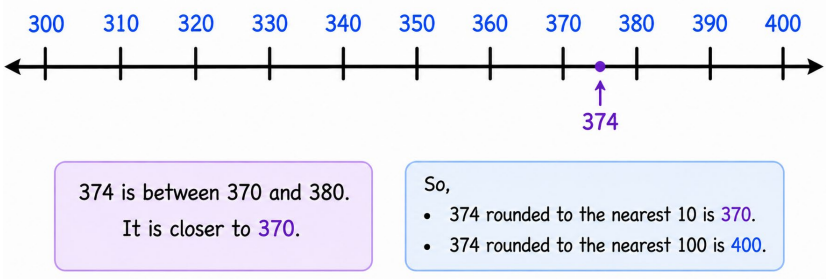
3.N.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

Instructional Notes:

- Learning focuses on understanding why a number rounds up or down, based on place value properties. Teachers may guide students to use place value charts and number lines to locate a target number, identify the two neighboring benchmark tens or hundreds, and then visually locate the closest landmark number. Rounding is introduced here.
- Students should recognize that 374 is made of 3 hundreds, 7 tens, and 4 ones, and that it sits in the space between 300 and 400. To the nearest ten, 374 is closest to 370. To the nearest hundred, 374 is closest to 400.

Example:

- Is 374 closer to 370 or 380? Is 374 closer to 300 or 400?



Glossary: place value

3.N.2 Compose and decompose four-digit numbers into thousands, hundreds, tens, and ones.

Instructional Notes:

- Learning focuses on understanding that the value for each digit in a number is based on the position it holds. In the number 374, the 3 represents 3 hundreds, the 7 represents 7 tens, and the 4 represents 4 ones. In the number 3745, the 3 represents 3 thousands, the 7 represents 7 hundreds, the 4 represents 4 tens, and the 5 represents 5 ones.

Examples:

- $3000 + 700 + 40 + 5 = 3745$
- $374 = 300 + 70 + 4$

Glossary: compose, decompose

3.N.3 Read and write whole numbers up to 10,000 using standard form, word form, and expanded form.

Instructional Notes:

- Learning focuses on reading and writing numbers up to 10,000 in three different ways: using digits (standard form), using words (word form), and showing place value for each digit (expanded form).

Examples:

- Standard form: 9741
- Word form: Nine thousand, seven hundred, forty-one
- Expanded form: $9741 = 9000 + 700 + 40 + 1$

Glossary: standard form, word form, expanded form

Operations and Algebraic Thinking

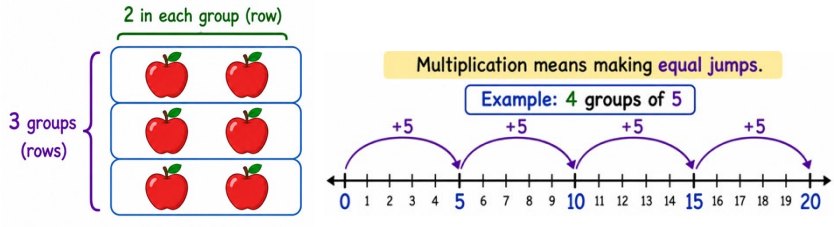
Number Operations

3.OA.1 Use visual models (e.g., arrays, equal groups, number lines) to explain and justify multiplication as combining equal groups.

Instructional Notes:

- Learning focuses on drawing and explaining physical representations for multiplication. Consider using equal groups of objects, rows and columns in arrays, and/or equal hops on a number line to represent multiplication. The goal is to demonstrate that multiplication is combining equal groups (repeated addition).
- Note: Using the standard form for multiplication alone $(3 \times 2 = 6)$, is not sufficient for this standard. A visual is required.

Example:



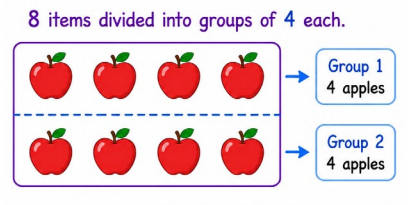
Glossary: visual model

3.OA.2 Use visual models (e.g., arrays, equal groups, number lines) to explain and justify division as separating into equal groups.

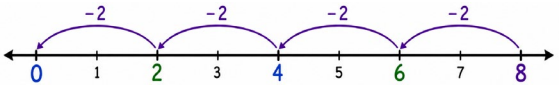
Instructional Notes:

- Learning focuses on physically or visually partitioning a given amount into a set number of equal-sized groups (e.g., rows, backward jumps on a number line) to show how division either separates a total into a target number of groups or measures the total into equal sized parts (repeated subtraction).
- Note: Using the standard form for division alone $(8 \div 2 = 4)$, is not sufficient for this standard. A visual is required.

Example:



We can use equal backward jumps to show division as separating into equal groups.



Glossary: visual model

3.OA.3 Solve word problems using multiplication and division within 100 using drawings and equations with a symbol for the unknown quantities.

Instructional Notes:

- Learning focuses on reading real-world math stories and using drawings and equations with a mystery symbol (like a question mark or a letter) to solve for the missing number.
- Teachers should emphasize that the unknown may be in any position of the equation. Encourage students to look for key words that provide clues about which operation to use.

Examples:

- Jack plays 5 games at the arcade. He wins 2 tickets from each game. How many tickets does he have in all? $5 \times 2 =$
- Jack has 10 arcade tickets. Each prize costs 2 tickets. How many prizes can he buy? $2 \times \quad = 10 \; OR \; 10 \div 2 =$
- Jack wins 10 arcade tickets and wants to split them equally among 5 different prize buckets. How many tickets will he put in each bucket? $\times 2 = 10 \; OR \; 10 \div \quad = 2$

Glossary: none

3.OA.4 Determine the unknown whole number in a multiplication or division equation relating to three whole numbers.

Instructional Notes:

- Learning focuses on finding the missing number in any position of a multiplication or division equation to make the math sentence true.

Examples:

- $5 \times \quad = 10 \; OR \; 10 \div 5 =$
- $\quad \times 2 = 10 \; OR \; 10 \div \quad = 2$

Glossary: equation

3.OA.5 Apply properties of operations as strategies to multiply and divide.

Instructional Notes:

- Learning focuses on understanding how properties of operations (commutative, associative, distributive) work on multiplication and division. Encourage students to use these properties as strategic tools.

- Learning focuses on reversing, regrouping, or breaking apart numbers to help students think flexibly about multiplication and division thus making challenging problems simpler to solve.
- Teachers should model and encourage students to use appropriate vocabulary (commutative, associative, distributive) when discussing these properties.

Examples:

- Commutative property: $4 \times 9 = 9 \times 4$
- Associative property: $(2 \times 3) \times 4 = 2 \times (3 \times 4)$
- Distributive property:

  7×8 *is the same as*
  $7 \times (5 + 3)$ *which is the same as*
  $(7 \times 5) + (7 \times 3)$.

  This is an example of subgrouping 8 into $3 + 5$ and then multiplying each subgroup by 7.

Glossary: none

3.OA.6 Understand that multiplication and division are inverse operations.

Instructional Notes:

- Learning focuses on understanding how multiplication and division are opposite operations (i.e., one operation can undo the other). Teachers are encouraged to use the same set of numbers (fact families) to work backward and forward.

Example:

- $3 \times 4 = 12 \rightarrow 12 \div 4 = 3$

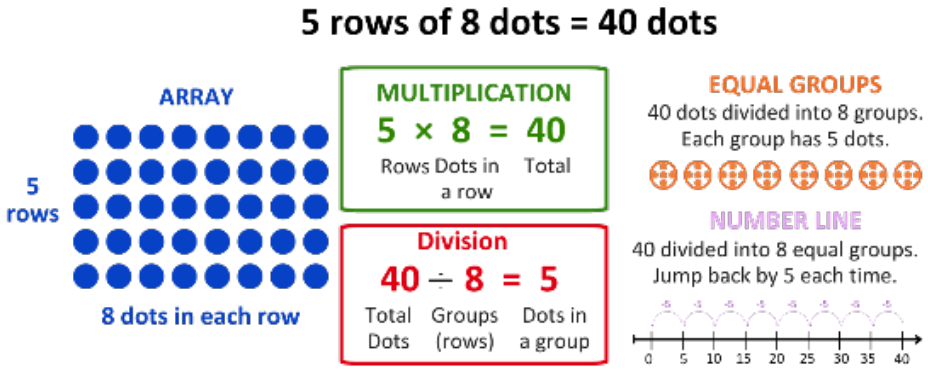
Glossary: inverse operations

3.OA.7 Demonstrate understanding of multiplication and division within 100 by using arrays, equal groups, and number lines to explain the relationship between the two operations.

Instructional Notes:

- Learning focuses on using a visual model to write both multiplication and division equations, thus proving that division acts as the inverse operation of multiplication dividing the total (or product) into the original factors.

Example:



Glossary: array

3.OA.8 Demonstrate understanding of addition and multiplication problems using properties (commutative, associative, and identity).

Instructional Notes:

- Learning focuses on understanding that in addition and multiplication, order and grouping of the numbers in an equation will not change the sum or product.
- Teachers should consider using visuals and manipulatives (such as rotating arrays or counters) to show order and regrouping doesn't change the sum or product.

Examples:

- Commutative property: $3 + 5 = 5 + 3,\ 4 \times 6 = 6 \times 4$
- Associative property: $(2 + 5) + 7 = 2 + (5 + 7),\ (2 \times 3) \times 4 = 2 \times (3 \times 4)$
- Identity property: For addition, zero is the identity. For multiplication, one is the identity. $8 + 0 = 8, \quad 8 \times 1 = 8$

Glossary: commutative property, associative property, identity property

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3.OA.9 Solve two-step word problems using addition, subtraction, multiplication, and division using an equation with a symbol for the unknown quantity; Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Instructional Notes:

- Learning focuses on understanding that some problems require more than one step and more than one operation to find a solution.
- Learning focuses on reflecting on problem answers to determine if the answer makes sense using estimation strategies such as rounding.
- Teachers should encourage students to write equations that show each step and include a symbol for the unknown. Teachers should also help students recognize key words.

Examples:

- Emma has 4 bags with 6 marbles in each bag. She finds 7 more marbles on the rug. How many marbles does Emma have now?
  - $4 \times 6 =$
  - $\quad + 7 = Total\ marbles$

Glossary: equation

3.OA.10 Identify and explain arithmetic patterns.

Instructional Notes:

- Learning focuses on noticing patterns in addition and multiplication, such as how sums or products change in predictable ways, and describing those patterns using mathematical reasoning.
- Learning focuses on connecting patterns to properties of operations like commutative or associative property.

Examples:

- Observe that four times a number is always even and explain why four times a number can be decomposed into two equal addends.
- What do you notice about the products of 2, 3, and 6? How do the products of 6 relate to the products of 2 and 3?
    - 2: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
    - 3: 3, 6, 9, 12, 15, 18, 21, 24, 30
    - 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60

Glossary: arithmetic patterns

Fractions

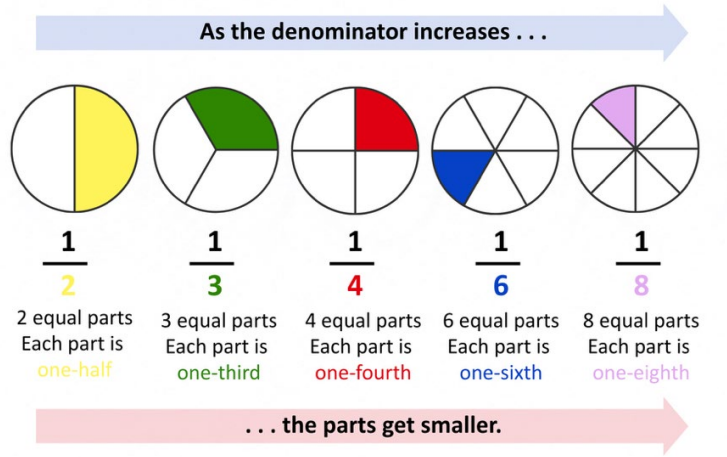
Fraction Foundation

3.F.1 Understand the denominator of a fraction represents the number of equal parts the whole is broken into.

Instructional Notes:

- Learning focuses on understanding that the denominator indicates the total number of equal-sized pieces a whole object or set is divided into.
- Teachers should emphasize the "larger" the denominator number, the "smaller" the size of each piece. It is recommended that students physically cut a whole strip of paper into equal parts to help them fully grasp how the number of parts affects part size.

Example:



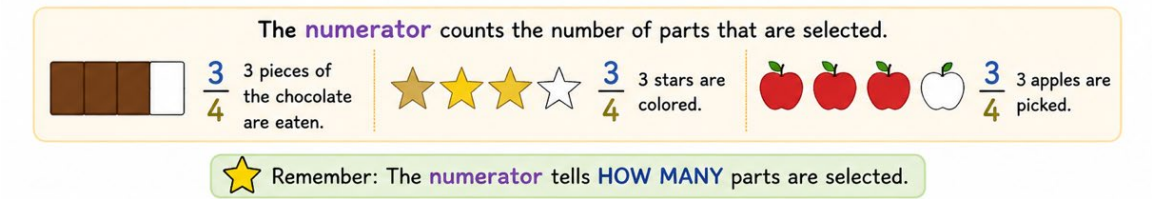
Glossary: denominator, fraction

3.F.2 Understand the numerator of a fraction represents the number of selected equal parts.

Instructional Notes:

- Learning focuses on understanding that the numerator counts the specific number of equal-sized pieces that are being considered (shaded, eaten, etc.) out of the whole.

Example:



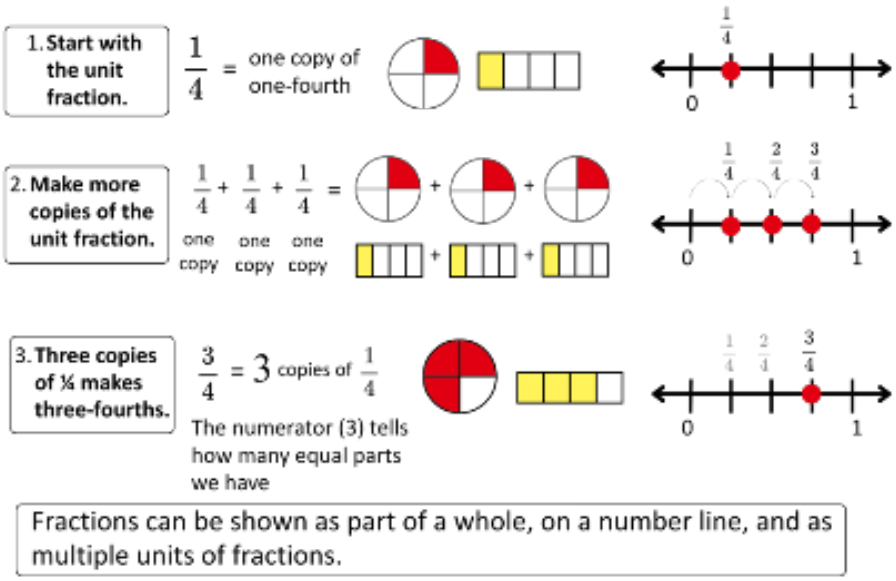
Glossary: numerator, fraction

3.F.3 Understand fractions as parts of a whole, as numbers on a number line, and as multiples of unit fractions.

Instructional Notes:

- Learning focuses on understanding that fractions can be represented in multiple ways.
- Teachers should consider starting with a unit fraction to emphasize that a fraction such as $\frac{3}{4}$ is three copies of $\frac{1}{4}$. This reinforces that the numerator represents a count of equal-sized pieces.

Examples:



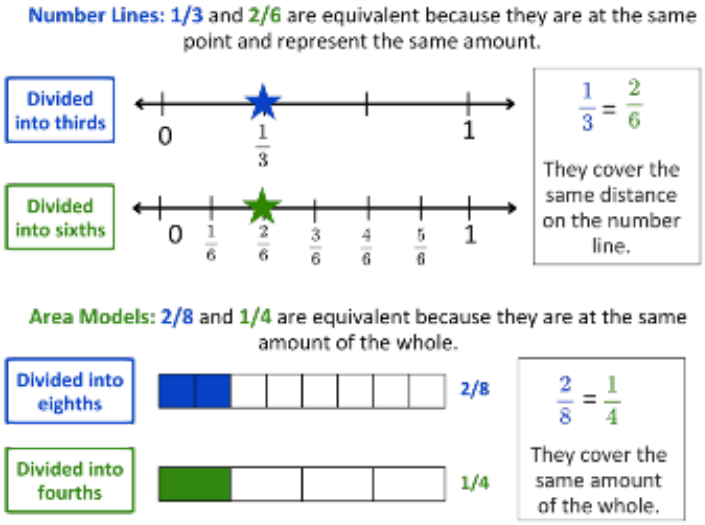
Glossary: fraction, unit fraction

3.F.4 Use number lines and area models to explain why two fractions are equivalent and how they represent the same quantity (include fractions with denominators 2, 3, 4, 6 and 8).

