SFUSD Math Core Curriculum

Grade 5 Homework

Unit 5.6 Multiplying Fractions
Unit 5.7 Dividing Fractions

Unit 5.6 Multiplying Fractions

Homework

Fifth Grade Family Letter

Unit 6: Multiplying Fractions

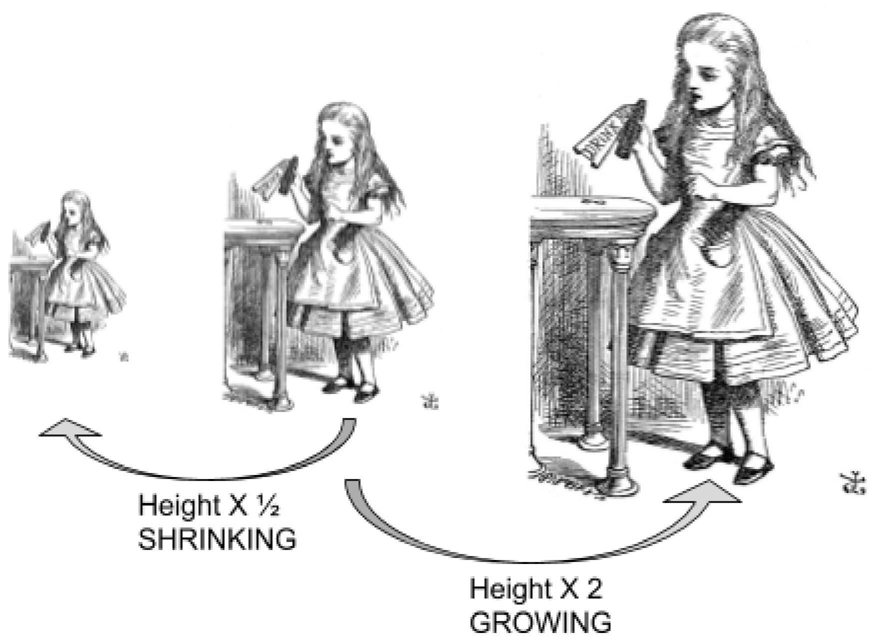
The ideas that apply to multiplying whole numbers and decimals also apply to multiplying fractions. In this unit, fifth graders continue to work with multiplication, extending their understandings to fractions.

What is a Unit Fraction?

A unit fraction is a fraction with a “1” in the numerator, such as one-half (½) or one-fifth (⅕). Unit fractions are the building blocks of all work in fractions, and help students compare, order, and operate with fractions. For example 3/8 can be decomposed into 3 unit fractions of 1/8, or 1/8 + 1/8 + 1/8, or 3 x 1/8. We could also say that 3/8 is composed of 2/8 and 1/8, or 1/4 and 1/8. Any composite fraction can be broken down into smaller components. Students were introduced to the concept of a unit fraction in Grade 3, and they learned to add and subtract them in Grade 4. In Grade 4, they began their thinking about multiplication of fractions with repeated addition.

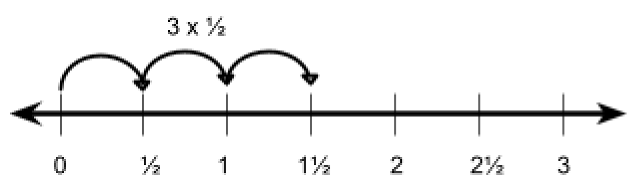
Important Shifts in Thinking About Multiplication and Division

One of the big misconceptions that students confront in Grade 5 is thinking that when you multiply, things always get bigger, and when you divide, things always get smaller. In Units 5.4, 5.5, 5.6, and 5.7, students have experiences that help them understand that when you multiply by a number less than one the product is smaller than the original number, and when you divide by a number less than one, the quotient will be larger than the original number. For example, if you multiply a 6 by ½, the product will be less than 6. This idea can be confusing at first to fifth graders, but it underpins students' understanding of rational numbers as well as their work with proportional reasoning in middle school.

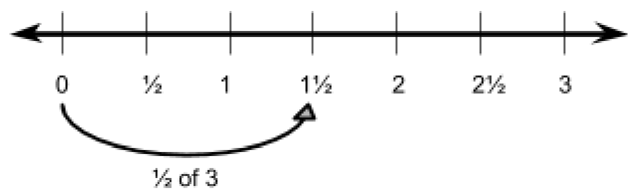


Showing Multiplication of Fractions on a Number Line

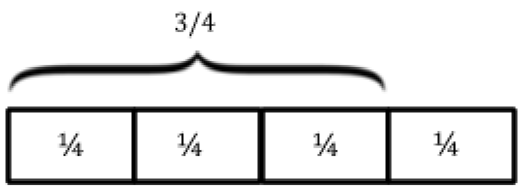
As students reason about multiplying fractions, number lines continue to be an important model for making sense of and reasoning with numbers. This number line illustrates 3 x ½, or 3 *of* ½. It shows multiplication as multiple instances of a fraction, the way students understood it in 4th grade.



