Grade 4 Math Unit 3

Content Area: **Mathematics**
Course(s):
Time Period: **Trimester 3**
Length: **59 days**
Status: **Published**

Brief Summary of Unit

In this unit, students learn that a fraction is a multiple of a unit fraction and that a multiple of a fraction is also a multiple of a unit fraction. Students will solve word problems involving the multiplication of a fraction by a whole number.

In addition, students will learn to write a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100. Students will add fractions with unlike denominators of 10 and 100. Next, students will use a place value chart to understand the value of a decimal in tenths or hundredths. Students will learn to write fractions with denominators of 10 and 100 as decimals and write decimals in tenths or hundredths as fractions. Students will use their understanding of place value to compare decimals to tenths and hundredths.

Next, students will apply their knowledge of time and money to solve word problems that involve all four operations. The problems involve converting larger units of measurement to smaller units. Students will also apply their knowledge of length, liquid volume, mass and weight to solve word problems that involve all four operations. They will solve problems that involve converting larger units of measurement to smaller units.

In this unit, students will identify, name, and draw geometric figures including points, line segments, lines, rays, and angles (right, acute, obtuse) as well as parallel and perpendicular lines and line segments. Students will also build on their understanding of angles and use a protractor to measure and draw angles. Students will use benchmark angles to estimate the measure of angle. Additionally, students will compose and decompose angles and find unknown angle measurements by adding and subtracting angles of known measure. Finally, students will classify figures and learn to name triangles as equilateral, isosceles or scalene as well as right, obtuse and acute. Students will build on their understanding to reason about lines of symmetry in two-dimensional figures.

Revision Date: August 2024

Essential Questions/Enduring Understandings

Essential Questions:

- How can I model the multiplication of a whole number by a fraction?
- How can I multiply a whole number as a fraction?

- How are decimals and fractions related?
- How are fractions with the denominator of 10 and 100 written in decimal notation?
- How do you compare decimals?
- How do you know how to convert larger units of measure to smaller units of measure?
- How do benchmark angles help you measure angles?
- How do we measure an angle using a protractor?
- How can angles be composed or decomposed to create other angles?
- How are triangles alike and different?
- How can angle and side measures help to create and classify angles?
- What is symmetry?
- Where is geometry found in your everyday world?

Essential Understandings:

- Students will understand that fractions are numbers that work like whole numbers, knowing whole numbers will help you add, subtract, multiply, and compare fractions.
- Students will understand that you can use what you know about fractions to write and compare decimals.
- Students will understand that when you convert larger units of measure to smaller units of measure you will have more smaller units than larger units.
- Students will understand that points, lines, line segments, rays and angles are geometric figures, knowing about these figures help to classify shapes based on their attributes.
- Students will understand that you can use what you know about benchmark angles to estimate the size of an angle or you can measure it accurately with a protractor.
- Students will understand that you can use what you know about angles and parallel and perpendicular lines to classify figures.

Students Will Know/Students Will be Skilled At

Students will know:

- How to multiply a fraction by a whole number for example: 3 x ½ = 3/2.

- How to write decimals as fractions and write fractions as decimals, for example: 0.75 = 75/100.
- How to compare decimals, for example: 0.65 < 0.7.
- How to solve problems about time and money.
- How to solve problems about length, liquid volume, mass and weight.
- How to identify points, lines, line segments, rays, and perpendicular and parallel lines, for example: a plus sign has perpendicular lines.
- How to measure angles using a protractor, for example: an angle on a stop sign is 135°.
- How to add and subtract angle measures to solve problems.
- How to classify two-dimensional figures based on sides and angles, for example: squares and rectangles have parallel sides.
- drawing and identifying lines of symmetry in shapes, for example: a square has 4 lines of symmetry.

Students will be skilled at:

- Multiplying a fraction by a whole number for example: 3 x ½ = 3/2.
- Writing decimals as fractions and writing fractions as decimals, for example: 0.75 = 75/100
- Comparing decimals, for example: 0.65 < 0.7.
- Solving problems about time and money.
- Solving problems about length, liquid volume, mass and weight.
- Identifying points, lines, line segments, rays, and perpendicular and parallel lines, for example: a plus sign has perpendicular lines.
- Measuring angles using a protractor, for example: an angle on a stop sign is 135°.
- Adding and subtracting angle measures to solve problems.
- Classifying two-dimensional figures based on sides and angles, for example: squares and rectangles have parallel sides.
- Drawing and identifying lines of symmetry in shapes, for example: a square has 4 lines of symmetry.

Learning Plan

Daily Warm-ups (5-10 minutes):

*As an opening to each math lesson, the instructor can use these different routines

- Number Talks- District Created Resource (Linked Below in Materials)

- Number Bounce- Begin this routine by telling your students that you will count forward or backward by ones starting with a specific number and ending with a specific number. Let your students know that when you tap them, they will have to say the next number. Here is one example using the start number 213 and the end number 235. Start counting forward by ones like: 213, 214, 215, 216. Next, tap a student on the shoulder. The student says 217. Then continue counting: 218, 219, 220. Tap a different student. The student says 221. Continue to count in this way until I have given most of the students an opportunity to answer. The student who says the last number in the sequence says, "235. Bounce" and gets the opportunity to do a 20-second celebratory dance. This routine also works well for fractions and decimals.

- Base Ten Toss- A beach ball or bean bag is recommended when implementing this routine. Begin this routine by telling your students that they will count in base ten language until they reach a base ten decade with no ones (example: 3 tens 0 ones or 30, 4 tens 0 ones or 40). For this routine, students stand in a circle. After one student counts in base ten language (ex. 7 tens 5 ones…75), he or she passes a beach ball or bean bag to the person standing next to them. When a student says a base ten decade with no ones (ex. 8 tens 0 ones…80) they get the opportunity to toss the beach ball to any classmate of their choice. For example: Count forward starting with 5 tens 9 ones…59. Next person 6 tens 0 ones..60, next person 6 tens 1 one…61, etc. This routine works for larger numbers and decimals as well. Students can add on hundreds (ex. 6 hundreds 9 tens and 8 ones…698) or hundredths (ex. 6 tens 7 ones and 37 hundredths…67.37). For more of a challenge, they can count backward.

- Amazing Race: Students work in pairs to decompose a given number in as many different ways as they can. You should provide each partner pair with a blank piece of paper or this sheet. You can give your students 5 – 10 minutes to record as many different ways to represent the number as possible. After the time is up, 1 or 2 partner pairs can randomly be selected to share what they recorded, in front of the class. This routine can easily be adapted to fractions or decimals. For example, you can write 7/10 or 0.7 as the number of the day. Students get a chance to be as creative as possible when recording. When you first start this routine, your students may only have 2 or 3 different ways. That's OKAY….. If you consistently use this routine your students will evolve and ultimately fill the page! As a quick tip, you can award team points to partner pairs that had the most inventive and correct ways. It is very important to check for accuracy.

- Number Strings- This routine helps to build students' mental math capabilities. The teacher writes a problem horizontally on the board in a whole group or small setting. The students mentally solve the problem and share with the whole group how they solved it. They must justify and defend their reasoning. The teacher records the students' thinking in an open number line and poses extended questions to draw out deeper understanding for all. The teacher can have students share other students' strategies to the whole group or with turn and talk. Eventually provide a few number sentences on the board to solve within 20 and multiplication to te and model how you can use mental math strategies to solve them in a snap just like they would on a fact test, then let them try solving in a snap as you point to each number sentence.