Instructional Notes:

- Learning focuses on using pictures and number lines to visually prove how two different fractions represent the exact same amount in a picture or space on a number line.

Examples:



Glossary: fraction

3.F.5 Recognize and generate equivalent fractions and explain why they are equivalent.

Instructional Notes:

- Learning focuses on creating equivalent fractions without the use of models. Teachers should emphasize that fractions can be equal even though they do not have the same numerator or denominator.

Example:

- $\frac{1}{2}$ and $\frac{2}{4}$ represent the same amount because each numerator is half as much as the denominator.

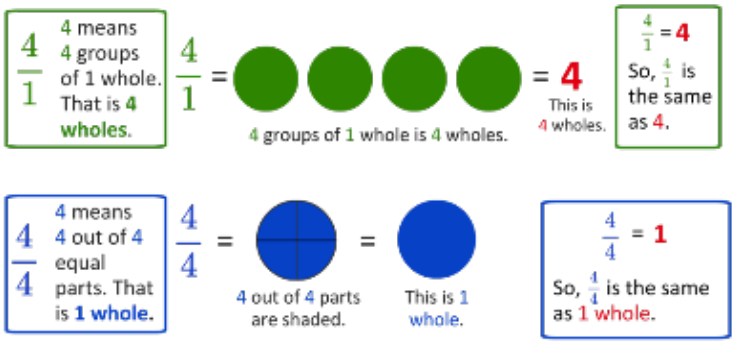
Glossary: equivalent, fraction

3.F.6 Express whole number fractions and recognize fractions that are equivalent to whole numbers.

Instructional Notes:

- Learning focuses on recognizing that a fraction can be equal to a whole number and written as a whole number, such as understanding $\frac{4}{4}$ is the same as 1 whole and $\frac{4}{1}$ is the same as 4.

Examples:



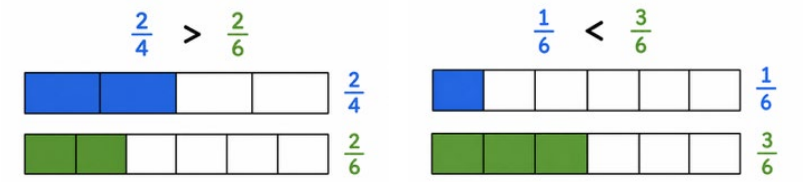
Glossary: fraction, equivalent

3.F.7 Compare two fractions with the same numerator or the same denominator using the symbols $<, >, =$.

Instructional Notes:

- Learning focuses on using the symbols $<, >, =$ to compare two fractions that share either the same numerator or the same denominator by reasoning about the size and number of the parts. Teachers should emphasize that a larger denominator does not necessarily mean a larger fraction.

Examples:



Glossary: fraction, numerator, denominator

Measurement

Measurement Concepts

3.M.1 Understand area to be the amount of space inside a two-dimensional shape.

Instructional Notes:

- Learning focuses on helping students understand that area is the flat space within a two-dimensional shape and know that it can be calculated in a variety of ways.
- Some students may confuse area with perimeter, standard 3.M.9. Teachers are encouraged to use images to help students understand that area represents a square unit and perimeter represents distance, a linear unit.
- Teaching standards 3.M.1 with 3.M.2 together may help students better understand the concept of area.

Example:



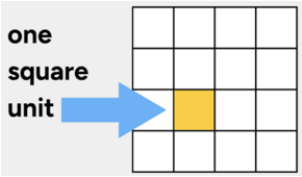
Glossary: area, two-dimensional

3.M.2 Understand a square unit to be a square that is 1 unit on each side and is used to measure area.

Instructional Notes:

- Learning focuses on helping students understand that a square unit is a square with sides that that measure one unit in length. Relating a square unit to a tile (manipulative) can help students grasp the concept of square unit.

Example:



Glossary: square unit, area

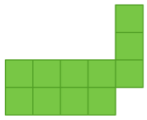
3.M.3 Understand a shape has an area of n square units if it can be covered with n unit squares without gaps or overlaps.

Instructional Notes:

- Learning focuses explicitly on enforcing the rule that tiles must touch edge-to-edge with zero gaps or overlaps to accurately measure the space. Teachers should emphasize that area can be found without equal rows and columns.
- Teachers should consider using "flawed" examples such as shapes covered with overlapping tiles or empty spaces and prompt students to explain why such examples give an incorrect measure of the area.
- Standards 3.M.3, 3.M.4, and 3.M.5 are closely related and should be taught in conjunction with one another.

Example:

- This figure has an area of 11 square units.



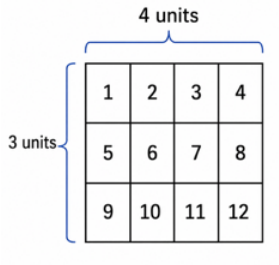
Glossary: square unit

3.M.4 Measure areas by square units.

Instructional Notes:

- Learning focuses on calculating the number of square units in a shape. Teachers should emphasize that there are a variety of methods to find area to include the standard area formula, $length\ x\ width$, and counting square units as noted in standard 3.M.3.

Example:



Area can be found by counting the number of square units or by multiplying the side lengths. $(A = l \times w)$

Glossary: square unit

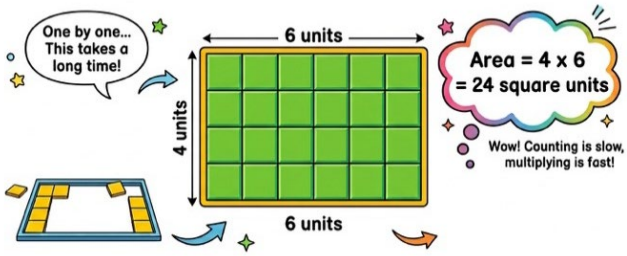
3.M.5 Use tiling and visual models to explain how multiplying side lengths of a rectangle represents its area.

Instructional Notes:

- Learning focuses on using square tiles and visual grids to show students that multiplying a rectangle's side lengths is an efficient way to find area.
- Teachers should gradually transition students from physically tiling the entire rectangle to looking at models where only the side lengths are marked.

Example:

- Ask students to fill a shape entirely with tiles. Once the shape is filled, student can count the total number of tiles to find the area. Prompt students to discuss how multiplying the number of tiles on two side lengths (length and width) can help them find the figure's area efficiently.



Glossary: tiling, visual model, rectangle, area

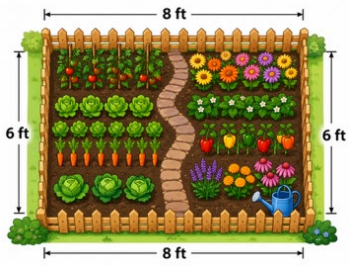
3.M.6 Solve word problems involving areas of rectangles.

Instructional Notes:

- Learning focuses on using multiplication strategies, multiplication facts, and the distributive property to solve real world and mathematical problems. Teachers should provide students with multiple opportunities to work with the distributive property.
- Standards 3.M.6 and 3.M.7 are closely related. Consider teaching them in conjunction with one another.

Example:

- Emma is planting a rectangular flower garden in her backyard. The garden is 8 feet long and 6 feet wide. What is the total area of her garden? ($length\ x\ width$: $8 \times 6 = 48\ square\ feet$)



Glossary: area, rectangle

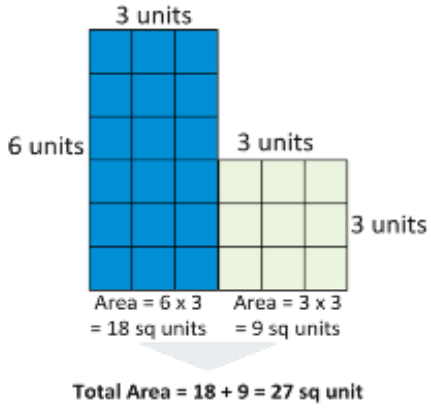
3.M.7 Use tiling with area models to represent the distributive property of multiplication.

Instructional Notes:

- Learning focuses on using tiled grids to show students how a rectangle's area can be split into two smaller rectangles. This will visually show the distributive property of multiplication.

Example:

- One recommended practice is to use the distributive property of multiplication to decompose *difficult* multiplication facts (e.g., 18×3 $becomes$ $(6 \times 3) + (3 \times 3)$) allowing students to visually connect the physical splitting of the grid to the algebraic distributive property.



Glossary: tiling, area model, distributive property of multiplication

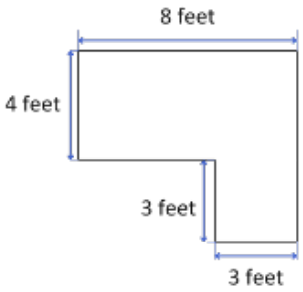
3.M.8 Understand that area can be found by adding the areas of non-overlapping rectangles and use this method to solve real-world problems.

Instructional Notes:

- Learning focuses on decomposing large, irregular figures into distinct, non-overlapping rectangles, finding the area of each individual rectangle, and adding those sums together.

Example:

- Susan is planting a garden in the shape shown. She wants to plant one flower in each square foot of the garden. How many flowers are needed to fill the garden?



$$8 \text{ feet} \times 4 \text{ feet} = 32 \text{ square feet}$$
$$3 \text{ feet} \times 3 \text{ feet} = 9 \text{ square feet}$$
$$32 + 9 = 41 \text{ square feet}$$

Susan needs 41 flowers to fill the garden.

Glossary: area, rectangle

3.M.9 Understand perimeter as the distance around a two-dimensional shape.

Instructional Notes:

- Learning focuses on understanding that perimeter is the total distance around the outside boundary of a two-dimensional shape and is found by adding all side lengths together.
- Students often confuse a shape's perimeter with a shape's area.

Example:



Glossary: perimeter, two-dimensional

3.M.10 Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding unknown side lengths, and creating rectangles with the same perimeter and different areas or with the same area and different perimeters.

Instructional Notes:

- Learning focuses on solving perimeter problems by calculating total boundaries, finding missing side lengths, and exploring how rectangles can share the same perimeter but have different areas, or share the same area but have different perimeters.
- Teachers are encouraged to provide students with a fixed number of square tiles and ask them to build various rectangles using all tiles (e.g., 1 x 12, 2 x 6, 3 x 4). Prompt students to discuss how the perimeter changes when the area remains the same. A similar activity can be done by keeping the perimeter constant and encouraging students to build various polygons (regular and irregular) with different areas.

Example:

- Leo is building a rectangular sandbox for his puppy, Rex. He wants the total distance around the sandbox (the perimeter) to be 18 feet. If the sandbox is 6 feet long, how wide should it be?



Glossary: perimeter, polygon, rectangle, area

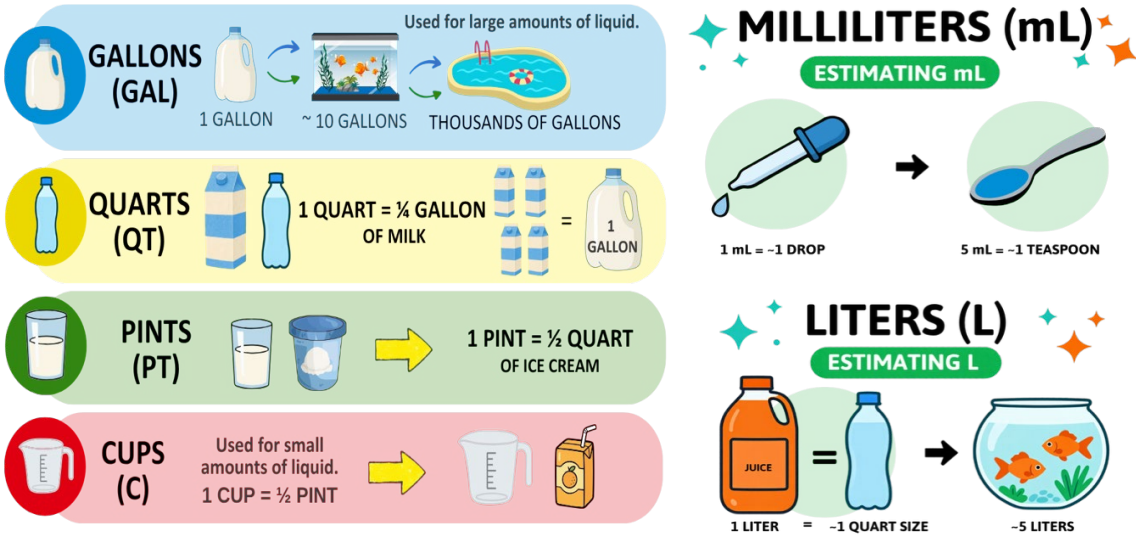
3.M.11 Measure and estimate liquid volumes using the U.S. Customary and metric system.

Instructional Notes:

- Learning focuses on using hands-on tools to estimate and measure liquid volume using both U.S. customary units (cups, pints, quarts, gallons) and metric units (milliliters, liters).
- Teachers are encouraged to provide opportunities for students to use everyday items to measure liquid volume and should help students build their estimation skills by associating everyday items with a given measure (e.g., gallon of milk, quart of paint, liter of soda).

Examples:

- Provide students with pictures of everyday items and ask them to determine the most appropriate unit of liquid measure with which to measure the item (cups or gallons, milliliters or liters, etc.).



Glossary: volume, U.S. customary, metric system

3.M.12 Measure and estimate masses of objects using the U.S. Customary and metric system.

Instructional Notes:

- Learning focuses on having students use scales to estimate and measure the weight/mass of everyday objects (e.g., pencils, books, box of tissue, etc.) using both U.S. customary units (ounces, pounds) and metric units (grams, kilograms).

Example:

- Provide students with pictures of everyday items and ask them to determine the most appropriate mass unit (e.g., gram or kilogram, ounce or pound). Examples might include a candy bar, a school chair, a dog, or a can of soda.

Glossary: mass, U.S. customary, metric system

3.M.13 Solve one-step addition, subtraction, multiplication, and division word problems involving masses or volumes in the same units.

Instructional Notes:

- Learning focuses on using all four basic operations (addition, subtraction, multiplication, division) to solve real-world, single-step word problems that involve measurements of mass or volume within the same measurement system (U.S. customary or metric system). This is an opportunity for students to apply previously learned computation skills.

Example:

- A science teacher has a container with 45 grams of sand. She wants to divide the sand equally among 5 small plastic bowls for a classroom experiment. How many grams of sand will go into each bowl?

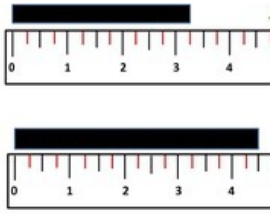
Glossary: mass, volume

3.M.14 Measure lengths using rulers to halves and fourths of an inch**.**

Instructional Notes:

- Learning focuses on using a ruler to accurately measure the length of various objects to the nearest half and fourth of an inch. Worth Noting: It is helpful to use one style/model of ruler making sure the zero is clearly marked.
- It may be helpful to teach students to count the fractional intervals (the "spaces" traveled, ¼, ½, ¾) starting from zero rather than just counting the tick marks. This helps to prevent common alignment and measurement errors.

Examples:



Glossary: length, halves, fourths

Time and Money

3.M.15 Tell and write time to the nearest minute using an analog and digital clock.

Instructional Notes:

- Learning focuses on the continuation of second grade standard 2.M.7 (telling time to the 5-minute). Teachers should build upon this prior knowledge when working to the minute.

Examples:

- Provide pictures of analog and digital clocks and ask students to tell and write the time to the nearest minute.





Glossary: none

3.M.16 When solving word problems add, subtract, multiply and divide time to the minute.

Instructional Notes:

- Learning focuses on solving real-world word problems by adding, subtracting, multiplying, and dividing intervals of time to the nearest minute.

Example:

- Aaron is baking 4 batches of chocolate chip cookies for his class. Each batch of cookies takes 12 minutes to bake in the oven. How many minutes in total will it take Leo to bake all 4 batches of cookies?

Glossary: none

3.M.17 Determine the value of a collection of U.S. coins and bills up to $100.00 using decimal notation.

Instructional Notes:

- Learning focuses on extending standards 2.M.10 and 2.M.11, which introduced counting coins and determining their value within simple addition problems. This standard focuses on using larger amounts (up to $100.00), incorporates decimal notation, and expects the use of both addition and subtraction to solve everyday problems.

Example:

- Maya wants to buy a new board game that costs $25.00. She looks inside her piggy bank and finds the following money: 1 ten-dollar bill, 2 five-dollar bills, 3 quarters, 2 dimes, 4 pennies. How much money does Maya have in total? Does she have enough money to buy the board game? Please explain your answer.