In 5th grade, students start to think of multiplication as scaling. For example, students think of ½ x 3 as "What is ½ of 3?" and see it as one part when 3 is partitioned into 2 parts.



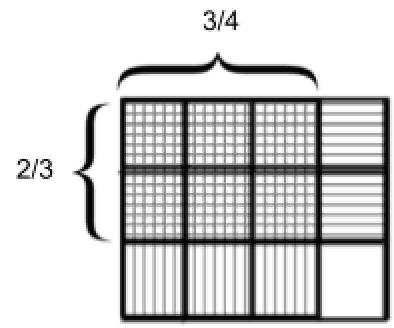
Showing Multiplication of Fractions with a Tape Diagram



Tape diagrams continue to be an important model for making sense of and reasoning with numbers. We can see here that if we cut ¾ into 3 equal parts, each part is ¼. This helps students understand that ⅓ of ¾ (or ⅓ x ¾) is ¼. These visual models will also help students begin to understand division of fractions in the next unit.

Multiplying Fractions By Fractions Using An Area Model

Area models are important models for making sense of and reasoning with fraction multiplication just as they were with whole number multiplication.



This model shows 3/4 times 2/3. We can see that 6/12, or 1/2, of the 12 squares are covered by lines going in both directions. A situation where this model might be useful is:

Today is a rare sunny day in San Francisco, and the fifth graders want to play kickball in the shade. Three-fourths of the playground is shaded. Two-thirds of the shaded part is covered in asphalt. How much of the whole playground is shaded AND covered in asphalt? Or, how much of the playground would work as a kickball field?

Fifth graders will also use this model with fractions greater than one, such as $\frac{3}{2}$, or $1\frac{1}{2}$.

Activities You Can Do to Support Math at Home

Connections in Literature

Reading at home builds a child's success in school, and it can be an imaginative way to practice in a loving family environment what a student is learning at school.

In this unit, fifth graders model the mathematics of Lewis Carroll's story <u>Alice's Adventures in Wonderland</u>, where Alice shrinks or grows based on what she eats or drinks. These are some other books you can find in your public library that tell stories with fractions:

In <u>Multiplying Menace: The Revenge of Rumpelstiltskin</u> by Pam Culvert, a boy must save his kingdom by using math.

In <u>My Half Day</u> by Doris Fisher, a boy and his friends have fraction adventures at camp.

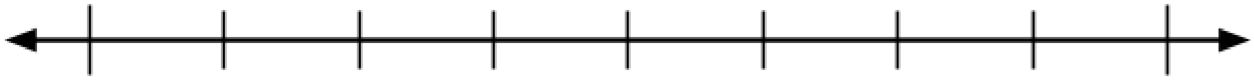
In <u>The Wishing Club: A Story About Fractions</u> by Donna Jo Napoli, each of the friends gets only a fraction of his/her own wish.