1. Fourth graders need to be fluent in multiplying and dividing to twelve. This is a skill that should be worked on throughout the year utilizing the Ready Math Program and supplemental resources that are located under materials.

2. Understand Fraction Multiplication- Instruct students that a fraction is a multiple of a unit fraction. This, in turn, means that a multiple of a fraction is also a multiple of a unit fraction. Students should be taught that these concepts provide a foundation for understanding what it means to multiply a fraction by a whole number. Students should be instructed to use visual fraction models and the concept of repeated addition to provide meaning for these computations.

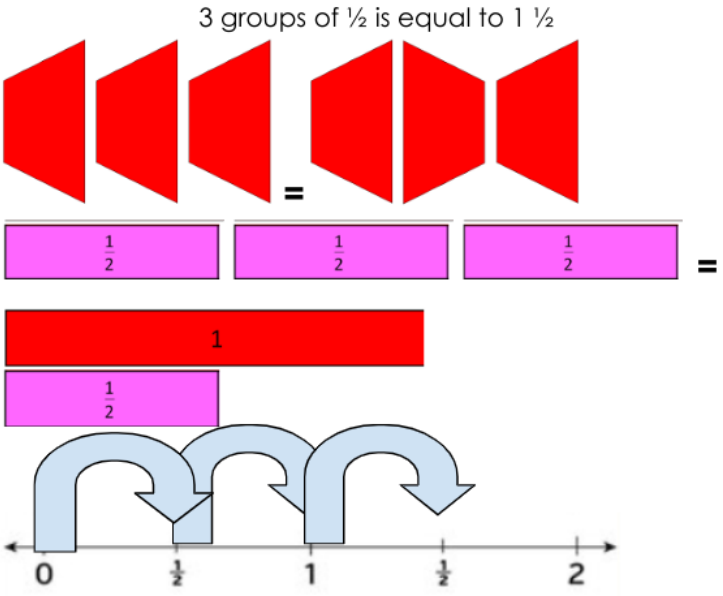
a. Complete Lesson 23, Sessions 1-3 (3 days)

b. Possible strategies include but are not limited to:

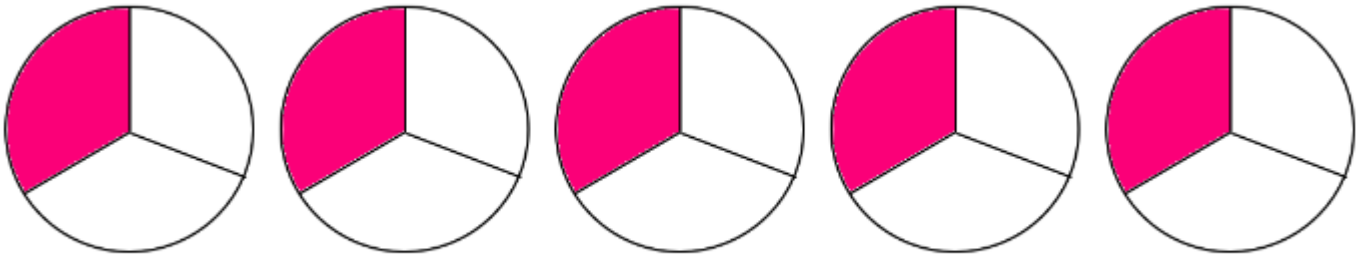
i. It is important that students understand multiplication as equal groups before they multiply fractions. In equal groups problems one factor is the 'multiplier' which tells us the number of groups and the other factor is the 'measure' which tells us the number of objects or the amount in each group. It is also important that students have context to multiplying so that when they get to the upper grades to multiplying partial groups.

1. For example: Gracyn poured three containers of water into her big jug. If each container had ½ cup of water in it, how many cups are in Gracyn's jug?

2. The math tools to help students develop understanding of multiplying fractions can be but not limited to the following: pattern blocks, fraction tiles, and number lines. Here is how it would look using each tool:

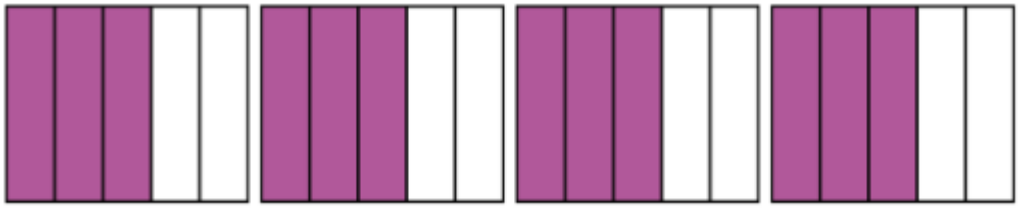


ii. Students should also be exposed to pictorial models that represent a problem to determine that multiplication sentence. For example: show the students the following pictures and then have them create the equation: ____ groups of ____ is equal to _____ or ___ x ____ = ____.

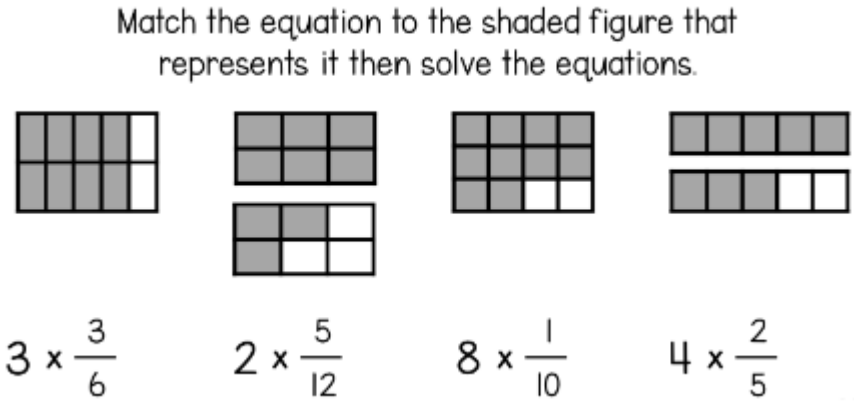


5 groups of ⅓ is equal to 1 ⅔ OR 5 x ⅓ = 1 ⅔

iii. Finally, students should be given an equation and then create the picture that matches the equation. For example 4 x ⅗ could look like this:



iv. You can also provide the problem and ask students to determine what the model is that represents the problem. See the example below:



c. Lesson Vocabulary: denominator, fraction, multiplication, multiply, numerator, product

3. Multiply Fractions by Whole Numbers- Students should be taught that this lesson builds off the previous lesson. Instruct students to represent and solve word problems involving the multiplication of a fraction by a whole number. Instruct students on the understanding of the process and meaning of multiplying a fraction by a whole number.

a. Complete Lesson 24, Sessions 1-3 (3 days)

b. Possible strategies include but are not limited to:

   i. Students should solve a variety of word problems and use repeated addition to check their answer. Students can use number lines and models to help them solve problems. (See previous

lessons for examples.

ii. Possible word problems:

One serving of goldfish crackers is about ⅕ of the whole box of goldfish crackers. Jess ate 4 servings. What fraction of the box did she eat?	Colin is making a bowl of slime for his little cousins. The recipe calls for ¾ of a cup of glue. Colin wants to make 5 bowls. How much glue does Colin need?
Kylie read ⅕ of her book each night for 5 nights. How much of her book did Kylie read in all?	Kailana and Emma use 2/16 of a piece of ribbon for each treat bag they tie. How much ribbon do they use after making 6 treat bags?
Sebastian and Grace use 2/12 of a cup of water to water their plants. How much water do they use if they water 5 plants?	Benjamin plays Animal Crossing for ⅖ of an hour. Joseph plays 3 times that amount. How long does Joseph play Animal Crossing?
Kellan fill's his pet fish Petey's tank with ⅘ of a gallon jug. He used the jug 9 times. How many gallons did he fill Petey's tank with?	Brain and Joey spend 3/12 of the day driving to the beach and the same amount driving home. What fraction of the day do Brian and Joey spend driving to the beach and back?
Julian and Landon spend ⅘ of an hour reading each day. How many hours do they read over 4 days?	Brielle and Ava plant seeds in 10 pots. They use 2/6 of a bog of seeds for each pot. How many bags of seeds do Brielle and Ava use?

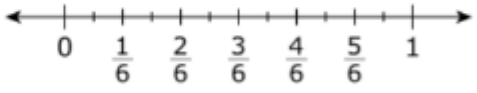
iii. Students should be exposed to these types of questions as well:

Example Stem: Enter the unknown number that makes the equation true.

$$\frac{4}{12} = \square \times \frac{1}{12}$$

Explain how to find $2 \times \frac{5}{12}$ using the number line.

Find the product.



Enter your answer and your explanation in the space provided.

Are the expressions in the table equal to $4 \times \frac{2}{6}$? Choose "Yes" or "No" for each expression.

Expression	Equal to $4 \times \frac{2}{6}$?
$4 \times \frac{4}{6}$	Yes / No
$4 \times \frac{1}{3}$	Yes / No
$8 \times \frac{1}{6}$	Yes / No

iv. Possible problem: The Penny

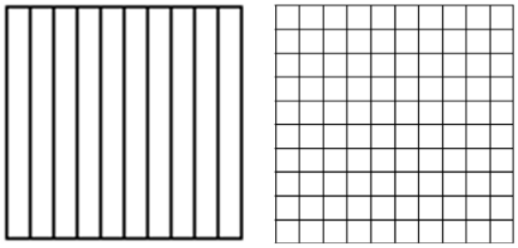
c. Lesson Vocabulary: denominator, fraction, multiply, numerator, product

4. Fractions as Tenths and Hundredths- Students should be taught to extend their work with equivalent fractions, and learn to write a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100. Instruct students how to add fractions with unlike denominators of 10 and 100.

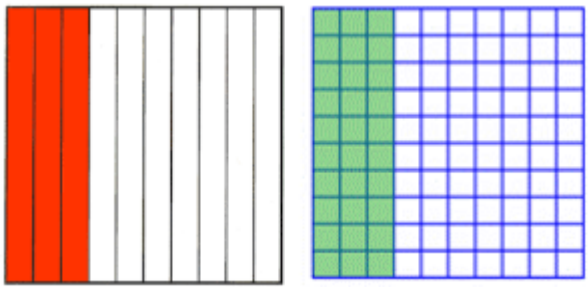
a. Complete Lesson 25, Sessions 1-3 (3 days)

b. Possible strategies include but are not limited to:

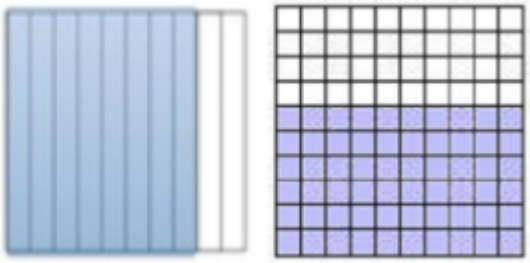
i. Students should have practice writing tenths fractions as hundredths fractions. One way to do this is to use grids or ten and hundred.



Students should see that 3/10 and 30/100 show the same area.

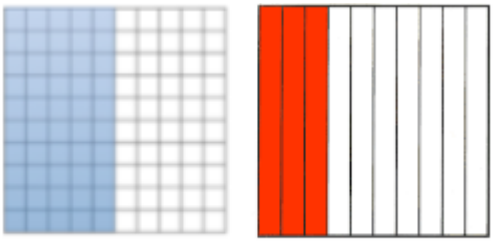


ii. Once students understand the equivalent fractions on the grids, share problems in which students work with different numerators. For example, Colin ran 8/10 of a mile. Gracyn ran 60/100 of a mile. Who ran more?



Students will see that although 8 is smaller than 60, the sizes of the 8/10 are larger than the 60/100 and therefore Colin ran more.

Another example of a word problem could be: Dave had 100 pages of their book left to read. He read 50/100 of his book on Monday and 3/10 on Tuesday. What fraction of pages did Dave read?



50/100 + 30/100 = 80/100

c. Lesson Vocabulary: hundredths, tenths, denominator, equivalent fractions, fraction, numerator

5. Relate Decimals and Fractions- Students should be taught how decimals are related to fractions. Instruct students to use a place value chart to understand the value of a decimal in tenths and hundredths. Instruct students to write fractions with denominators of 10 and 100 as decimals and, conversely, to write decimals in tenths and hundredths as fractions.

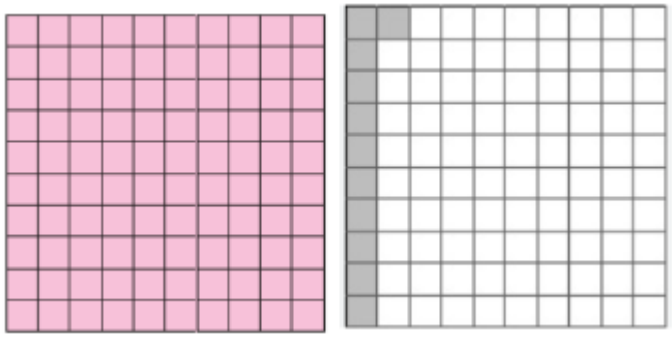
a. Complete Lesson 26, Sessions 1-4 (4 days)

b. Possible strategies include but are not limited to:

i. Oftentimes students have difficulty with understanding the value of a decimal even when using a place value chart. It can be confusing to students to rename the place value blocks that they know well. This technique is from Marilyn Zecher. Give students a cube of clay and explain that this cube represents 1 whole. (The cube should be close to the size of a place value block that is used as one because that is where your decimals come from, they are part of that 'one'.) Next, use a flosser (see picture) to cut the cube into ten pieces (flat). Use a place value chart to show that these are "tenths" and that the pattern of place value continues to the right of the

decimal point (these flat tenth pieces are the same shape as the hundreds blocks in base 10). Next, you can cut 1 tenth of clay into ten pieces, and name them “hundredths” (rod). This is a good small group activity however it can be used with the whole class.