Glossary: decimal notation

Data

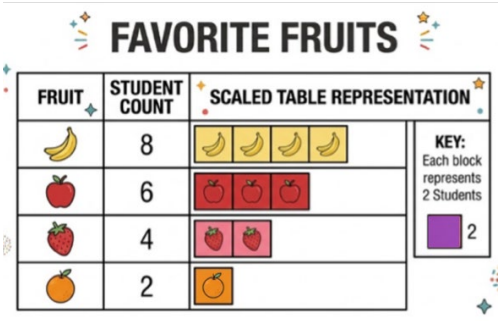
3.M.18 Create a scaled table, bar graph, circle graph, and line graph to represent a given set of data.

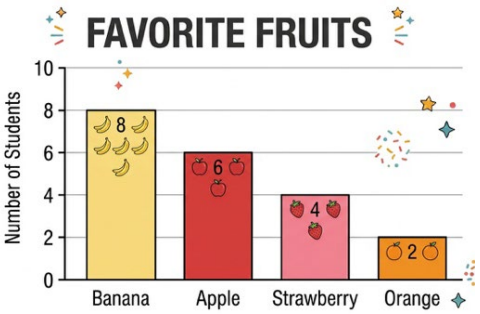
Instructional Notes:

- Learning focuses on representing and organizing data by creating scaled tables, bar graphs, circle graphs, and line graphs.

Examples:

- Ms. Lopez surveyed her 3rd-grade class to find out their favorite fruits. Here is the data she collected:
  Banana: 8 students, Apple: 6 students, Strawberry: 4 students, Orange: 2 students
  Display this data in more than one way.





Glossary: scaled table, bar graph, circle graph, line graph, data

---

3.M.19 Interpret and analyze one and two-step data problems with scaled tables, bar graphs, circle graphs, and line graphs.

Instructional Notes:

- Learning focuses on reading and interpreting graphs while incorporating multistep word problems. Teachers are encouraged to emphasize the connection to standard 3.OA.9 regarding multistep story problems.

Example:

- Mr. Harrison owns a toy store. He made a bar graph to show the number of board games, puzzles, and action figures he has in stock. Use the graph to answer the following questions:
    - How many puzzles and action figures does Mr. Harrison have in total?
    - If Mr. Harrison sells 5 of his board games, how many board games will he have left?



Glossary: scaled table, bar graph, circle graph, line graph

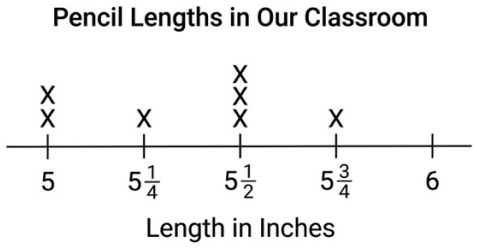
3.M.20 Make a line plot using horizontal scale marked off in whole numbers, halves, or quarters.

Instructional Notes:

- Learning focuses on using fractional measures as specific as a quarter of an inch for organizing and displaying data. This standard builds on standard 3.M.14 (using a ruler), and teachers should revisit this skill as students create their own line plots.

Example:

- Max measured the lengths of some used pencils in his classroom to the nearest quarter of an inch. Here are his measurements:
  5 inches, 5 ½ inches, 5 ¼ inches, 5 inches, 5 ½ inches, 5 ¾ inches, 5 ½ inches.
  Create a line plot to show the lengths of the pencils. Remember to label your scale with quarter inches and put an X for each pencil.



Glossary: line plot, halves, quarters

Geometry

Shapes

3.G.1 Understand that shapes in different categories may share attributes and can define a larger category.

Instructional Notes:

- Learning focuses on looking at a collection of diverse shapes that share attributes, focusing on geometric definitions rather than only the traditional appearance of a shape. Teachers should emphasize that there may be more than one correct name for a shape when looking at its attributes.
- This standard is closely related to standard 3.G.4 and may be taught in conjunction.
- Remember that a square also meets the definition of a rectangle (a figure with 4 right angles and opposite sides congruent), a parallelogram (a figure with 2 pair of parallel sides), and a quadrilateral (a figure with 4 sides)

Example:

- Prepare index cards with pictures of a variety of shapes and distribute cards to students. Ask students to work in pairs or triads to organize the shapes into groups based on their attributes. Students will likely identify many valid ways to group and regroup the figures. Discuss the groupings and emphasize the broader categories (i.e., polygon, non-polygon, quadrilateral, circle).

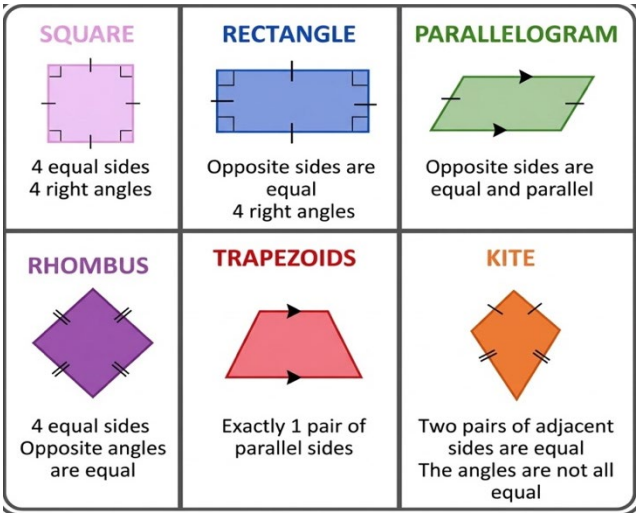
Glossary: attributes

3.G.2 Understand that a quadrilateral is any four-sided shape, and identify and describe the relationships between various quadrilaterals, including trapezoids, parallelograms, rectangles, and squares.

Instructional Notes:

- Learning focuses on defining a quadrilateral as a four-sided shape and understanding that there are many shapes that fall into this category.

Examples:



Quadrilaterals are shapes with 4 sides.

Glossary: quadrilateral, trapezoid, parallelogram, rectangle, square

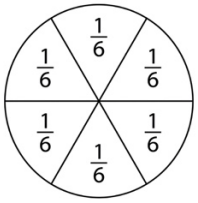
3.G.3 Break apart shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.

Instructional Notes:

- Learning shifts away from naming fraction parts (such as ½ the circle is shaded) and focuses on building conceptual spatial reasoning.
- Note: This standard connects the student's understanding of fraction to the concept of area.

Examples:

One slice is $\frac{1}{6}$ of the circle. It takes $\frac{6}{6}$ to make a whole.



One part is $\frac{1}{5}$ of the rectangle. It takes $\frac{5}{5}$ to make a whole.



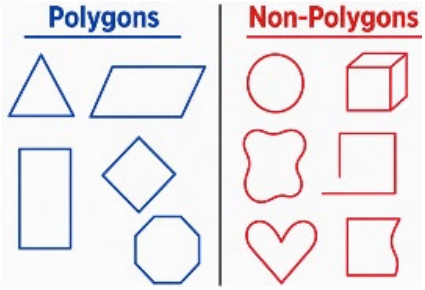
Glossary: area, unit fraction

3.G.4 Determine whether a shape is a polygon or non-polygon.

Instructional Notes:

- Learning focuses on identifying shapes as polygons (closed two-dimensional figures with straight line segments) or as non-polygons (figures with an open gap or curved lines).

Examples:



Glossary: polygon, non-polygon

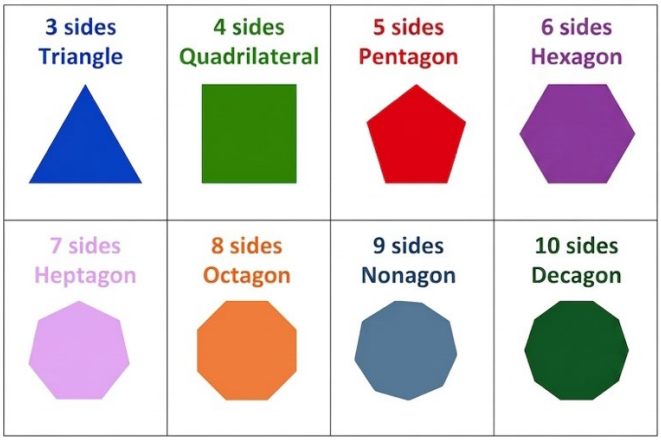
3.G.5 Classify polygons based on the number of sides.

Instructional Notes:

- Learning focuses on helping students identify and name different polygons by counting the total number of sides.
- Teachers are encouraged to discuss prefixes and how they relate to the number. For example, think of everyday words which use polygon prefixes (e.g., Tri means 3, think of a tricycle, Deca means ten, think of a decade).

Examples:

Polygons by Number of Sides



Glossary: polygon

Mathematical Fluency

3.MF.1 Fluently use multiplication strategies to mentally solve multiplication facts through 12.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Learning focuses on using flexible mental strategies and number relationships (rather than rote memorization) to accurately and efficiently solve multiplication facts up to 12 x 12. Teachers should encourage students to derive unknown facts from known "anchor" facts using relational mental strategies. Standard 3.MF.2 identifies which multiplication facts should be automatic.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Example:

- 9×11 *can be thought of as* 9×10 *plus one more group of* 9 *to* $= 99$.

Glossary: fluently

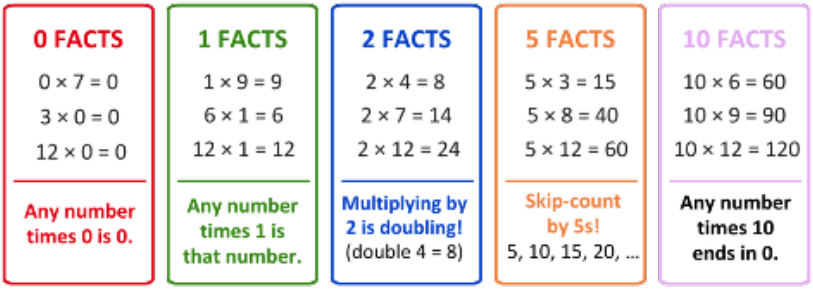
3.MF.2 Recall from memory multiplication facts (0-12) to include 0, 1, 2, 5, and 10.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Learning focuses on exploring the predictable rules and visual patterns of these foundational factors, like skip-counting by 5s or recognizing how multiplying by 2 is doubling a number.
- A recommended practice is to develop automaticity through gamified, low-stakes retrieval practice that isolates specific "anchor" families first, ensuring students transition to instant recall through pattern recognition rather than blind rote memorization.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Examples:

These “anchor” families help us see patterns and make facts easy to remember!



Glossary: none

3.MF.3 Fluently add within 1,000 using various strategies.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Learning focuses on using flexible methods, such as decomposing numbers, place value, standard method, etc. to accurately and efficiently add numbers up to 1,000.
- Teachers are encouraged to emphasize fact fluency and number sense strategies for addition facts 0-20.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Example:

- A student is adding $348 + 296$ and notices that 296 is very close to 300. The student adds 4 to 296 to make it 300 and then adds the numbers $348 + 300 = 648$. The student then subtracts the extra 4 to get the final answer: 644.

Glossary: fluently

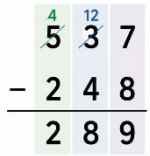
3.MF.4 Fluently subtract within 1,000 using various strategies.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Learning focuses on using flexible methods (decomposing numbers, place value, standard method, etc.) to accurately and efficiently subtract numbers within 1,000 without relying solely on a single standard algorithm.
- It is recommended to ask students to map out their thinking on open number lines to visualize subtraction both as "taking away" and as "finding the distance between" two numbers.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Examples:

Standard Algorithm Alternative Strategy



First notice how 537 and 248 are related.
If I add 11 to 537, I'll have 548.
$548 - 248 = 300$
Now subtract the 11 you initially added in.
The difference is 289.

Glossary: fluently

3.MF.5 Fluently multiply one-digit whole numbers by multiples of 10 in the range 10-90.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Learning focuses on using place value understanding and basic multiplication facts to mentally determine products of a single digit and a multiple of ten, such as recognizing that 3 x 40 is the same as 3 groups of 4 tens. See connection to standard 3.MF.1.
- It is recommended to explicitly use place value language (3 x 4 tens = 12 tens which is 120) rather than teaching tricks like "just add a zero," ensuring students understand why the digit shifts to the left.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Example:

- 3 x 4 tens = 12 tens which is 120.

Glossary: fluently

4th Grade Mathematics Standards

Numbers

Place Value

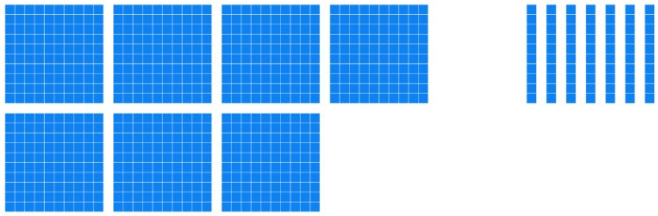
4.N.1 Recognize that a digit in a given place represents ten times what it represents in the place to its right.

Instructional Notes:

- Learning focuses on structure and relationships in base ten place value system.
- Note: Teachers should embed this concept in multiple lessons.

Examples:

- 700 is ten times as much as ___.



Glossary: none

4.N.2 Use place value understanding to round multi-digit whole numbers to any place.

Instructional Notes:

- Learning focuses on looking at the digit immediately to the right to determine whether or not to round up or down.

Examples:

- 2,387 rounded to the nearest thousand is?
- 987 rounded to the nearest hundred is?
- 43 rounded to the nearest ten is?

Glossary: place value

4.N.3 Compose and decompose five-digit numbers into ten thousands, thousands, hundreds, tens, and ones.

Instructional Notes:

- Learning focuses on developing and extending knowledge of place value.
- Note: Students should know how many ten-thousands, thousands, hundreds, tens, and ones are represented in each number.

Examples:

- 2,359 has 2 thousands, 3 hundreds, 5 tens, and 9 ones.
- 4 ten thousands, 5 hundreds, and 2 ones = 40,502

Glossary: compose, decompose

4.N.4 Read and write whole numbers up to 1,000,000 using standard form, word form, and expanded form.

Instructional Notes:

- Learning focuses on students understanding that a number can be represented in multiple forms.

Examples:

- Number form: 46,274
- Written form: Forty-six thousand, two hundred seventy-four
- Expanded form: $40{,}000 + 6{,}000 + 200 + 70 + 4$

Glossary: standard form, word form, expanded form

4.N.5 Compare two multi-digit numbers based on values of the digits in each place value using the symbols $<, >, =$.

Instructional Notes:

- Learning focuses on using the correct symbol to compare two multidigit numbers by starting with the largest place value.
- Note: Students should know what the symbols <, >, = mean and how to correctly read them.

Examples:

- 2,129 < 6,378
  9,130 > 340
  753 = 753

Glossary: place value

Operations and Algebraic Thinking

Number Operations

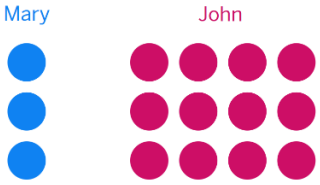
4.OA.1 Represent and explain multiplicative comparisons using equations, drawings, and verbal reasoning.

Instructional Notes:

- Learning focuses on how many times bigger one number is than the other.

Examples:

- Mary has 3 apples and John has 4 times as many apples as Mary. How many apples does John have?
  $4 \times 3 = 12\ apples$



Glossary: multiplicative comparison, equation

4.OA.2 Solve real-world problems involving multiplicative comparison, using drawings and/or equations with a symbol for the unknown number, and distinguish between multiplicative comparison and additive comparison.

Instructional Notes:

- Learning focuses on knowing the difference between a multiplicative comparison and an additive comparison.
- Note: Students should know that a symbol takes the place of an unknown number.

Examples:

- Mary has 3 apples and John has 4 times as many apples as Mary. How many apples does John have? $4 \times 3 = t$
- Mary has 3 apples and John has 4 more apples than Mary. How many apples does John have? $4 + 3 = t$

Glossary: multiplicative comparison, equation, additive comparison

---

4.OA.3 Multiply four-digit whole numbers by one-digit whole numbers, and multiply two two-digit whole numbers.

Instructional Notes:

- Learning focuses on learning the steps to multiplying multidigit whole numbers.

Examples:

- $1486 \times 2 =$
- $48 \times 12 =$

Glossary: none

4.OA.4 Divide four-digit whole numbers by one-digit divisors; quotients should be with and without whole number remainders.

Instructional Notes:

- Learning focuses on learning steps to divide a four-digit number by a one-digit divisor.

Examples:

- $8934 \div 2 =$, $= 4467$
  $4729 \div 3 =$, $= 1576\ R1$

Glossary: divisor, quotient, remainder

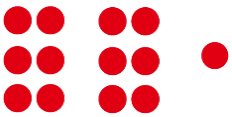
4.OA.5 Interpret a remainder of a one-step division problem.

Instructional Notes:

- Learning focuses on understanding that all whole numbers may not always be able to be divided evenly.

Examples:

- $13 \div 2 = 6\ R1$
- 13 red dots can be divided into 2 groups of 6 with 1 left over.



Glossary: remainder

4.OA.6 Solve multi-step word problems using addition, subtraction, multiplication, and division, with whole numbers and having whole number answers, including problems in which remainders must be interpreted; assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Instructional Notes:

- Learning focuses on understanding that multiple operations might be needed to solve a multistep word problem.
- Learning focuses on reviewing answers to determine reasonableness through mental computation and estimation.
- Note: Students should know how to interpret remainders based on the context of the word problem.

Examples:

- Sarah has 4 packs of erasers, each with 15 erasers. She gives 3 erasers to her sister, then packs the remaining erasers into boxes that hold 8 each. How many full boxes can Sarah make, and how many erasers are left over?
- A school is planning a field trip. 50 students and 8 teachers will be attending. Each van holds 9 people. How many vans will the school need to transport everyone to the field trip?

Glossary: remainder

4.OA.7 Find factor pairs for whole numbers up to 100.

Instructional Notes:

- Learning focuses on finding all sets of two numbers whose product is a specific number.

Example:

- Find the factor pairs of 20. (1, 20), (2, 10), (4, 5).

Glossary: factor

4.OA.8 Recognize that a whole number (within 100) is a multiple of each of its factors.

Instructional Notes:

- Learning focuses on the relationship between multiples and factors.

Examples:

- Factors of 20 = 1, 2, 4, 5, 10, 20. Each factor of 20, includes 20 as a multiple.
  Multiples of 2 = 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
  Multiples of 4 = 4, 8, 12, 16, 20
  Multiples of 5 = 5, 10, 15, 20
  Multiples of 10 = 10, 20

Glossary: factor

4.OA.9 Find multiples of single-digit whole numbers.

Instructional Notes:

- Learning focuses on finding the number you get when you multiply a number by a given whole number.

Example:

- What are the first 5 multiples of 8? The first 5 multiples are 8, 16, 24, 32, 40.

Glossary: multiple

4.OA.10 Determine whether a whole number from 1 to 100 is prime or composite.

Instructional Notes:

- Learning focuses on understanding the difference between prime and composite numbers.
- Note: Students should know that a prime number has exactly two factors (1 and itself) and a composite number has more than two factors.
- Note: Students should know that the numbers 0 and 1 are neither prime nor composite.

Examples:

- Explain why 3 is a prime number.
  Factors of 3 are 1 and 3, so it is a prime number.
- Explain why 9 is a composite number.
  Factors of 9 are 1, 3, and 9, so it is a composite number.

Glossary: prime, composite

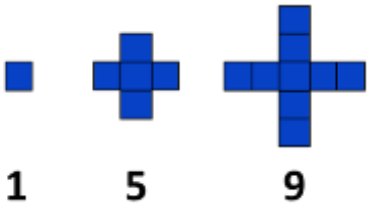
4.OA.11 Generate a number or shape pattern that follows a given rule, identifying apparent features of the pattern that are not explicit in the rule itself.

Instructional Notes:

- Learning focuses on creating number and shape patterns and stating why the pattern works. This is the precursor to arithmetic sequences.

Examples:

- Pattern: 3, 6, 9, 12, 15, 18...
  Rule: Increasing by 3
  Features: Numbers alternated between even and odd
- Pattern: 1, 5, 9, 13, 17
  Rule: Increasing by 4
  Features: As the pattern increases, the image adds one more square to the extending arms.



Glossary: none

4.OA.12 Demonstrate understanding of addition and multiplication problems using properties (commutative, associative, distributive, and identity).

Instructional Notes:

- Learning focuses on reviewing addition and multiplication properties (commutative, associative, distributive, and identity).

- Note: Students should be able to use correct vocabulary terms when demonstrating understanding.

Examples:

- Commutative Property
  $a + b = b + a$
  $a \times b = b \times a$
- Associative Property
  $(a + b) + c = a + (b + c)$
  $(a \times b) \times c = a \times (b \times c)$
- Distributive Property
  $a \times (b + c) = (a \times b) + (b \times c)$
- Identity Property
  Addition (Identity 0) $a + 0 = a$
  Multiplication (Identity 1) $a \times 1 = a$

Glossary: commutative property, associative property, distributive property, identity property

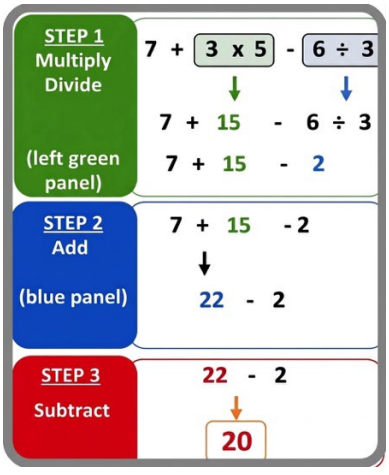
4.OA.13 Evaluate a numerical expression including addition, subtraction, multiplication, and division using the order of operations of whole numbers without parenthesis and exponents.

Instructional Notes:

- Learning focuses on using the order of operations to solve equations without parenthesis and exponents.
- Note: Students should know that the order of operations works from left to right completing all multiplication and division first, followed by addition and subtraction.

Example:

$7 + 3 \times 5 - 6 \div 3 =$
$7 + 15 - 2$
$22 - 2$
20



Glossary: numerical expression, order of operations

Fractions

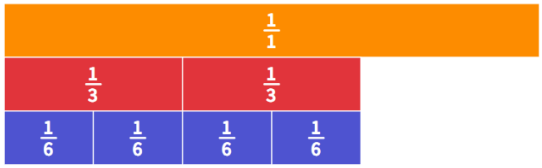
Operations and Properties

4.F.1 Use visual models and reasoning to explain why a fraction a/b is equivalent to another fraction when both the numerator and denominator are multiplied by the same number.

Instructional Notes:

- Learning focuses on understanding how equivalent fractions are derived.
- Note: Students should be able to generate equivalent fractions and explain why they are equivalent.

Example:



$\frac{2}{3} \times \frac{2}{2}\ (or\ 1\ whole) = \frac{4}{6}$

Glossary: visual models, fraction, equivalent, numerator, denominator

4.F.2 Compare fractions with different numerators and denominators, by creating common denominators or numerators, using the symbols $<, >, =$.

Instructional Notes:

- Learning focuses on creating fractions with like numerators or denominators, then comparing the fractions using the symbols <, >, =.
- Note: Students must know multiples and how to create common denominators.

Examples:

- Compare $\frac{3}{4}\ to\ \frac{5}{8}$. First get common denominators, then compare. $\frac{3}{4}$ $\frac{5}{8} = \frac{6}{8} > \frac{5}{8}$.
- Compare $\frac{1}{2}\ to\ \frac{5}{11}$. First get common denominators, then compare. $\frac{1}{2}$ $\frac{5}{11} = \frac{11}{22} > \frac{10}{22}$.

Glossary: fraction, numerator, denominator, common denominator

4.F.3 Add and subtract fractions with like denominators.

Instructional Notes:

- Learning focuses on understanding that when denominators are the same, only the numerators are added or subtracted. The denominator remains the same.

Examples:

- $\frac{4}{10} + \frac{8}{10} = \frac{12}{10}$
- $\frac{12}{32} - \frac{5}{32} = \frac{7}{32}$

Glossary: fraction, denominator

4.F.4 Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

Instructional Notes:

- Learning focuses on applying standard 4.F.3 to word problems.
- Note: The same whole means that the items being compared are the same sized object.

Examples:

- Nonexample:
  1/2 of full-size candy bar is not equivalent to 1/2 of a king size candy bar because a full-size and a king size are not the same whole.
- Example:
  If Sam ate 3/8 of a full-size candy bar and Tim ate 2/8 of a full-size candy bar how much of the full-sized candy bar was eaten altogether?

Glossary: fraction, denominator

4.F.5 Break apart fractions into sums of fractions with the same denominator and smaller numerators.

Instructional Notes:

- Learning focuses on understanding that a fraction can be broken into smaller pieces, and when added together, the smaller pieces equal the original fraction.

Example:

- $\frac{6}{8} = \frac{1}{8} + \frac{3}{8} + \frac{2}{8}$

Glossary: fraction, denominator, numerator

4.F.6 Add and subtract mixed numbers with like denominators using various strategies.

Instructional Notes:

- Learning focuses on adding and subtracting mixed numbers with like denominators.

Examples:

- Adding whole numbers first: $8\frac{2}{4} + 5\frac{1}{4} = (8 + 5)\ and\ \left(\frac{2}{4} + \frac{1}{4}\right) = 13\frac{3}{4}$
- Changing to improper fractions before adding: $8\frac{2}{4} + 5\frac{1}{4} = \frac{34}{4} + \frac{21}{4} = \frac{55}{4}$

Glossary: mixed number, denominator

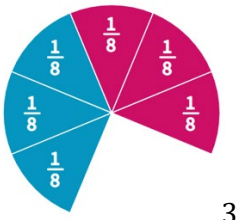
4.F.7 Multiply a fraction by a whole number and a whole number by a fraction.

Instructional Notes:

- Learning focuses on building on to whole number multiplication by using fractions in multiplication.
- Note: Teachers can help students understand this by showing students that you can convert a whole number to a fraction by placing it over 1 and it won't change its value, but this is not a requirement of this standard.
- Note: Teachers can help connect to previous learning by using models to show the groups times size structure of multiplication.

Examples:

- $2 \times \frac{3}{8} = \frac{(2\times3)}{8} = \frac{6}{8}$
- $2 \times \frac{3}{8} = \frac{2}{1} \times \frac{3}{8} = \frac{6}{8}$
- $\frac{1}{2} \times 6 = \frac{(1\times6)}{2} = \frac{6}{2} = 3$
- $\frac{1}{2} \times 6 = \frac{1}{2} \times \frac{6}{1} = \frac{6}{2} = 3$



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



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

Glossary: fraction

4.F.8 Understand a fraction a/b is a multiple of $1/b$.

Instructional Notes:

- Learning focuses on understanding that a fraction can be broken down into a whole number multiplied by its unit fraction.

Example:

- The base unit fraction is $\frac{1}{4}$.
  Count three copies of that unit.
  $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$ *which is the same as* $3 \times \frac{1}{4} = \frac{3}{4}$
  Therefore, $\frac{3}{4}$ is the 3rd multiple of $\frac{1}{4}$.

Glossary: fraction, multiple

4.F.9 Understand a multiple of a/b is also a multiple of $1/b$.

Instructional Notes:

- Learning focuses on expanding an understanding of multiples.

Example:

- $\frac{6}{4}$ *is a multiple of* $\frac{3}{4}$ *which is also a multiple of* $\frac{1}{4}$.

Glossary: multiple

4.F.10 Solve word problems involving multiplication of fractions by whole numbers.

Instructional Notes:

- Learning focuses on applying standard 4.F.7 to word problems.

Examples:

- John ran $\frac{3}{8}$ of a mile two days this week. How many total miles did he run?
- Sarah has 6 pens and $\frac{1}{2}$ of them are blue. How many pens are blue?

Glossary: fraction

4.F.11 Add two fractions with denominator of 10 and 100 by expressing the denominator of 10 as an equivalent fraction with a denominator of 100.

Instructional Notes:

- Learning focuses on understanding that you can change a fraction by multiplying the numerator and denominator by equal groups of tens.

Examples:

- $\frac{7}{10} + \frac{15}{100} =$
  $\frac{70}{100} + \frac{15}{100} =$
  $\frac{85}{100}$

Glossary: denominator, equivalent, fraction

4.F.12 Understand a decimal number to be a number with a whole part and a fractional part separated by a decimal point.

Instructional Notes:

- Learning focuses on understanding that to the left of the decimal point is the whole of the number and to the right of the decimal point is the fraction portion of the number.

Examples:

- $5\frac{2}{10} = 5.2$
- $6\frac{3}{100} = 6.03$

Glossary: decimal number

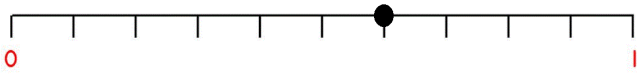
4.F.13 Apply decimal notation for fractions with denominators 10 or 100; locate these decimals on a number line.

Instructional Notes:

- Learning focuses on converting fractions to decimals and locating those decimals on a number line.

Examples:

- $\frac{6}{10} = 0.6$



- $\frac{45}{100} = 0.45$

Glossary: decimal notation, fraction, denominator

4.F.14 Read, write, and describe the value of decimal numbers to the hundredths place.

Instructional Notes:

- Learning focuses on students understanding that the value of a decimal can be represented in multiple ways.
- Note: Students should know that when reading a decimal, the decimal point is read as the word *and*.

Examples:

- $0.25 = \frac{25}{100} =$ twenty-five hundredths
- $9.82 = 9\frac{82}{100} =$ nine and eighty-two hundredths

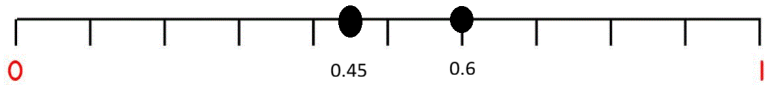
Glossary: decimal number

4.F.15 Compare decimals to the hundredths place on a number line and by using the symbols $<, >, =$.

Instructional Notes:

- Learning focuses on knowing how to place a decimal on the number line and then comparing the two decimals using symbols.

Example:



$0.45 < 0.6$

Glossary: none

Measurement

Measurement Concepts

4.M.1 Measure length, weight, mass, and capacity using U.S. Customary and metric systems of measurement (including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.).

Instructional Notes:

- Learning focuses on practice with customary and metric systems of measurement using the appropriate tool.
- Note: Teachers should model and encourage appropriate measuring techniques so that students develop accuracy.

Examples:

- Provide opportunities for students to build accuracy using measuring tools. Students could measure the length of their desk in inches or centimeters. Weight and mass could be measured using various books.
- Provide pictures or gather classroom objects and ask students which tool would be appropriate to measure the specified item by a specific trait (e.g., height of the classroom, volume of the teacher's favorite coffee mug, weight/mass of 10 paper clips, etc.).

Glossary: length, weight, mass, capacity, U.S. customary, metric system

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4.M.2 Express larger units in terms of smaller units through conversions within a single system of measurement.

Instructional Notes:

- Learning focuses on converting measurements within the customary or metric systems, but not between the two systems.

Examples:

- How many inches are in three feet?
- Convert 500 ml to liters.

Glossary: conversion

4.M.3 Solve word problems using addition, subtraction, multiplication, and division involving distance, intervals of time, capacity, masses, and money, using fractional and decimal values.

Instructional Notes:

- Learning focuses on solving multistep word problems involving forms or measurement.
- Note: Answers may include fractions and decimals. (e.g., money or fraction of time).
- Note: Refer to standards 4.F and 4.OA for appropriate problem structures for fraction and decimal operations.

Example:

- Callie went to a concert last Saturday that started at 6:50 p.m. and finished at 9:28 p.m. How long was the concert?

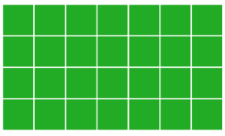
Glossary: capacity, mass, fractional

4.M.4 Use visual models and reasoning to explain how area and perimeter formulas for rectangles relate to their side lengths and solve real-world problems.

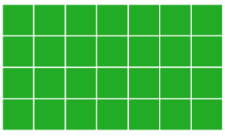
Instructional Notes:

- Learning focuses on understanding where area and perimeter formulas come from and why they work.

Example:



$A = l \times w$



$P = l + l + w + w = 2 \times (l + w)$

Glossary: visual models, area, perimeter, rectangles

Data

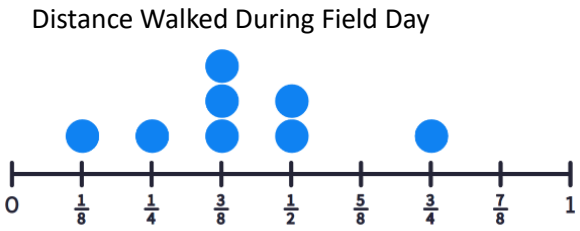
4.M.5 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8) and solve problems using the line plot.

Instructional Notes:

- Learning focuses on understanding and using a line plot to display measurements in fractions of a unit.

Example:

- How many people walked at least $\frac{1}{2}$ mile?