Have students show the decimal in a fraction model as well. The decimal above would look like: $1\ {}^{11}/_{100.}$

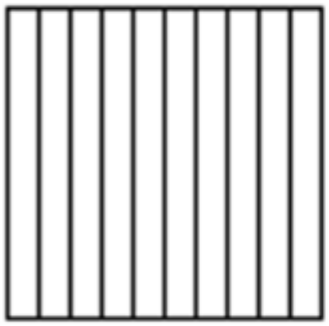


ii. You can use the visual of the clay and fraction grid visuals to have students write the decimals and help with pronouncing a decimal. One way to do this is to introduce it with a word problem like the ones below:

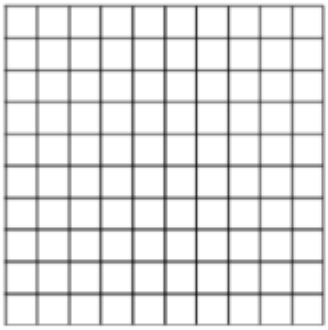
In Andre's neighborhood, 2 out of 10 boys have a basketball hoop on their driveway. How can you write $^{2}/_{10}$ as a decimal? Explain.

Decimal:_____

Example 1:



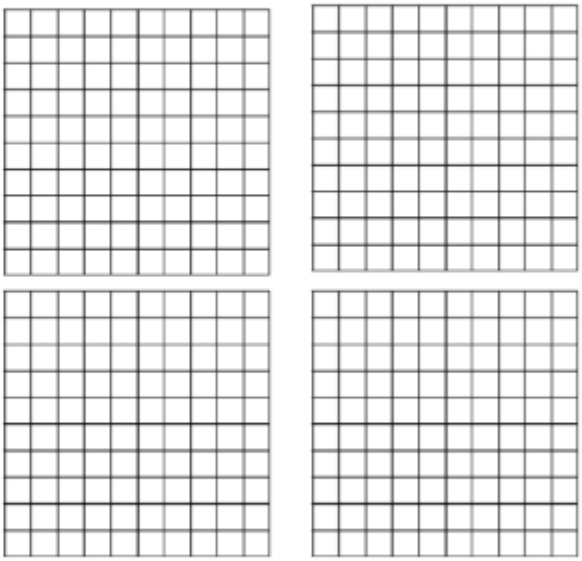
Example 2:



Ones		Tenths	Hundredths
	.		

Joey has $3\ ^{8}/_{100}$ gallons of water leftover from baseball practice. How would you write this as a decimal?

Decimal: _____



Ones		Tenths	Hundredths
	.		

iii. Fraction Art Slideshow and Recording Sheet- Students will create pixel art to identify fractions and decimals.

iv. Students should solve problems like these during their practice:

What is the decimal form of each fraction?

Drag and drop the correct decimal form into the box below each fraction.

0.8	0.9	0.08	0.09	0.008	0.009

Fraction Form	$\frac{9}{100}$	$\frac{8}{10}$
Decimal Form		

c. Lesson Vocabulary: decimal, decimal point, Review the following key terms: decimal point, denominator, equivalent fractions, fraction, numerator

6. Compare Decimals- Instruct students to build on their knowledge from previous lessons in which they learned about decimals and related them to equivalent fractions with denominators of 10 and 100. Students should be taught to use their understanding of place value to compare two decimals. Students should be taught to use visual models and place value charts to compare decimals to tenths and hundredths.

a. Complete Lesson 27, Sessions 1-4 (4 days)

b. Possible strategies include but are not limited to:

i. In a previous lesson students compared fractions using the grid models, in these lessons, students will begin using the grid models to compare fractions. It is important to show students examples that look like the following as they are the most commonly confused:

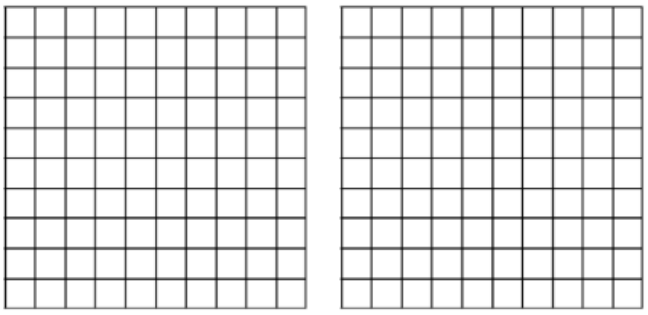
1. 0.6 and 0.60

2. .5 and 0.5

3. .01 and .1

ii. Attempt to give the students context with their word problems such as the sample below:

Sarah measures two bugs. The butterfly was. 0.80 cm long and the ant was 0.08 centimeters long. Which bug was bigger? Use the models to explain your answer.



Decimal: _____ Decimal: _____

Slowly move away from the visual model.

Kellan read 0.98 of his book club book, Julian read 0.09 of his book club book, Brielle read 0.87 of her book club book and Ava read 0.9 of hers. Order their miles from least to greatest. Who read more?

iii. Students should also practice placing decimals on a number line, if needed begin with modeling the fraction on the number line and then move to the decimals. Students that have a strong understanding of decimals will not need this step. Here are some examples you can use with your students:

Avery and Grace collect data on the pencil lengths of the pencils in our class. Here is what they collected: .5 .8 .2 .9

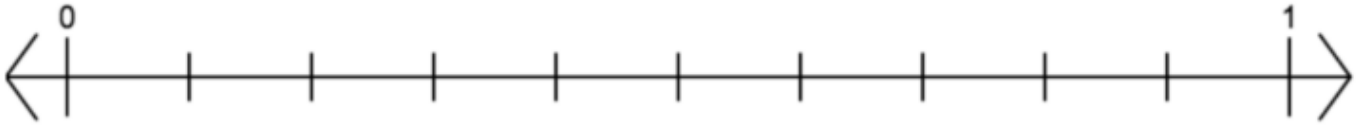
Order their data on the number line from least to greatest

0

iv. Decimal Cards- These cards are made to be used with groups of students, however you can use them as you see fit with your students. Some ways to use the cards are: decimal war, students flip over a card and the largest decimal (or smallest) takes the pile, ordering on a number line, etc.

v. Students should be exposed to problems like this:

Plot the point 0.29 on the number line. First, select a section of the number line to zoom in and then select the appropriate point.



Knowing what they know about fractions students should be able to plot this point. They can turn the decimal into a fraction if needed as the number line is broken into tenths. 29/100 is close to 30/100 or 3/10 therefore the point would be plotted right

before 0.30.

c. Lesson Vocabulary: compare, decimal, equal, equal sign (=), greater than symbol (>), less than symbol (<)

7. Problems about Time and Money- Students should be taught to apply their knowledge of time and money to solve word problems that involve all four operations. Instruct students to solve problems that involve converting larger units of measurement to smaller units. Students should solve problems that have more than one step. Instruct students to use pictures, models, number lines, and equations to represent word problems that involve whole numbers, simple fractions, and simple decimals.

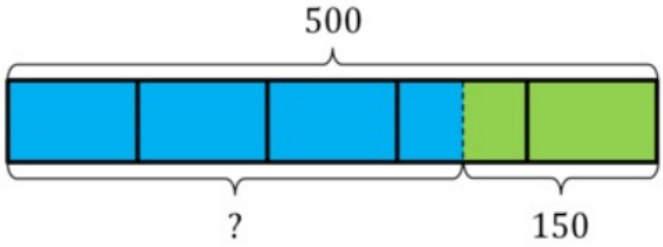
a. Complete Lesson 28, Sessions 1-4 (4 days)

b. Share a conversion chart with the students, here is a sample chart as well as sample problems to use for both time, money, length, liquid volume, mass, and weight.

c. Possible strategies include but are not limited to:

i. Bar models are helpful for students to visualize what is occurring in the word problem. Here is a sample of how students might solve a problem involving money.