Glossary: line plot, data, fraction

Geometry

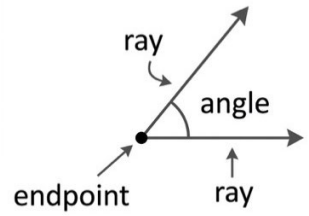
Geometric Measurement

4.G.1 Recognize angles as geometric shapes that are formed where two rays share a common endpoint.

Instructional Notes:

- Learning focuses on understanding the definition of an angle.

Example:



Glossary: angles, rays, endpoint

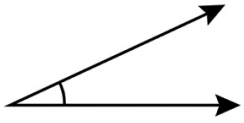
4.G.2 Measure angles in degrees using a protractor and understand a degree as 1/360 of a circle; draw angles of specific measure.

Instructional Notes:

- Learning focuses on knowing how to use a protractor and what the degrees on a protractor mean in relationship to a circle.

Examples:

- Use a protractor to measure the following angle.



- Draw an angle with 50 degrees.

Glossary: angles, degrees, protractor

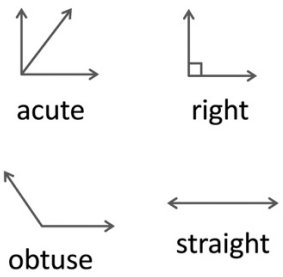
4.G.3 Classify angles as right, acute, obtuse, or straight. Draw right, acute, obtuse, and straight angles.

Instructional Notes:

- Learning focuses on understanding the definition of right, acute, obtuse, or straight angles and being able to draw an example of each type of angle.

Examples:

- Angle types



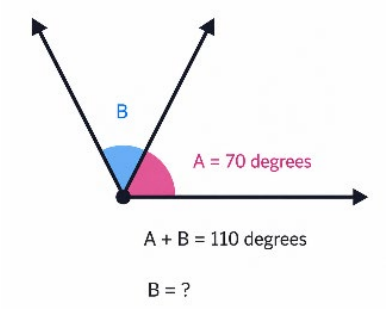
Glossary: angles, right angle, acute angle, obtuse angle, straight angle

4.G.4 Recognize and apply the concept of additive angles: when angles are broken apart the sum of the parts is equal to the angle measure of the whole.

Instructional Notes:

- Learning focuses on applying the concept of decomposition (i.e., breaking apart) to the context of angles.

Examples:



Glossary: additive angles, angle

Shapes

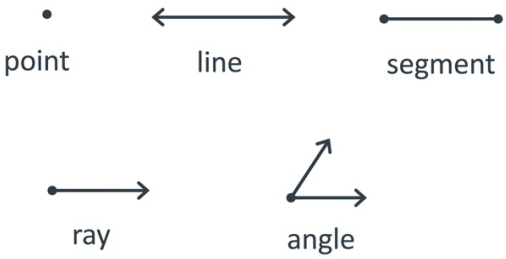
4.G.5 Identify, describe, and draw points, lines, segments, rays, and angles.

Instructional Notes:

- Learning focuses on knowing the definitions of vocabulary and creating examples of each.

Examples:

- Describe the similarities and differences between a line, a segment, and a ray.
- Why is a point important in geometry?



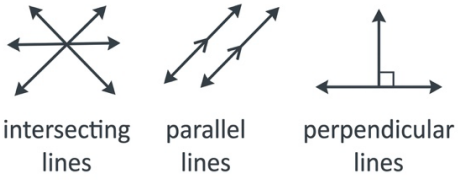
Glossary: point, line, segment, ray, and angle

4.G.6 Identify, describe, and draw intersecting, parallel, and perpendicular lines.

Instructional Notes:

- Learning focuses on knowing the definitions of vocabulary and creating an example of each.

Examples:



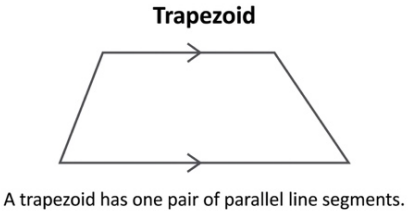
Glossary: intersecting, parallel lines, perpendicular lines

4.G.7 Understand a trapezoid to be a two-dimensional shape with four sides, where exactly one pair of sides is parallel.

Instructional Notes:

- Learning focuses on knowing that a trapezoid has **exactly one** pair of parallel sides.

Examples:



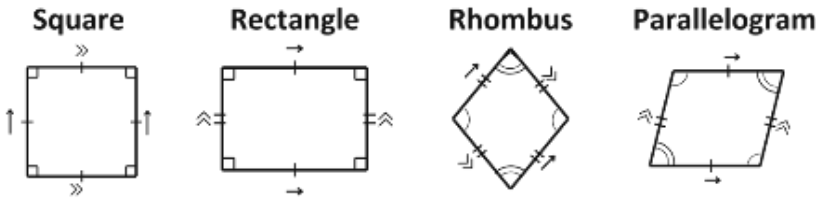
Glossary: trapezoid, two-dimensional, parallel

4.G.8 Identify and describe various quadrilaterals by their properties of parallel and perpendicular lines including square, rectangle, trapezoid, and rhombus.

Instructional Notes:

- Learning focuses on understanding the definitions of a square, rectangle, trapezoid, and rhombus according to their sides.
- Note: In 3rd grade students learned about parallelograms. Teachers should build upon this understanding so that students understand that a polygon can be named in different ways (e.g., a rectangle is both a quadrilateral and a parallelogram).

Examples:



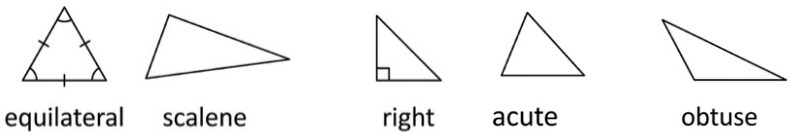
Glossary: quadrilateral, parallel line, perpendicular line, square, rectangle, trapezoid, rhombus

4.G.9 Identify, describe, and draw equilateral, scalene, right, acute, and obtuse angles and triangles.

Instructional Notes:

- Learning focuses on understanding what the different types of triangles are.

Examples:



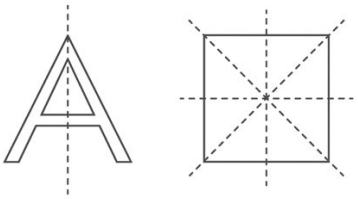
Glossary: equilateral triangle, scalene triangle, right angle, acute angle, obtuse angle

4.G.10 Identify and draw lines of symmetry for two-dimensional figures.

Instructional Notes:

- Learning focuses on being able to recognize lines of symmetry.

Examples:



Glossary: lines of symmetry, two-dimensional

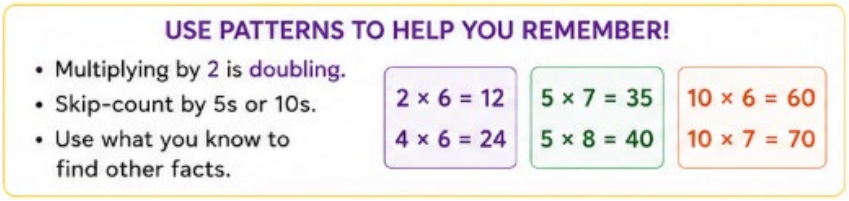
Mathematical Fluency

4.MF.1 Recall from memory multiplication facts (0-12).

Instructional Notes:

- Learning focuses on automatic recall of multiplication facts (0-12).
- Note: Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Examples:



Glossary: none

4.MF.2 Recall from memory division facts (0-12).

Instructional Notes:

- Learning focuses on automatic recall of division facts (0-12).
- Note: Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Examples:



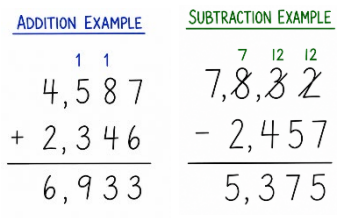
Glossary: none

4.MF.3 Fluently add and subtract multi-digit whole numbers using an algorithm including, but not limited to, the standard algorithm.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Note: These do not need to be memorized, but the process of solving it should be automatic for the student.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Examples:



Glossary: fluently, algorithm, standard algorithm

5th Grade Mathematics Standards

Numbers

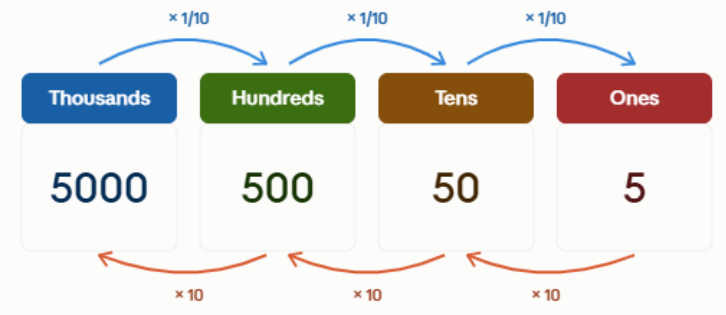
Place Value

5.N.1 Recognize that a digit in a given place represents ten times what it represents in the place to its right and 1/10 what it represents in the place to its left.

Instructional Notes:

- Learning focuses on understanding the multiplicative relationship between adjacent place values. The same digit has ten times the value when it is one place to the left and one-tenth the value when it is one place to the right.
- Note: Students should use place-value models, numbers, and explanations to recognize that moving one place to the left makes a digit's value ten times greater, while moving one place to the right makes its value one-tenth as great.

Examples:



Glossary: none

5.N.2 Use place value reasoning and patterns to explain how multiplying or dividing by powers of 10 affects the value and placement of digits in a number.

Instructional Notes:

- Learning focuses on understanding that multiplying by powers of 10 makes each digit 10 (10^1), 100 (10^2), or 1,000 (10^3) times greater, while dividing by powers of 10 makes each digit $\frac{1}{10}$, $\frac{1}{100}$ or $\frac{1}{1000}$ times smaller.
- Note: This is students' first formal experience with exponents.

Examples:

- Multiply by 10^3
  Understand that 10^3 = 1000, so 23×10^3 *is the same as* 23×1000 *or* $23{,}000$.
  Explanation: The number becomes 1000 times larger so three zeros must be added to show the correct place value.
- Divide by 10^3
  Understand that 10^3 = 1000, so $34{,}000 \div 10^3$ *is the same as* $34{,}000 \div 1000$ *or* 34.
  Explanation: The number becomes 1000 times smaller so three zeros must be removed to show the correct place value.

Glossary: place value

5.N.3 Read and write decimal numbers to the thousandths place using standard form, word form and expanded form.

Instructional Notes:

- Learning focuses on developing place value understanding by reading and writing decimals in standard, word, and expanded form, progressing between standard to word to expanded form to deepen understanding of each digit's value and the relationships among place values.
- Note: Building understanding of decimal place value can be challenging for students. The recommended learning progression is:
    - Read the decimal
    - Write in standard form
    - Write in word form
    - Write in expanded form
- Note: In Grade 4 (standard 4.F.14), students were introduced to reading fractions as decimals (e.g., $9.82 = 9\frac{82}{100} =$ nine and eighty-two hundredths). Standard 5.N.3 builds on this learning.

Examples:

- Present students with decimals written in standard form (e.g., 1.3, 1.07) and ask them to read or verbalize the decimals stressing place value (*one and three tenths, one and seven hundredths*).
- Orally present decimals (e.g., *one and three tenths, one and three hundredths*) and ask students to write the stated decimals in standard form. Once students demonstrate a level of confidence with reading and writing decimals in standard form, initiate activities with word form.
- Present decimals in standard form (e.g., 1.3, 2.16) and ask students to write those decimals in word form. At this point, it might be productive for students to generate a decimal number, read it to a student partner, and ask the partner to write the decimal in standard form and word form always stressing appropriate place value.
- Writing decimals in expanded form helps students clarify their understanding of place value and can reveal misconceptions. Referring to a place value chart may help students accurately use expanded form.

Glossary: decimal number, standard form, word form, expanded form

5.N.4 Order and compare decimal numbers to the thousandths place using the symbols $<, >, =$.

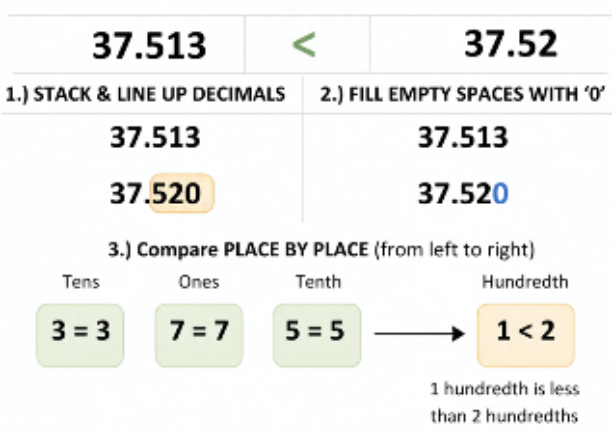
Instructional Notes:

- Learning focuses on comparing decimals by examining digits from the greatest place value to the least.
- Note: Teachers are encouraged help students build useful techniques such as lining up the numbers according to place value prior to making a comparison. Students can generate their own place value charts to help them build accuracy.

- Note: Students tend to think that a number with more decimal digits is greater just because of the number of digits. Reinforce that a number with many decimal digits will not automatically result in a larger number.

Examples:

- Compare 0.8 and 0.79.
- Order the following numbers from least to greatest. 3.405, 3.45, 3.054, 3.5.
- Compare 37.513 and 37.52.



Glossary: decimal number

5.N.5 Apply place value understanding to round decimals to any decimal place up to the hundredths place.

Instructional Notes:

- Learning focuses on locating a decimal between two possible benchmark values and determining which value it is closer to.
- Note: Using number lines and place-value reasoning are useful strategies to explain rounding to the nearest whole, tenth, or hundredth. Teachers are encouraged to model comparing two possible outcomes using a number line.

Examples:

- Round 34.506
  - To the nearest hundredth.
  - To the nearest tenth.
- Round 13.281 to the nearest hundredth.

Glossary: place value

Operations and Algebraic Thinking

Number Operations

5.OA.1 Write and evaluate numerical expressions with parentheses using the order of operations.

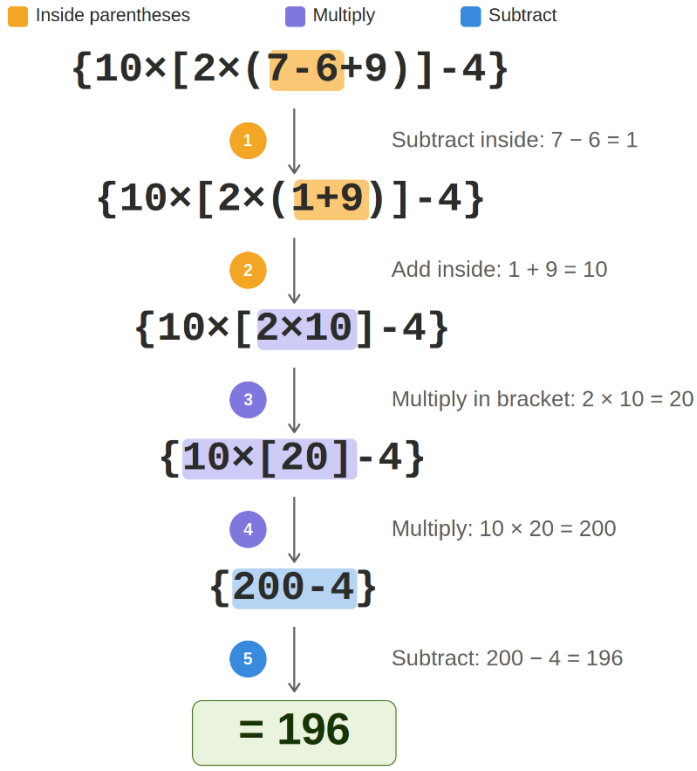
Instructional Notes:

- Learning focuses on using the correct order of operations along with navigating multiple layers of grouping symbols.

- Note: A common misconception about order of operations is that multiplication always comes before division and that addition always comes before subtracting. Since both pairs are inverse operations, they should be performed in the order presented (left to right).
- For accelerated learners teachers may include order of operations to the base of ten (e.g., $5 + 6(10 - 1) \times 10^2$. Using exponents in order of operations is not assessed in Grade 5.

Examples:

- $\{10 \times [2 \times (7 - 6 + 9)] - 4$



Glossary: numerical expression, order of operations

5.OA.2 Generate two number patterns by following two different rules and make a graph using ordered pairs that match the numbers from each pattern.

Instructional Notes:

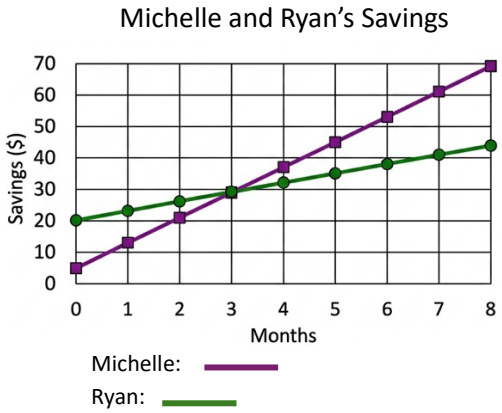
- Learning focuses on creating an organized table (x, y) and graph from two rules.
- Note: When introducing this standard, it is recommended to provide students with the rules for table and graph creation. As they build confidence generating tables and graphs, students can then generate their own rules.

Examples:

- Michelle and Ryan are saving money. Michelle's rule is $8x + 5$ because she starts with \$5 and adds 8 more dollars each month. Ryan's rule is $3x + 20$ because he starts with \$20 and adds 3 more dollars each month. Use the rules to create a data table of savings and then create a graph to show how their savings grow.

Savings Data Table

Months	Michelle's Savings ($)	Ryan's Savings ($)
0	5	20
1	13	23
2	21	26
3	29	29
4	37	32
5	45	35
6	53	38
7	61	41
...	...	...
15	125	65
100	805	320



Glossary: ordered pair

5.OA.3 Calculate whole number quotients of whole numbers with up to four-digit dividends and two-digit divisors. Explain the calculation by using equations, rectangular arrays, illustrations, area models, or other representations based on place value.

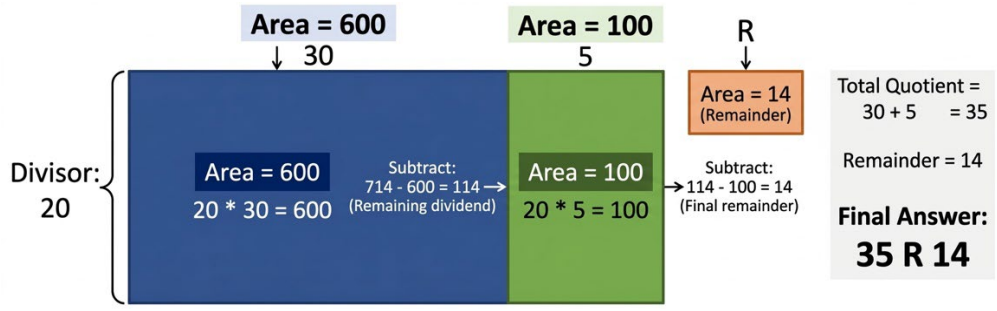
Instructional Notes:

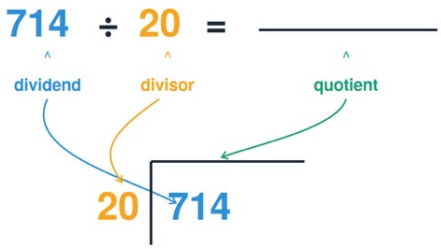
- Learning focuses on how to set up a division problem using the standard algorithm. If students struggle with this concept, consider using an array or illustrations as needed.
- Note: Teachers should model and encourage students to use appropriate division vocabulary (e.g., quotient, dividend, divisor, remainder). Models may only be appropriate for simpler numbers.

Examples:

Division of 714 by 20 Using an Area Model

$$714 \div 20 = 35\ R14$$





Use appropriate division vocabulary.

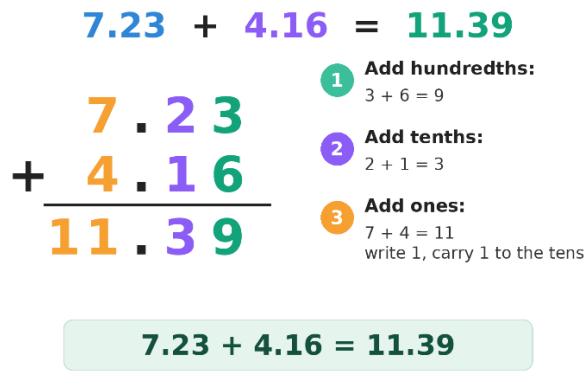
Glossary: quotient, dividend, divisor, equation, rectangular array, area model, place value

5.OA.4 Add decimals to the hundredths place using various strategies.

Instructional Notes:

- Learning focuses on aligning addends by place value so that like place-value units are added. The decimal point drops straight down in the sum maintaining place-value alignment.
- Note: The use of grid paper can help students keep digits in the proper place-value column.

Example:



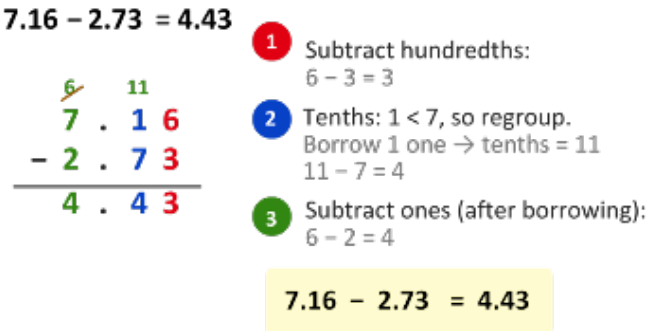
Glossary: none

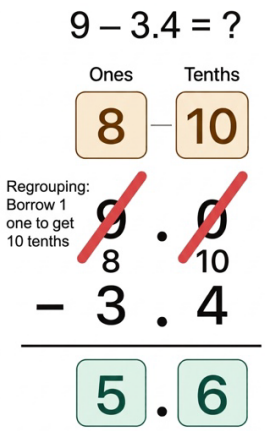
5.OA.5 Subtract decimals to the hundredths place using various strategies.

Instructional Notes:

- Learning focuses on aligning digits in the minuend and subtrahend according to place value so that like place-value units can be subtracted.
- Note: Students must understand that adding zeros after the decimal point does not change the value of the number (e.g., $4.5 = 4.50, 7 = 7.00$) and that zeros may need to be inserted to accurately regroup and subtract. As with addition, the use of grid paper can help students keep place value columns aligned.

Examples:





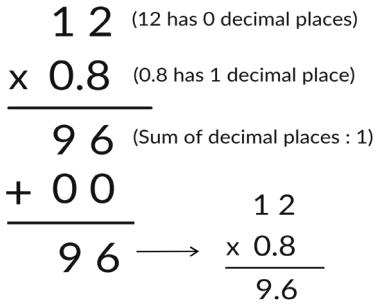
Glossary: none

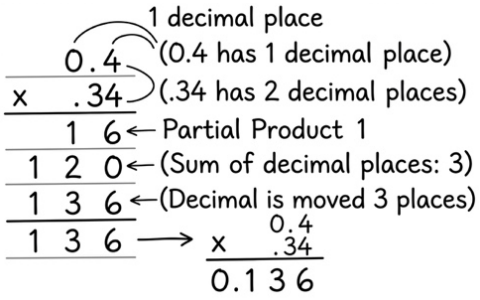
5.OA.6 Multiply decimals to the hundredths place using various strategies.

Instructional Notes:

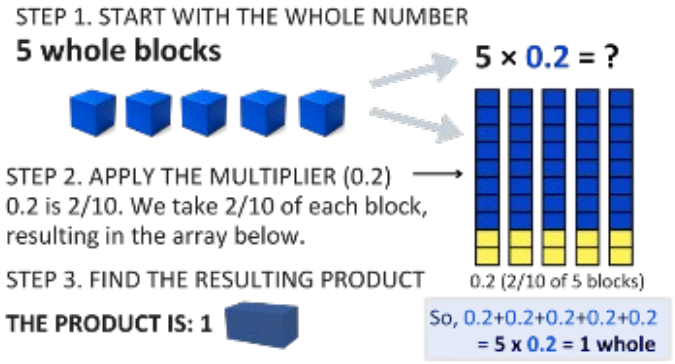
- Learning focuses on applying place value understanding and whole number multiplication skills to multiply decimal numbers. Students will be able to count decimal places in the factors to know how many decimal places to include in the product.
- Note: Encourage students to use their place-value understanding and estimation skills to determine if their products are reasonable. This is especially important as they learn where to place the decimal point in the product. Students may assume that multiplication always leads to a larger product, and they may need visuals like an array to help them understand why this is not true (see example)

Examples:





Multiplying by less than 1 whole.



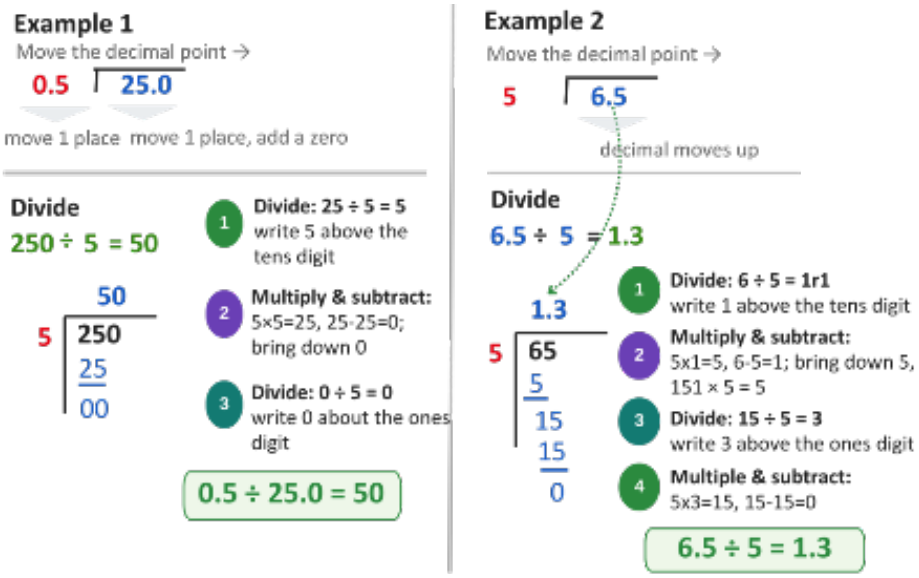
Glossary: none

5.OA.7 Divide decimals to the hundredths place using various strategies.

Instructional Notes:

- Learning focuses on using place-value understanding and applying whole number division skills to dividing with decimal numbers.
- Note: Help students understand that divisors must be whole numbers prior to dividing and that increasing both the divisor and the dividend by a multiple of 10 does not change the resulting quotient (See example).
- Note: Students may assume that dividing always makes the quotient smaller, but when dividing by a number less than 1, this is not true. Help students understand that a divisor (like denominators in fractions) represents the size of the part (e.g., $4 \div 0.5 = 8$). There are 8 parts that are 0.5 in size in 4 whole.

Examples:



Glossary: none

Fractions

Fractional Operations and Properties

5.F.1 Add and subtract fractions, fractions with unlike denominators, mixed numbers, and improper fractions by replacing given fractions with equivalent fractions.

Instructional Notes:

- Learning focuses on using equivalent fractions to create common units before adding or subtracting.

Examples:

- $\frac{2}{3}+\frac{3}{4}=$ $3\frac{1}{2}-1\frac{2}{3}=$ $\frac{5}{4}+2\frac{4}{5}=$

Glossary: fraction, denominator, mixed number, improper fraction, equivalent

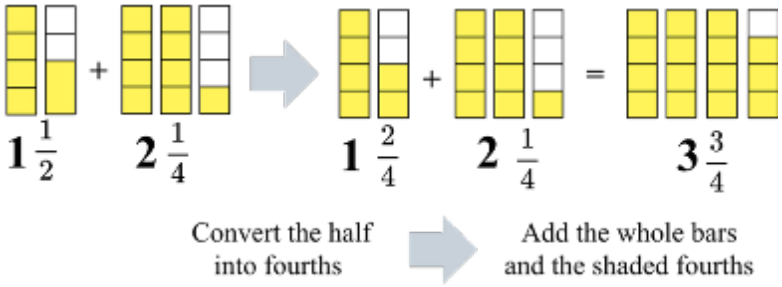
5.F.2 Solve word problems using addition and subtraction of fractions, fractions with unlike denominators, mixed numbers, and improper fractions by using visual fraction models or equations.

Instructional Notes:

- Learning focuses on identifying the quantities, the operation, and the meaning of the answer in context. Students should connect visual fraction models, number lines, and equations to explain why only fractions with like-sized parts can be combined directly.

Examples:

- Mia walked $1\frac{1}{2}$ miles in the morning and $2\frac{1}{4}$ miles in the afternoon. How far did she walk altogether? Represent the problem with a model and an equation.



Glossary: fraction, denominator, mixed number, improper fraction, visual fraction model, equation

5.F.3 Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.

Instructional Notes:

- Learning focuses on using benchmarks, such as 0, $\frac{1}{2}$, and 1, to estimate fraction sums, differences, products, and quotients. Students should explain whether an exact answer is reasonable by comparing each fraction with a familiar benchmark.

Examples:

- Estimate $\frac{5}{8}+\frac{7}{10}$. Is your estimate closer to $1, 1\frac{1}{2}, 2, or\ 2\frac{1}{2}$? Explain your reasoning.
- Is $2\frac{1}{6}$ a reasonable sum for $1\frac{3}{4}+\frac{2}{5}=$? Explain.
- Without calculating exactly, determine whether $\frac{7}{8}-\frac{2}{5}$ is greater or less than $\frac{1}{2}$. Explain how you know?

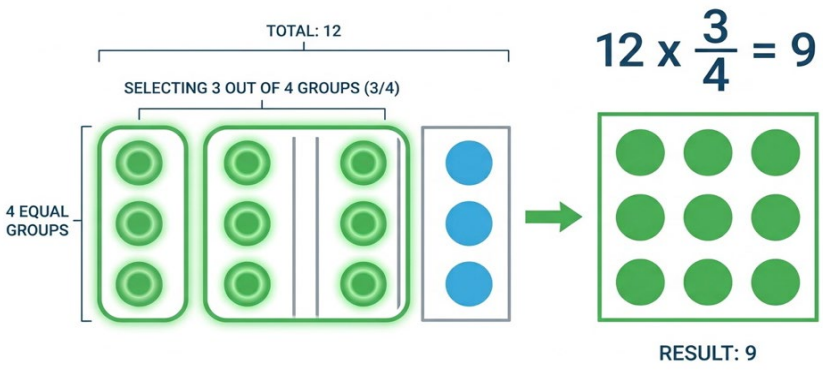
Glossary: benchmark fraction, fraction

5.F.4 Multiply a fraction or whole number by a fraction. Interpret the product using visual fraction models and story contexts (e.g., area models for rectangles with fractional side lengths).

Instructional Notes:

- Learning focuses on understanding the resulting product when a whole number or fraction is multiplied by a fraction less than one. Students often believe that multiplication always makes the product larger than the factors, but this does not hold true when multiplying by less than one. Teachers can choose to use area models, fraction strips, number lines, or story contexts to connect the factors to the product.
- Note: Within word problems, the word "of" often means multiplication, but it should not become a rule, as it isn't always true.

Examples:



Glossary: fraction, product, visual fraction model, area model, rectangle, fractional

5.F.5 Solve real-world problems involving multiplication of fractions and mixed numbers, including interpreting multiplication as scaling (resizing). Explain why multiplying by a fraction greater than 1 increases the product and multiplying by a fraction less than 1 decreases the product.

Instructional Notes:

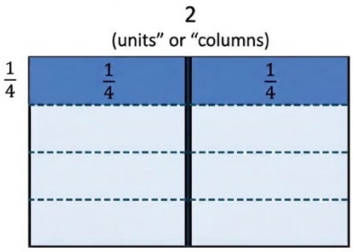
- Learning focuses on multiplication as scaling. Students should predict and explain whether a product will be greater than, equal to, or less than the original quantity based on whether the multiplying factor is greater than, equal to, or less than 1.

Examples:

Will the product be greater than, less than, or equal to the first factor?

- $4 \times \frac{3}{3} =$
- $5 \times 1\frac{1}{2} =$
- $4 \times \frac{4}{5} =$
- $3 \times \frac{4}{3} =$

$$2 \times \frac{1}{4} =$$



$$2 \times \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$$

Glossary: fraction, mixed number, scaling, product

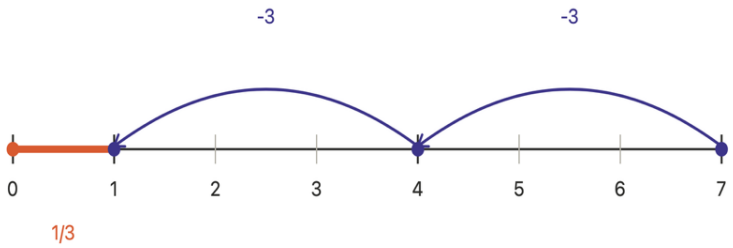
5.F.6 Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, using visual fraction models or equations to represent the problem.