Margie bought 3 apples that cost 50 cents each. She paid with a five-dollar bill. How much change did Margie receive?



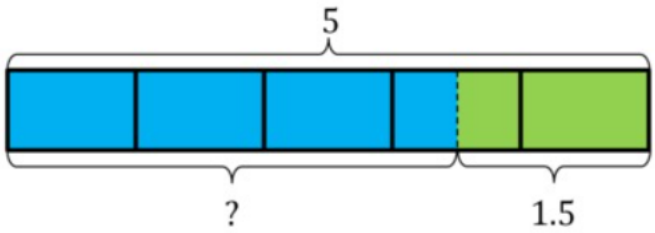
So Margie will get back

$$500 - 150 = 350 \text{ cents.}$$

This is the same as $3.50.

OR

The apples cost 50 cents each. This is $\frac{1}{2}$ of a dollar. So two apples will cost 1 dollar and 3 apples cost an extra $\frac{1}{2}$ dollar making $1\frac{1}{2}$ dollars. Margie paid 5 dollars.



So Margie will get back

$$5 - 1\frac{1}{2} \text{ dollars.}$$

Taking away one dollar leaves Margie with 4 dollars and taking away an additional h
dollar means Margie will get back $3\frac{1}{2}$ dollars or $3.50.

OR

Taking away one dollar leaves Margie with 4 dollars and taking away an additional half dollar means Margie will get back $3\frac{1}{2}$ dollars or $3.50.

Solution: 3 Using dollars and decimals from the start

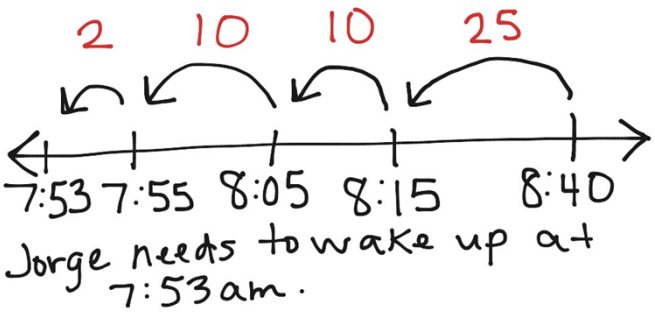
The apples cost 50 cents each. Since one cent is 0.01 dollars, 50 cents is 0.50 dollars. Two apples will cost 1 dollar and 3 apples cost an extra 50 cents making 1.50 dollars. Margie paid 5 dollars. So Margie will get back

$$5 - 1.50 \text{ dollars.}$$

Taking away one dollar leaves Margie with 4 dollars and taking away an additional 0.50 dollars means Margie will get back 3.50 dollars.

ii. Students can also draw pictures or a number line to represent the problem. Acting it out through pictures will also help students solve the problem. Here is a sample of a multi-step time problem with time.

Jorge needs to arrive at school by 8:40 am. It takes him 25 minutes to take a shower and get dressed, 10 minutes to eat breakfast and 12 minutes to drive to school. What time does he need to wake up to arrive at school on time?



d. Lesson Vocabulary: convert, equation, expression

8. Problems About Length, Liquid Volume, Mass, and Weight- Instruct students to apply their knowledge of length, liquid volume, mass, and weight to solve problems that involve all four operations. Students should solve problems that involve converting larger units of measurement to smaller units. Students should solve problems that have more than one step. Instruct students to use pictures, models, number lines, and equations to represent word problems that involve whole numbers, simple fractions, and simple decimals.

a. Complete Lesson 29, Sessions 1-5 (5 days)

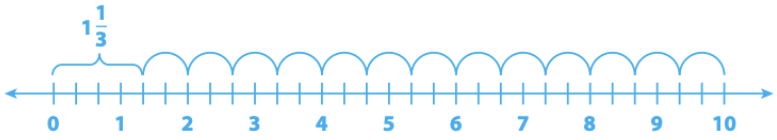
b. Share a conversion chart with the students, here is a sample chart as well as sample problems to use for both time, money, length, liquid volume, mass, and weight.

c. Possible strategies include but are not limited to:

i. Just like the previous lesson with money and time, students should be encouraged to use bar models, number lines, and drawing to aid in their solving of the problem. See sample below:

7 Lulu has 10 feet of ribbon. She uses $1\frac{1}{3}$ feet of ribbon for a project. She uses the rest of the ribbon to make bows. She uses 8 inches of ribbon for each bow. How many bows does Lulu make? Show your work. **Possible student work:**

$\frac{1}{3}$ of a foot is equal to 4 inches, so each tick mark represents 4 inches and two tick marks is 8 inches.



Mark $1\frac{1}{3}$ feet. Count 8-inch sections. There are thirteen 8-inch sections.

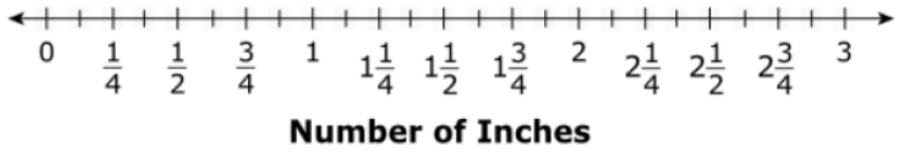
Solution **13 bows**

d. Students should be introduced to problems like the following:

Sam cut $\frac{3}{4}$ inch off a piece of ribbon that was 2 inches long.

Place a point on the number line to show the length, in inches, of the remaining ribbon.

Mark on the number line to plot the point.



A pitcher contains 2 liters of juice. A glass is filled with 180 milliliters of juice from the pitcher. How many milliliters of juice are left in the pitcher after filling the glass?

Enter your answer in the box.

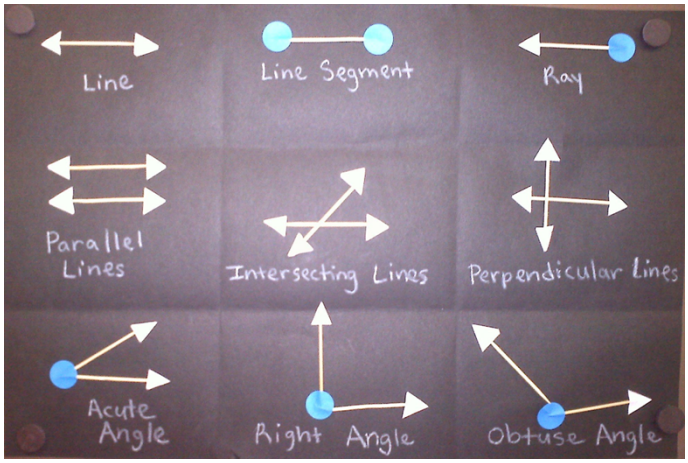
e. Lesson Vocabulary: weight, convert, equation, expression, length, liquid volume, mass

9. Points, Lines, Rays, and Angles - Students should be taught to identify, name, and draw geometric figures including points, line segments, lines, rays, and angles (right, acute, and obtuse) as well as parallel and perpendicular lines and line segments. Guide students to gain a concrete understanding of the geometric concepts as they draw the figures as well as identify them in two-dimensional figures.

a. Complete Lesson 30, Sessions 1-5 (5 days)

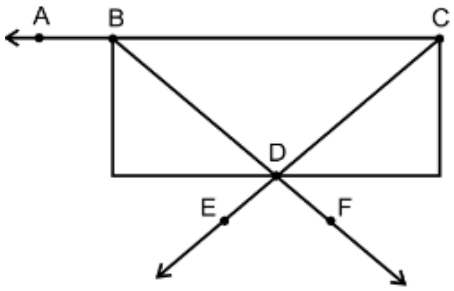
b. Possible strategies include but are not limited to:

i. One way to teach students about points, lines, rays, and angles is to have the students physically create them with craft materials such as toothpicks, craft sticks, pipe cleaners, dot stickers, and cut out triangles for arrowheads. Here is one possibility below (the point is missing from the picture). As you create each figure, have the students come up with its definition and write it on a class chart/notebook. This way students create their own working definition for each that they can go back to.