Instructional Notes:

- Learning focuses on understanding that fractions represent division by interpreting a fraction as the numerator divided by the denominator. This understanding leads to solving real-world problems involving whole-number division by representing with visual models or equations.

Examples:

- $5 \div 2 = \frac{5}{2} = 2\frac{1}{2}$
- Three sandwiches are shared equally among four students. How much sandwich does each student receive? $3 \div 4 = \frac{3}{4}$ Each student receives $\frac{3}{4}$ sandwich.
- Represent $7 \div 3$ with a drawing and an equation.



The drawing shows there are 2 groups of 3 with 1 part of another group (or $\frac{1}{3}$) left over.

$7 \div 3 = 2\frac{1}{3}$

Glossary: fraction, numerator, denominator, mixed number, visual fraction model, equation

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5.F.7 Interpret division of a unit fraction by a non-zero whole number and compute such quotients.

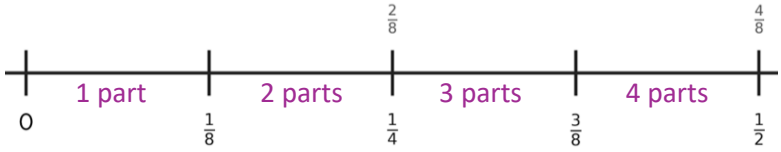
Instructional Notes:

- Learning focuses on understanding what division of a unit fraction by a whole number represents (i.e., splitting a fractional amount into equal groups) and then computing the quotient.
- Note: The use of visual models and reasoning to compute quotients will help students better understand this concept. Including the vocabulary term, reciprocal, will help students in future learning.

Examples:

- Jake is preparing an experiment, and he must equally divide $\frac{1}{2}$ cup of sugar into 4 containers. How much sugar will be placed in each container?

  $\frac{1}{2} \div 4 =$ Jake will place $\frac{1}{8}$ cup sugar in each container.



- Show why $\frac{1}{3} \div 5 = \frac{1}{15}$
- $\frac{1}{4} \div 3 = \frac{1}{12}$ and $\frac{1}{12} \times 3 = \frac{1}{4}$. How are these related?

Glossary: unit fraction, quotient

5.F.8 Interpret division of a whole number by a unit fraction and compute such quotients.

Instructional Notes:

- Learning focuses on understanding how many fractional parts are within a whole number and how to break those apart as well as using visuals to compute the quotient.
- Note: Teachers are encouraged to help students develop understanding of part size and unit fractions (i.e., as the total number of parts increases, the size of each part decreases).

Examples:

- $3 \div \frac{1}{4} =$ How many one-fourths are in 3?
- Show why $5 \div \frac{1}{2} = 10$.

Glossary: unit fraction, quotient

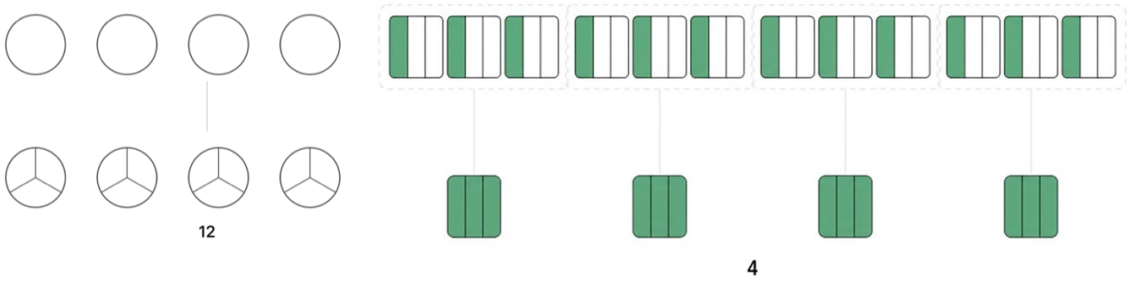
5.F.9 Divide unit fractions by whole numbers and whole numbers by unit fractions. Use visual fraction models and equations to represent and explain the relationship between multiplication and division.

Instructional Notes:

- Learning focuses on inverse operations and helping students understand that as with whole numbers (i.e., $12 \div 4 = 3 \; and \; 3 \times 4 = 12$), division with unit fractions follows the same pattern (i.e., $4 \div \frac{1}{3} = 12 \; and \; 12 \times \frac{1}{3} = 4$).
- Note: Visual models and equations should be used for students to see and explain the relationships.

Examples:

$4 \div \frac{1}{3} = 12$ $\qquad$ $12 \times \frac{1}{3} = 4$



Glossary: unit fraction, visual fraction model, equation

5.F.10 Solve real-world problems involving the division of unit fractions by whole numbers and whole numbers by unit fractions, using visual fraction models and equations to represent the problem.

Instructional Notes:

- Learning focuses on applying fraction division strategies to solve real-world problems involving unit fractions and whole numbers by using visual fraction models, equations, and reasoning to represent and explain the relationship between the quantities.

Examples:

- One-half pound of chocolate is shared equally among four students. How much does each student receive?
- How many $\frac{1}{4}$ cup servings are in 3 cups of cereal?

Glossary: unit fraction, visual fraction model, equation

Measurement

Measurement Concepts

5.M.1 Convert length, weight, mass, capacity, and time measurements from larger to smaller units and vice versa within the U.S. customary and metric measuring systems.

Instructional Notes:

- Learning focuses on developing students' understanding of the relationships among units within the U.S. customary and metric measurement systems. Students should use multiplication and division to accurately convert between larger and smaller units.
- Note: Students are not asked to convert or compare measurements between measurement systems.

Examples:

- How many minutes are in $\frac{1}{4}$ of an hour?
- How many minutes are in $1\frac{3}{4}$ of an hour?
- How many grams are there in 5 kilograms?

Glossary: length, weight, mass, capacity, U.S. customary, metric measuring system

Data

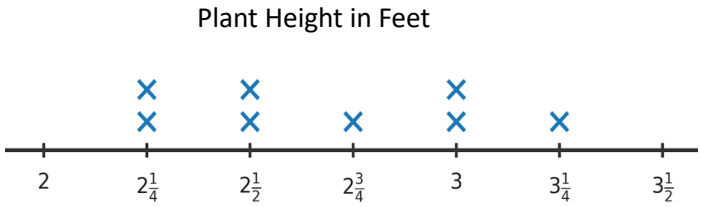
5.M.2 Create and use a line plot to display a data set of measurements to solve real-world problems involving information presented.

Instructional Notes:

- Learning focuses on collecting, organizing, and accurately representing measurement data on a line plot, then interpreting the data to solve real-world problems by identifying patterns, comparing values, and drawing evidence-based conclusions.
- Note: Teachers should encourage students to clearly display data using only required data points.

Examples:

- Ashley and Tim measured the plants at their homes and collected the following data:
  Plant heights in feet: $2\frac{1}{2},\ 3,\ 2\frac{1}{4},\ 3,\ 2\frac{3}{4},\ 2\frac{1}{2},\ 3\frac{1}{4},\ 2\frac{1}{4}$.
  Create a line plot displaying the data and use the plot to answer the following questions.
  - What is the difference in height between the tallest and shortest plants?
  - What does an X represent on the line plot?
  - How many plants are represented on this line plot?



Glossary: line plot, data

Geometry

Geometric Measurement

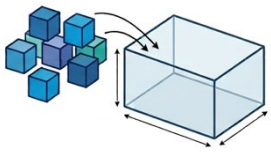
5.G.1 Use unit cubes and visual models to explore and explain volume as the amount of space inside a three-dimensional object.

Instructional Notes:

- Learning focuses on understanding that volume is the amount of space occupied by a three-dimensional object.
- Note: Teachers are encouraged to use visuals such as unit cubes and various sized containers (e.g., small gift box, tall rectangular box, long narrow box, etc.) to explore and explain the measurement of volume. Learning the formula for volume is not required with this standard.

Examples:

- Reinforce volume as the amount of space inside a three-dimensional object. Provide various sized rectangular prisms and discuss which prisms have the most space inside. The least space inside.
- Use cubic units to fill various rectangular containers.



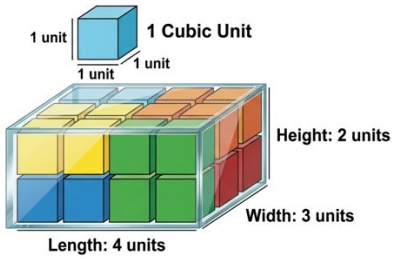
Glossary: unit cube, visual model, volume, three-dimensional

5.G.2 Understand a shape has a volume of n cubic units if it can be filled with n unit cubes without gaps or overlaps.

Instructional Notes:

- Learning focuses on building an understanding of how volume is measured (i.e., the need for cubic units).
- Note: Teachers are encouraged to liken measuring volume with cubic units to past experiences of measuring area with square units. In both cases, the object must be completely filled (or covered) without gaps or overlaps to accurately measure. This can be connected to the count of cubes to represent the total cubic units of space occupied.
- Standards 5.G.1 and 5.G.2 are closely related and may be taught in conjunction.

Examples:



Glossary: volume, cubic units,

5.G.3 Measure volume by cubic units using cubic cm, cubic in, cubic ft or cubic units.

Instructional Notes:

- Learning focuses on understanding that volume can be measured using different cubic units and that the most appropriate measurement unit is typically based on the situation. For example, measuring the volume of a refrigerator in cubic ft is more efficient than measuring the volume of a refrigerator in cubic in.
- Note: Help students understand how cubic units are labeled (i.e., cubic centimeters = cm^3).
- Note: Teachers are encouraged to reinforce volume as the amount of space the object occupies.

Examples:

- Help students identify benchmark items for various cubic units. Once students have gained a sense of capacity, then compile a list of items from around the school and ask students which cubic unit would best be used to measure the item.

Unit	Everyday Object	Best Used for Measuring
Cubic centimeter (cm^3)	Standard base ten unit cube or a single blueberry	Small objects, liquid volume in science (1 cm^3 = 1 ml)
Cubic inch (in^3)	Small wooden block or standard playing die	Medium small items like pencil boxes
Cubic foot (ft^3)	Standard basketball or large square box	Luggage, storage bins, trunk space in a car
Cubic meter (m^3)	Washing machine or dishwasher	Room size, large cargo container, pool capacity

Glossary: volume, cubic units

5.G.4 Find the volume of right rectangular prism by packing with unit cubes and show that the volume is the same as multiplying the edge lengths (or multiplying the height by the area of the base).

Instructional Notes:

- Learning focuses on connecting the number of cubes in one layer, the number of layers, and the dimensions of a rectangular prism to the formal formula for volume. This visual representation helps to reinforce volume as the total number of cubic units.

Examples:

- Using various rectangular prisms (boxes), ask students to fill the bottom of a box with unit cubes. Ask questions such as:
    - What dimensions does this bottom layer represent? Connect this layer to area of the bottom or base of the prism.
    - What dimension is needed to find volume?
    - Ask student to stack a column of unit cubes to the top to find the box's height. Once this dimension is found, students can compute volume by multiplying edge lengths.

Glossary: volume, right rectangular prism, unit cube, length, height, base

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5.G.5 Use threefold whole-number products of volume to represent the associative property of multiplication.

Instructional Notes:

- Learning focuses on using three-factor whole-number products to represent the volume of rectangular prisms and on how the associative property of multiplication allows factors to be grouped in different ways without changing the product and thus the volume.

Examples:

- Find the volume of a rectangular prim with dimensions: Length = 4 in, Width = 3 in, Height = 6 in

$(4 \times 3) \times 6 =$ $\quad$ $4 \times (3 \times 6) =$

$12 \times 6 =$ $\quad$ $4 \times 18 =$

72 in^3 $\quad$ 72 in^3

Glossary: threefold whole-number product, volume, associative property of multiplication

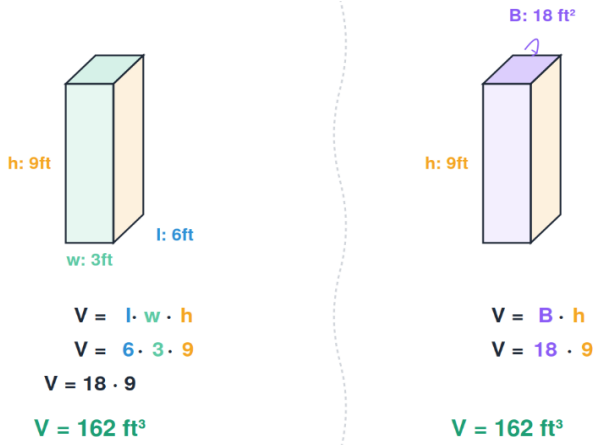
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5.G.6 Solve real-world problems by applying formulas (V=l • w • h, V=B • h) for rectangular prisms to find the volume of right rectangular prisms with whole number side lengths.

Instructional Notes:

- Learning focuses on applying known volume formulas to find volume of right rectangular prisms. This includes solving real-world volume problems using the dimensions of length, width, height and/or base area (if base is already known).
- Note: Students should distinguish B, the area of the base, from a single base edge, b.

Examples:



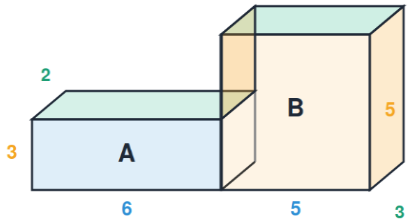
Glossary: formula, rectangular prism, right rectangular prism

5.G.7 Find volumes of solid figures composed of two non-overlapping right rectangular prisms (with whole number side lengths) by adding the volumes.

Instructional Notes:

- Learning focuses on finding the volume of composite solid figures by breaking them apart into two non-overlapping right rectangular prisms, calculating each prism's volume, and adding the volumes together to determine the total space occupied.

Examples:



Shape A		Shape B		Total Volume
$2 \times 3 \times 6$	+	$5 \times 5 \times 3$	=	111 cubic units
36 cubic units		75 cubic units		

Glossary: volume, right rectangular prism, volume

Shapes

5.G.8 Understand attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

Instructional Notes:

- Learning focuses on understanding how attributes of two-dimensional figures are shared among categories/subcategories and knowing that they may fit in more than one category based on defining properties.

Examples:

	Shape Attributes
Quadrilateral	4 sides, 4 angles
Parallelogram	2 pairs of parallel sides
Rectangle	A parallelogram with 4 right angles
Rhombus	A parallelogram with 4 equal sides
Square	A parallelogram, rectangle, and rhombus: It has 4 equal sides and 4 right angles.

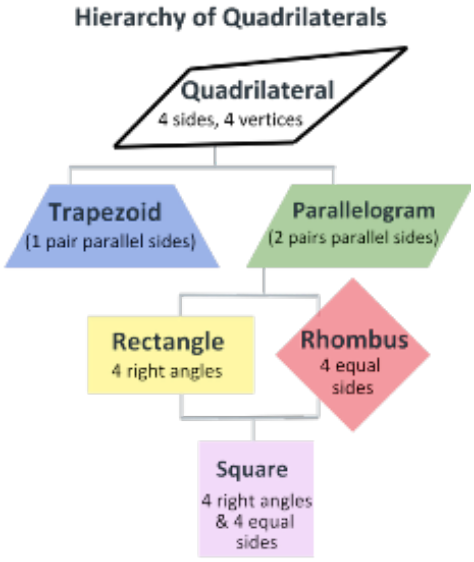
Glossary: attributes, two-dimensional

5.G.9 Classify two-dimensional figures in a hierarchy based on properties.

Instructional Notes:

- Learning focuses on an understanding of the properties of two-dimensional figures for classification.

Examples:



Glossary: two-dimensional

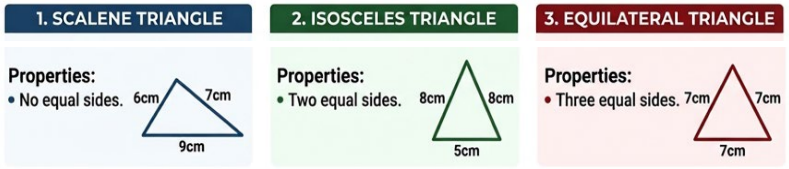
5.G.10 Identify and draw triangles based on their attributes (side lengths and angle measures). Understand that triangles can be classified into categories (such as equilateral, isosceles, scalene, acute, right, and obtuse), and that these categories can overlap.

Instructional Notes:

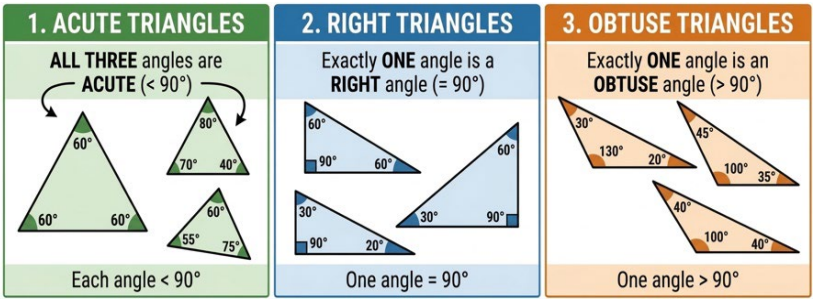
- Learning focuses on understanding attributes of triangles and how to classify triangles using side-length and angle-measure attributes.
- Note: Triangles are classified by both side lengths and angle measures.

Examples:

Classifying triangles by sides



Classifying triangles by angles



Glossary: triangle, attributes, angle measure, equilateral triangle, isosceles triangle, scalene triangle, acute triangle, right triangle, obtuse triangle

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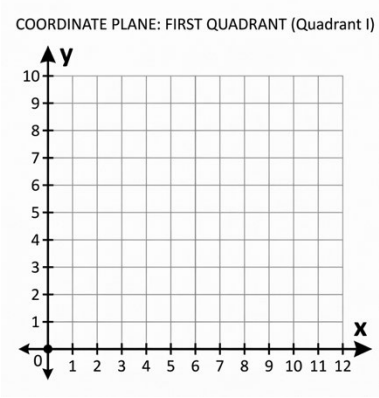
Coordinate Plane System

5.G.11 Understand a coordinate plane to be a diagram for graphing two related pieces of information with two perpendicular number lines.

Instructional Notes:

- Learning focuses on understanding what a coordinate plane is (i.e., perpendicular number lines that intersect at point (0,0) to form x- and y- axes) and how a coordinate plane displays information.

Examples:



Glossary: coordinate plane, perpendicular

5.G.12 Identify the origin, x-axis, and y-axis on the coordinate plane.

Instructional Notes:

- Learning focuses on identifying the parts of a coordinate plane with the correct terminology.
- Note: Standards 5.G.11 and 5.G.12 are closely related and may be taught in conjunction.

Examples:

- When given an example of a blank coordinate plane, students should be able to locate and accurately label the *x-axis*, the *y-axis*, and explain that the origin is the point where the x- and y-axes meet to form point (0,0).

Glossary: origin, x-axis, y-axis, coordinate plane

5.G.13 Identify x- and y-coordinates of points on a coordinate plane.

Instructional Notes:

- Learning focuses on locating points in the correct order: horizontal movement first and vertical movement second.

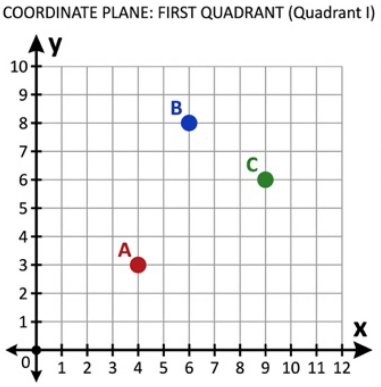
Examples:

Label the ordered pairs.

Point A =

Point B =

Point C =



Glossary: x-coordinate, y-coordinates, coordinate plane

5.G.14 Understand the x-coordinate of an ordered pair as the point's location on the coordinate plane relative to the y-axis, and the y-coordinate of an ordered pair as the point's location on the coordinate plane relative to the x-axis.

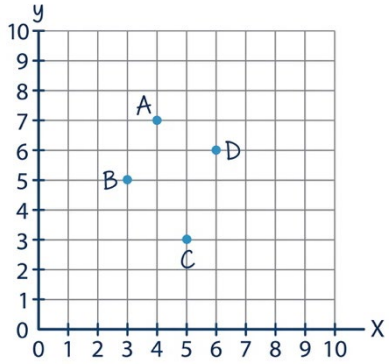
Instructional Notes:

- Learning focuses on understanding that a data point's location on a coordinate plane is determined by information from both the x- and y-axes (i.e., an ordered pair). Students should be able to identify the x-coordinate, the y-coordinate, and locate the data point on the coordinate plane.

Examples:

A student plotted the following data points on a coordinate plane. Which point is not plotted correctly? What mistake did the student make?

- Point A: (7, 4)
- Point B: (3, 5)
- Point C: (5, 3)
- Point D: (6, 6)



Glossary: x-coordinate, y-coordinate, ordered pair, coordinate plane, x-axis, y-axis

5.G.15 Represent and interpret real-world and mathematical problems by graphing points in the first quadrant on a coordinate plane.

Instructional Notes:

- Learning focuses on using data from everyday situations to graph ordered pairs in the first quadrant. Students should be able to interpret and explain how the coordinate pairs represent and help solve real-world and mathematical problems.

Example:

- Beth's little sister, Peg, tracked how many minutes she read each day for 7 days, and Beth helped her display her work on a graph. Create three questions that can be answered using the data presented in this graph.
    - How many minutes did Peg read on day 4?
    - How many more minutes did Peg read on day 5 than on day 2?
    - How many minutes did Peg read in all during the 7 days?



Glossary: quadrant, coordinate plane

Mathematical Fluency

5.MF.1 Fluently multiply multi-digit whole numbers using an algorithm, including but not limited to the standard algorithm.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation.
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Example:

- A school bought 248 notebooks. Each notebook cost $12. How much did the school spend on notebooks?

$$\begin{array}{r} 248 \\ \times\ 12 \\ \hline 496 \\ +\ 2480 \\ \hline 2976 \end{array}$$

The school spent $2976 on notebooks.

Glossary: fluently, algorithm, standard algorithm

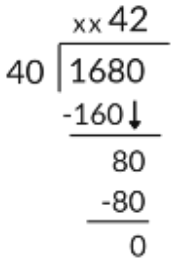
5.MF.2 Fluently divide multi-digit whole numbers using an algorithm, including but not limited to the standard algorithm.

Instructional Notes:

- Learning focuses on the ability to perform the skill accurately and quickly, with no effort or hesitation
- Practice makes it stick. Teachers are encouraged to play games, use flash cards, timed practice, and challenge students for quick recall.

Example:

- A school has 1,680 students going on a field trip. Each bus holds 40 students. How many buses will the school need?



The school needs 42 buses.

Glossary: fluently, algorithm, standard algorithm

3-5 GLOSSARY

ACUTE ANGLE	An angle that measures between 0° and 90°.
ACUTE TRIANGLE	A triangle where all three interior angles measure less than 90°
ADDITIVE ANGLES	Adjacent angles that share a common vertex and side without overlapping.
ADDITIVE COMPARISON	Math concept used to determine exactly how much larger or smaller one quantity is compared to another using phrases such as “how many more” or “how many less.”
ALGORITHM	A step-by-step set of instructions or rules designed to solve a problem or perform a computation.
ANGLE	Formed by two rays, called sides, that share a common end point known as the vertex.
ANGLE MEASURE	The size of the angle created where two rays (sides) meet at a common endpoint (the vertex).
AREA	The amount of space occupied by a two-dimensional flat surface or shape.
AREA MODEL	Visual mathematical tool that uses a rectangle to represent multiplication or division.
ARITHMETIC PATTERNS	A sequence of numbers arranged in an order where the difference between any two consecutive terms is always constant.
ARRAY	An orderly arrangement of similar objects, numbers, or data points, typically laid out in rows and columns.
ASSOCIATIVE PROPERTY OF ADDITION	When adding three or more numbers, the way they are grouped (by parentheses) does not change the sum.
ASSOCIATIVE PROPERTY OF MULTIPLICATION	When multiplying three or more numbers, the way they are grouped (by parentheses) does not change the product.
ATTRIBUTES	Specific characteristics, traits, or properties of shapes, numbers, or objects used to describe, compare, and classify them.
BAR GRAPH	A visual data tool that uses horizontal or vertical rectangular bars to compare numerical values across discrete categories.
BASE	Side of the polygon that is used to measure its height or area.
BENCHMARK FRACTION	Easily visualized fractions (like $0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1$) used as a reference point to help with estimates, comparisons, ordering, and understanding the size of a less common fraction.
CAPACITY	The maximum amount a container can hold.
CIRCLE GRAPH	A visual graph used to display data using a circle divided into sectors (slices) where bigger sectors represent larger proportions of data and smaller sectors represent smaller proportions of data.
COMMON DENOMINATOR	A shared multiple of the bottom numbers (denominators) in a set of fractions

COMMUTATIVE PROPERTY	The concept that changing the order of the addends in an addition problem not change the total sum.
COMPOSE	Combining smaller parts to form a larger whole.
CONVERSION	Changing a measurement from one unit to another.
COORDINATE PLANE	A flat, two-dimensional surface formed by two intersecting number lines used to visually graph points, shapes and equations.
CUBIC UNITS	A standard measurement of volume or three-dimensional space.
DATA	Collection of facts, figures, measurements, or observations.
DECIMAL NOTATION	A base-10 method of writing numbers that uses digits (0-9) and a decimal point to represent both whole numbers and fractions (parts of a whole).
DECIMAL NUMBER	A number with a whole part and a fractional part separated by a decimal point.
DECOMPOSE	Breaking down a larger whole to form smaller parts.
DEGREES	Standard unit of measurement used to describe the size of an angle or how much an object turned.
DENOMINATOR	The number on the bottom of a fraction indicating how many equal parts the whole is divided into.
DISTRIBUTIVE PROPERTY OF MULTIPLICATION	Rule stating that multiplying a number by a group of numbers add (or subtracted) together is the same as doing each multiplication separately.
DIVIDEND	The total number that is being divided into smaller, equal groups (the number being divided).
DIVISOR	How many equal parts the total is being split into (the number being divided by).
ENDPOINT	A specific point that marks where a geometric figure-such as a line segment or a ray-begins or terminates.
EQUATION	A mathematical sentence where two expressions are equal, indicated by an equal sign.
EQUILATERAL TRIANGLE	A triangle with all three sides of equal length.
EQUIVALENT	Equal in value, amount, function, meaning, or effect (not necessarily identical).
EXPANDED FORM	A way to write numbers by breaking them down into the sum of the place value of each digit.
FACTOR	A number or quantity that divides another number evenly, leaving no remainder or numbers you multiply together to get a product.
FLUENTLY/FLUENCY	The ability to perform a skill accurately and quickly, with little effort or hesitation.
FORMULA	A concise rule or fact expressed using mathematical symbols.
FOURTHS	One of four equal parts that make up a whole.
FRACTION	A part of a whole or any number of equal parts.
FRACTIONAL	Pertains to a fraction or indicates a portion of a whole.
HALVES	Two equal parts that make up a whole.
HEIGHT	The vertical distance from the base of a shape or object to its highest point.
IDENTITY PROPERTY OF ADDITION	The sum of any number and zero is equal to the original number

IMPROPER FRACTION	Type of fraction where the numerator is greater than or equal to the denominator.
INTERSECTING	Point, line, or area that two or more objects share.
INVERSE OPERATIONS	Reverse operations that undo the effect of the other operation to return to the original number.
LENGTH	The measurement of distance from one end of an object to the other.
LINE	A straight, one-dimensional figure that has infinite length but no thickness or width.
LINE GRAPH	Visual data tool that tracks change over time by connecting individual data points with a line
LINE PLOT	A graph that displays data frequency along a horizontal number line by using marks placed above each data value to show how often that value occurs.
LINES OF SYMMETRY	An imaginary line that divides a shape or object into two identical halves, where one half is the exact mirror image of the other.
MASS	Amount of matter contained within an object.
METRIC (MEASURING) SYSTEM	A decimal-based system of measurement including meter, kilogram, and seconds as units of measure.
MIXED NUMBER	A number that combines a whole number and a proper fraction.
MULTIPLE	The number you get when you multiply a given number by an integer.
MULTIPLICATIVE COMPARISON	Math concept used to determine exactly how much larger or smaller one quantity is compared to another using phrases such as “how many times as many” or “times as much.”
NON-POLYGON	Any shape that has open or curved sides and is not two-dimensional.
NUMERATOR	Number on the top of the fraction which indicates how many parts of a whole are being counted or divided.
NUMERICAL EXPRESSION	Mathematical phrase that combines numbers and operation symbols to represent a specific value.
OBTUSE ANGLE	An angle that measures greater than $90°$ but less than $180°$
OBTUSE TRIANGLE	A triangle with one obtuse interior angle (greater than $90°$).
ORDER OF OPERATIONS	A universal set of rules in mathematics that establishes the exact sequence in which you should calculate a multistep expression.
ORDERED PAIR	Set of two numbers used to locate a point on a coordinate grid or represent a relationship.
ORIGIN	The exact central point where the horizontal x-axis and vertical y-axis intersect.
PARALLEL LINES	Two or more straight lines in the same plane that are always the exact same distance apart and never intersect.
PARALLELOGRAM	A four-sided shape in which both pairs of opposite sides are parallel and equal in length.
PERIMETER	The total distance around the outside of a two-dimensional shape.
PERPENDICULAR	Lines, planes, or surfaces that meet or intersect at exactly a right angle ($90°$).
PERPENDICULAR LINES	Lines that meet or intersect at exactly a right angle ($90°$).
PLACE VALUE	The numerical value a digit holds based on its position within a number.
POINT	An exact position or location-has no length, width, or depth.

POLYGON	A closed, two-dimensional figure made up of three or more straight line segments or sides.
PRODUCT	The result of a multiplication problem.
PROTRACTOR	Geometric tool used to measure and draw angles.
QUADRANT	One of the four sections of a coordinate plane divided by a horizontal x-axis and a vertical y-axis.
QUADRILATERAL	A two-dimensional polygon with exactly four straight sides, four angles, and four vertices.
QUARTERS	One of four equal parts of a whole.
QUOTIENT	The result of a division problem.
RAY	Part of a line having one fixed point and the other point does not have an end.
RECTANGLE	A quadrilateral with four right angles (square corners) and two pairs of opposite sides that are parallel and equal in length.
RECTANGULAR ARRAY	An arrangement of objects into rows and columns that form a rectangle.
REMAINDER	The amount left over when a number cannot be divided evenly.
RHOMBUS	A quadrilateral with four equal sides and opposite sides parallel. Opposite angles are congruent.
RIGHT ANGLE	An angle that measures exactly $90°$ forming a “square corner.”
RIGHT RECTANGULAR PRISM	A three-dimensional shape with six rectangular faces and six angles.
RIGHT TRIANGLE	A triangle with one interior angle that measures exactly 90 degrees.
SCALED TABLE	A data display where each symbol, unit, or grid line represents more than one count of an item.
SCALENE TRIANGLE	A triangle where all three sides have different lengths and all three interior angles have different measures.
SCALING	Changing the size of an object, shape, or number by multiplying its dimensions by a constant value called a scale factor.
SEGMENT	A straight part of a line that has two fixed end points.
SQUARE	A quadrilateral with four equal sides and four right angles (square corners).
SQUARE UNIT	A standard unit of measurement used to find the area or flat space of a two-dimensional shape.
STANDARD ALGORITHM	A step-by-step, traditional procedure used to solve multidigit arithmetic operations like addition, subtraction, multiplication, and division
STANDARD FORM	A method of representing numbers by writing numbers using digits.
STRAIGHT ANGLE	An angle that measures exactly 180 degrees which looks like a straight line.
THREE-DIMENSIONAL	A shape that has three measurable dimensions-length, width, and height.
THREEFOLD WHOLE-NUMBER PRODUCT	the multiplication of three whole numbers together, written as $a \times b \times c$ used in elementary math to find the volume of a rectangular prism ($length \times width \times height$).
TILING	The covering of a flat surface or plane using one or more geometric shapes with no gaps or overlaps.
TRAPEZOID	A quadrilateral with four straight sides that has at least one pair of parallel sides.
TWO-DIMENSIONAL	A shape that has two measurable dimensions, typically length and width.
U.S. CUSTOMARY	The system of measurement used for everyday life in the United States.
UNIT CUBE	A cube where every edge has a length of exactly one unit.

UNIT FRACTION	Any fraction that has a 1 as the numerator (top number) and a positive whole number as the denominator (bottom number).
VISUAL FRACTION MODEL	A picture, diagram, or object that shows a fraction as a part of a whole, a distance on a number line, or a part of a group.
VISUAL MODEL	A picture, diagram, or physical object used to represent numbers and solve problems.
VOLUME	The amount of space that a three-dimensional object occupies.
WEIGHT	The measure of how heavy an object is based on the force of gravity pulling it down.
WORD FORM	A method of representing numbers by writing them out in words.
X-AXIS	The horizontal number line on a graph that runs left and right through zero.
X-COORDINATE	The first number in an ordered pair (x, y) that shows a point's horizontal position on the Cartesian Plane.
Y-AXIS	The vertical number line on a graph that runs up and down through zero.
Y-COORDINATE	The second number in an ordered pair (x, y) that shows a point's vertical position on the Cartesian Plane.