To help with naming the figures, students can add letters to them to get in that practice, for example students and name the line segment AB.

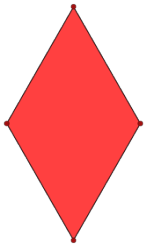
ii. Provide many opportunities for students to look at a figure with multiple lines, line segments rays and or angles and name the ones they see. See the sample below:



Or you can create a large one using tape (this was Washi tape) on a dry erase board or table and have students use a dry erase marker to mark when they see.

iii. Body movements are one way for students to remember what a point, line, ray and angles are. In this graphic you see the students creating each with their arms. To show an ongoing side of a ray or line, the student has their fingers out in a blade. To show a point or and end, the student put their hand in a fist or clasped together. Once the students know the movements you can play Simon Says during transition times in the classroom or waiting in the hallway.

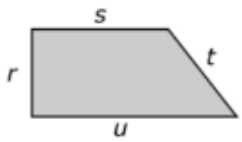
iv. Partner students up to have them give directions to each other using the points, lines, rays and angles to draw a specific two-dimensional figure. For example: The figure has 4 line segments. The line segments are the same length, it has 4 angles. None of the angles are right angles. The partner should draw a rhombus:



v. Line pictures for students or groups of students to sort.

c. Students should be exposed to questions like these:

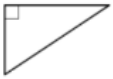
A trapezoid is shown.



Which statement is true about side *r* ?

- A. Side *s* is parallel to side *r*.
- B. Side *t* is parallel to side *r*.
- C. Side *u* is parallel to side *r*.
- D. None of the sides are parallel to side *r*.

For each figure pictured in the table, select the box for any statement that describes the figure. You may select more than one box for each figure.

	Appears to have at least 2 parallel sides	Has at least 2 perpendicular sides
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

d. Lesson Vocabulary: acute angle, angle, line, line segment, obtuse angle, parallel lines, perpendicular lines, point, ray, right angle, vertex

10. Angles- Students should build on their understanding of angles. Instruct students on the use of a protractor to measure and draw angles. Students should use benchmark angle measures of 90° (right angle) and 180° (straight angle) to estimate the measure of an angle. Students should use their estimates to reason about the measure of an angle and then use a protractor to find angle measures and to draw angles of a specified measure

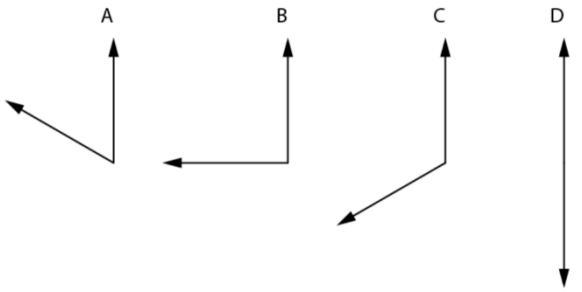
a. Complete Lesson 31, Sessions 1-4 (4 days)

b. Possible strategies include but are not limited to:

i. Review angle names and sizes from the previous lesson; Right angle 90°, acute angle is smaller than 90° and an obtuse angle is larger than 90°. This is important knowledge not only for estimating angle measurements but for using a protractor and being able to determine which degree to use.

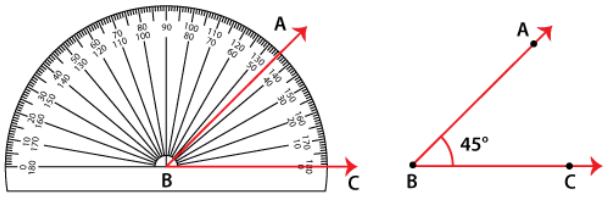
ii. Begin with estimating angles using problems such as this:

Four angles are shown below. One angle measures 60 degrees. Which angle is it?

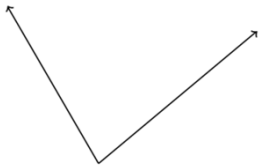


Potential Misconceptions: If the student is having a hard time estimating angle degrees you can have them use a corner of a paper to test out a 90 degree angle or to go to the center point of the angle and draw out a ray that would be 90 degrees and see if the angle is larger or smaller than it.

iii. When starting to use a protractor, scaffold the angles you use. For example, start with angles that have one ray that would fall easily on the baseline of the protractor without having the student turn the paper multiple ways. This will allow students to get comfortable with the dual measures. **Students will need practice reading the lines in between the measurements.**



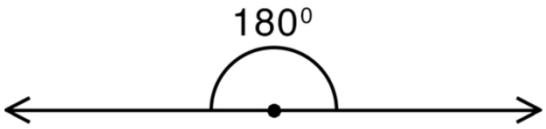
Next move to angles in which they are turned on the page and the student will have to manipulate the protractor.



Instruct students to draw out the ray if it doesn't reach the measures on the degree side. Here are some sheets of angles you can use with your students. Reference Sheet with some practice and More Practice.

Students need to know that at a straight angle is 180 degrees and have practice measuring them as

well. This will be needed for adding and subtracting angles.



iv. Steps to measuring angles with a protractor:

1. **Estimate the size of the angle first!**

2. Find the baseline of the protractor and line it up with the baseline of the shape or angle.

3. Place the midpoint of the protractor on the vertex of the angle.

4. Line up one side of the angle with the zero line of the protractor (where you see the number 0).

5. Read the degrees where the other side crosses the number scale. Is the number close to the size of your estimate?

v. Students should not only measure angles, but they should draw them as well. This project provides a set of simple directions to create pictures from specified angle measurements.

vi. BrainPop: Measuring Angles video

c. Lesson Vocabulary: degree (°), protractor, acute angle, angle, obtuse angle, ray, right angle, vertex

11. Add and Subtract Angles- Students should continue working with angle measures. Instruct students to split up, or decompose, and angle into smaller angles, as well as combine, or compose, angles to form a larger angle. Students should find unknown angle measures by adding and subtracting angles of a known measure. Instruct students to apply this knowledge to solve word problems that involve angle measures.

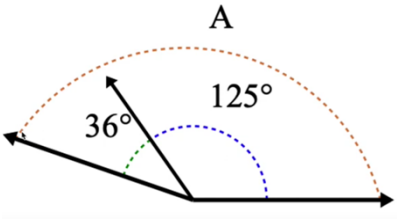
a. Complete Lesson 32, Sessions 1-4 (4 days)

b. Possible strategies include but are not limited to:

i. Terms used during the lesson: decomposing angles: to make smaller angles out of larger angles composing angles: to make larger angles. Students should be familiar with compose and

decompose but what is new is how it relates to angles.

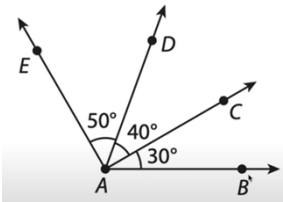
Composing Examples: Taking the two measurements and combining/adding them for the larger angle measurement. The smaller angles are color coded green and blue and the larger angle is red.



125 ° + 36 ° = 161 °

Angle A measures 161°

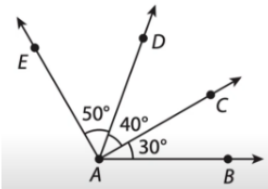
Another example of composing with the letter names of the angles.



What is the measure of angle EAB?

50 ° + 40 ° + 30 ° = 120 °

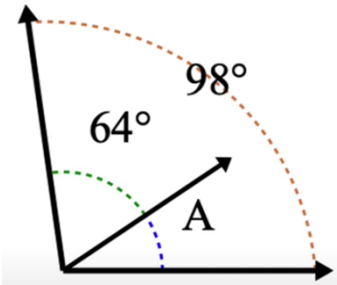
Instruct students to only look at certain angles. Here is the same problem from above, but only focusing on angle EAC.



What is the measure of angle EAC?

50 ° + 40 ° = 90 °

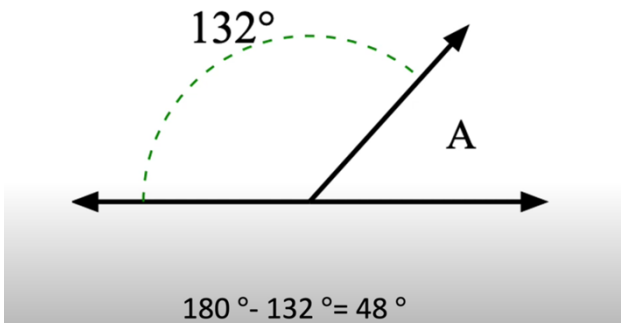
Decomposing Examples: Taking the two measurements and taking apart/subtracting them for the smaller angle measurement. In this situation, students know the measure of the larger angle and need to subtract to find the measure of Angle A, the missing angle. The larger angle is in red and the two smaller angles are in green and blue so students can see them easier.



98 ° - 64 °= 34 °

Angle A measures 34 °

Students should be exposed to and know the measure of a straight angle. In the example below, students are expected to know what a **straight angle** is to solve for the missing angle.



c. Lesson Vocabulary: angle, degree (°), protractor

12. Classify Two-Dimensional Shapes- Students should be taught to extend their work classifying figures to include hexagons, trapezoids, and triangles. Guide students to learn to name a triangle as equilateral, isosceles, or scalene, as well as right, acute, or obtuse.

a. Complete Lesson 33, Sessions 1-5 (5 days)

b. Possible strategies include but are not limited to:

i. Review the term polygon: a flat, two-dimensional (2D) shape with straight sides that is fully closed.

ii. Students should use side length to classify triangles as equilateral, isosceles, or scalene. They should also use angle size to classify them as acute, right, or obtuse. Then students can cross-classify the angles. For example, naming a shape as a right isosceles triangle. This way students will develop explicit awareness of and vocabulary for many concepts they have been learning, including points, lines, line segments, rays, angles, and perpendicular/parallel lines. This Triangle Sort is a great way to classify triangles. However you can also do a similar task including hexagons and trapezoids. To review quadrilaterals from third grade, they can also be included.

iii. Students should be encouraged to use mathematical terms to communicate geometric ideas when looking at polygons such as hexagons, trapezoids and triangles.

iv. Students should be constructing examples, such as drawing angles and triangles that are acute, obtuse, and right. Students can draw on paper or create the examples using craft sticks, pipe cleaners, etc.

v. Triangles Interactive Slideshow (Make a copy so you can use the interactive parts.)

vi. What is a trapezoid?- : The purpose of this task is for students to create their own definition of a trapezoid looking at attributes of what is a trapezoid and what isn't a trapezoid.

vii. Triangle student note sheet

viii. Geometry Town- This project ties in points, lines, rays, angles, and two-dimensional shapes. This sheet is sheet can be copied for each student

c. Lesson Vocabulary: acute triangle, equilateral triangle, hexagon, isosceles triangle, obtuse triangle, polygon, right triangle, scalene triangle, trapezoid (exclusive), trapezoid (inclusive), triangle. Review the following key terms: parallel lines, parallelogram, perpendicular lines, rhombus

13. Symmetry- Students should be taught to build on their understanding to reason about lines of symmetry in two-dimensional figures. Instruct students to find lines of symmetry by cutting and folding a figure along a line to determine whether its parts match. Students should draw lines of symmetry and recognize that some figures have no lines of symmetry and some figures have more than one line of symmetry.

a. Complete Lesson 34, Sessions 1-3 (3 days)

b. Possible strategies include but are not limited to:

i. Students should understand that not every shape has a line of symmetry.

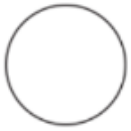
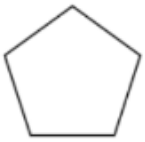
ii. Symmetry Practice and Project: This is a digital project that can be shared on Google Classroom with students. The slideshow has a lesson about symmetry and then at the end it requires students to use digital pattern blocks to design a 'quilt piece' that has at least one line of symmetry. Here is a non-digital version of the quit project.

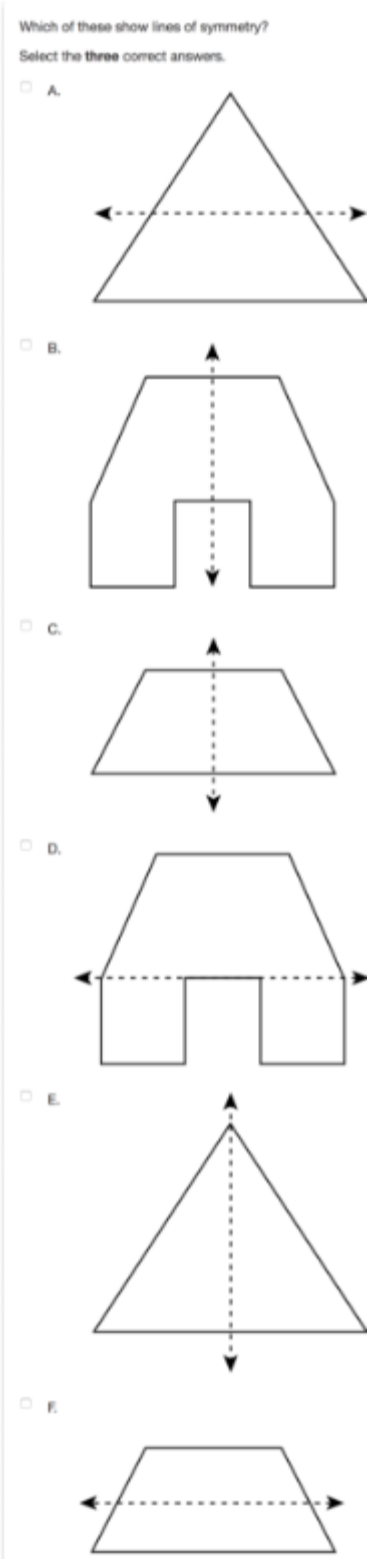
iii. Lines of Symmetry for Quadrilaterals Task- For each quadrilateral, find and draw all lines of symmetry.

iv. Questions students should be exposed to are:

Which figures have exactly 1 line of symmetry?

Select the **two** correct answers.

- [ ] A. 
- [ ] B. 
- [ ] C. 
- [ ] D. 
- [ ] E. 



c. Lesson Vocabulary: lines of symmetry

GENERAL QUESTIONS FOR TEACHER USE

Adapted from Growing Success and materials from Math GAINS and TIPS4RM (Georgia Department of

Education)

Reasoning and Proving

• How can we show that this is true for all cases?

• In what cases might our conclusion not hold true?

• How can we verify this answer?

• Explain the reasoning behind your prediction.

• Why does this work?

• What do you think will happen if this pattern continues?

• Show how you know that this statement is true.

• Give an example of when this statement is false.

• Explain why you do not accept the argument as proof.

• How could we check that solution?

• What other situations need to be considered?

Reflecting

• Have you thought about...?

• What do you notice about...?

• What patterns do you see?

• Does this problem/answer make sense to you?

• How does this compare to...?

• What could you start with to help you explore the possibilities?

• How can you verify this answer?

• What evidence of your thinking can you share?

• Is this a reasonable answer, given that...?

Selecting Tools and Computational Strategies

• How did the learning tool you chose contribute to your understanding/solving of the

problem? Assist in your communication?

• In what ways would [name a tool] assist in your investigation/solving of this problem?

• What other tools did you consider using? Explain why you chose not to use them.

• Think of a different way to do the calculation that may be more efficient.

• What estimation strategy did you use?

Connections

• What other math have you studied that has some of the same principles, properties, or procedures as this?

• How do these different representations connect to one another?

• When could this mathematical concept or procedure be used in daily life?

• What connection do you see between a problem you did previously and today's problem?

Representing

• What would other representations of this problem demonstrate?

• Explain why you chose this representation.

• How could you represent this idea algebraically? graphically?

• Does this graphical representation of the data bias the viewer? Explain.

• What properties would you have to use to construct a dynamic representation of this situation?

• In what way would a scale model help you solve this problem?

Note: The instructor is encouraged to consult the supplemental resources located under materials to personalize and differentiate instruction for students, as well as address any learning gaps based on formative assessments.

Evidence/Performance Tasks

Formative Assessment:

- Fact Fluency Practice Assessments
- Administer Ready Math Lesson Quizzes at the end of each Lesson
- Administer Comprehension Check (digital)

Summative Assessments:

- Administer Ready Math Mid-Unit Assessments
- Administer Ready Math End of Unit Assessments

Benchmark Assessments:

- iReady Diagnostic
- Fact Fluency Assessment
- Acadience Assessment (As a reference, these assessments are not administered by the classroom teacher)

Alternative Assessments:

- Informal Observation
- Small Group Observation
- Exit Tickets
- Math Journal
- Oral and Written Explanations of Reasoning

Materials

The following are approved resources that teachers can include to further unit related objectives:

- Ready Math Teacher Toolbox Resources
    - Whole Class Instruction
        - Teach: Instruction & Practice, Interactive Tutorials,
        - Assess: Lesson Quizzes & Unit Assessments

    - Small Group Differentiation
        - Prepare: Prerequisite Lessons
        - Reteach: Tools for Instruction
        - Reinforce: Math Center Activities
        - Extend: Enrichment Activities
- Ready Math Workbook
- Ready Math Slides
- Digital Math Tools
- iReady My Path
- Learning Games
- The First 10 Weeks Number Talks
- The Second 10 Weeks Number Talks
- The Third 10 Weeks Number Talks
- The Fourth 10 Weeks Number Talks
- Manipulatives: counters, tens frames, connecting cubes, base 10 blocks, fraction strips,
- White boards
- Number paths
- Hundred charts
- Blank Bar Models
- Grid Paper
- Blank Number Bonds
- CPS District Mathematics Google Drive Folder
- Literature to assist in teaching:
    - *Fractions, Decimals and Percents* by David A. Adler
    - *Seeing Symmetry* by Loreen Leedy
    - *Greedy Triangle* by Marilyn Burns (Two-dimensional figure)
    - *If You Hopped Like a Frog* by David M. Schwartz (Measurement)

- *When a line bends a shape begins* by Rhonda Gowler Greene (Shapes)

Supplemental Resources:

- Grade 4 NJSLA Questions Organized by Topic
- Acing Math- Card games that support a variety of math skills
- Brain Pop Video: Centimeters, Meters, and Kilometers
- Brain Pop Video: Elapsed Time
- Three Act Task: Time (Dill'er Up)
- Three Act Task: Multiplying a Fraction by a Whole Number (Dew the Dew)
- Three Act Task: Multiplying a Fraction by a Whole Number (Dip Drop)
- Three Act Task: Multiplying a Fraction by a Whole Number (The Juicer)
- Three Act Task: Measurement Geometry and Angles (For the Win)

Any additional resources that are not included in this list will be presented to and reviewed by the supervisor before being included in lesson plans. This ensures resources are reviewed and vetted for relevance and appropriateness prior to implementation.

Standards

MATH.K-12.1	Make sense of problems and persevere in solving them
MATH.K-12.2	Reason abstractly and quantitatively
MATH.4.OA.A.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.4.OA.A.3	Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning

MATH.4.NBT.B.4	With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm.
MATH.4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
MATH.4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area model.
MATH.4.NF.B.3.c	Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
ELA.L.VL.4.2	Determine or clarify the meaning of unknown and multiple-meaning academic and domain-specific words and phrases based on grade 4 reading and content, choosing flexibly from a range of strategies.
MATH.4.NF.B.3.d	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
MATH.4.NF.B.4	Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
MATH.4.NF.B.4.a	Understand a fraction a/b as a multiple of $1/b$.
MATH.4.NF.B.4.b	Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number.
MATH.4.NF.B.4.c	Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
MATH.4.NF.C.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.
MATH.4.NF.C.6	Use decimal notation for fractions with denominators 10 or 100.
MATH.4.NF.C.7	Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
MATH.4.M.A.1	Know relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
MATH.4.M.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
MATH.4.M.B.4	Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
MATH.4.M.B.4.a	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360th of a circle is called a “one-degree angle,” and can be used to measure angles.
MATH.4.M.B.4.b	An angle that turns through n one-degree angles is said to have an angle measure of n degrees.

MATH.4.M.B.5	Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
MATH.4.M.B.6	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
MATH.4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
MATH.4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category and identify right triangles.
MATH.4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
ELA.SL.PE.4.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
ELA.SL.PE.4.1.C	Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
ELA.SL.ES.4.3	Identify the reasons and evidence a speaker provides to support particular points.
ELA.SL.AS.4.6	Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.
WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

Suggested Strategies for Modification

Possible accommodations/modification for Fourth Grade

Note: Teachers can find more specific modifications for English learners, learners with special needs,learners reading below grade level, and advanced learners on the Ready Math website.