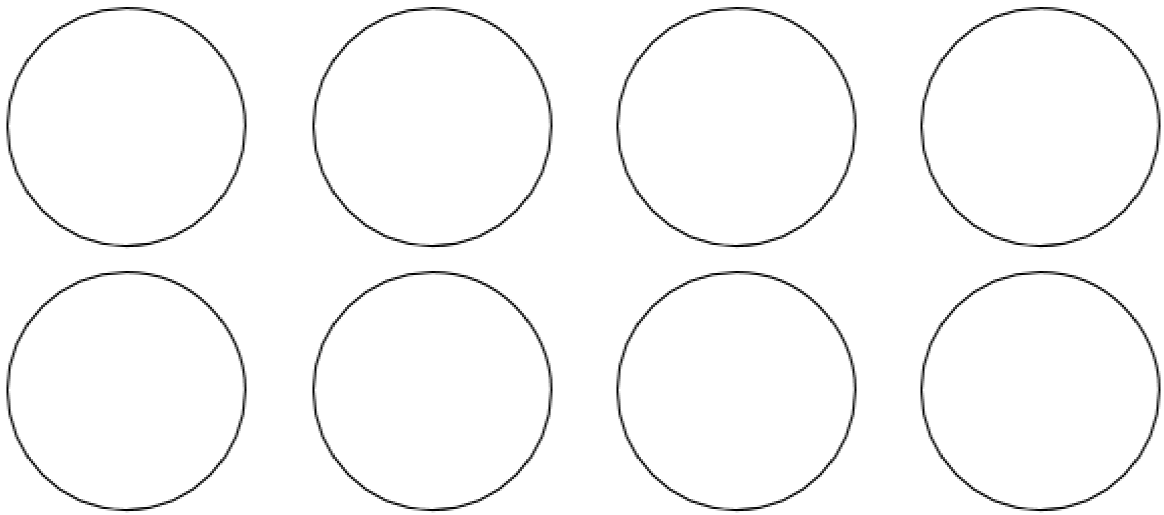
Helping Your Child with Homework

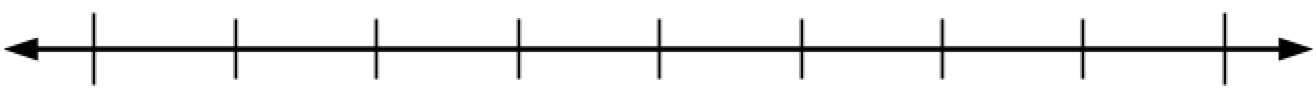
The Standards for Mathematical Practice describe the ways students behave as they learn math. While the mathematics content changes from grade to grade, these standards are the same for kindergarten through high school. Mathematical Practice Standard 2 says: ***Reason abstractly and quantitatively.*** As student work with fractions, they have to understand both how to manipulate the numbers and also what the numbers are showing.

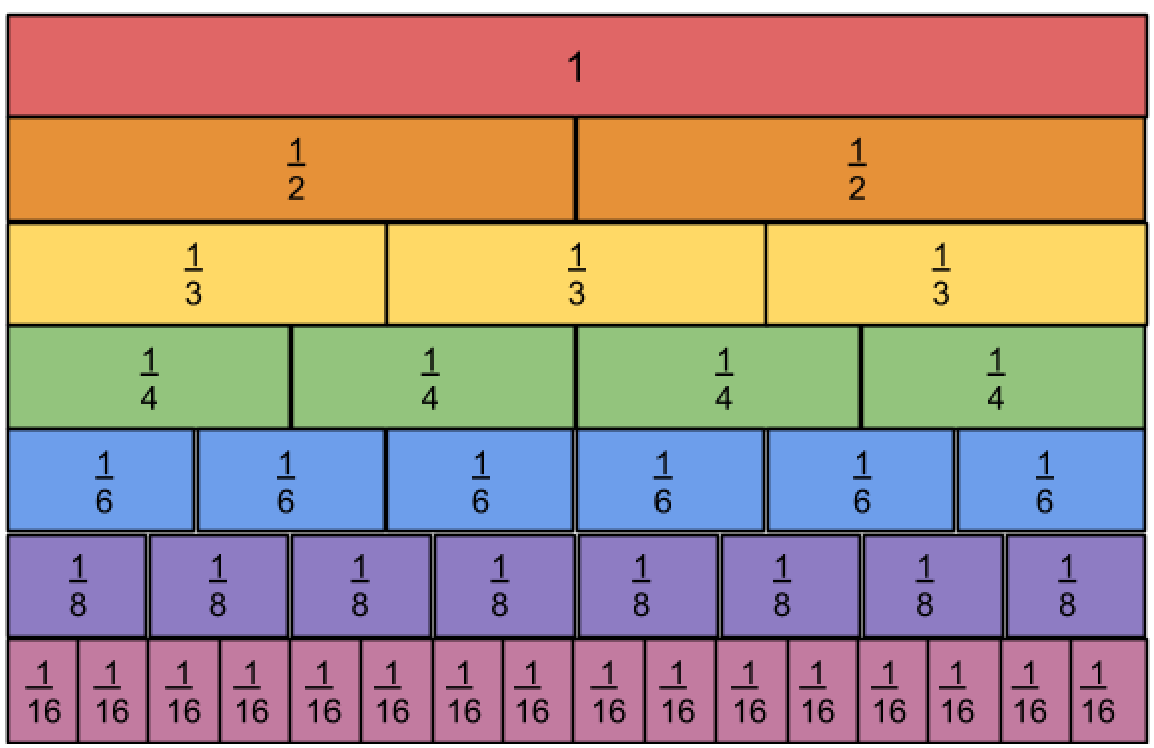
Questions that you can ask that support this practice are:

- (If you start with a story): Can you write a number sentence to match the situation?
- (If you start with numbers): Can you write a story that matches the numbers?
- What's the connection between the numbers and the story?








1
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1/3 1/3 1/3
1/4 1/4 1/4 1/4
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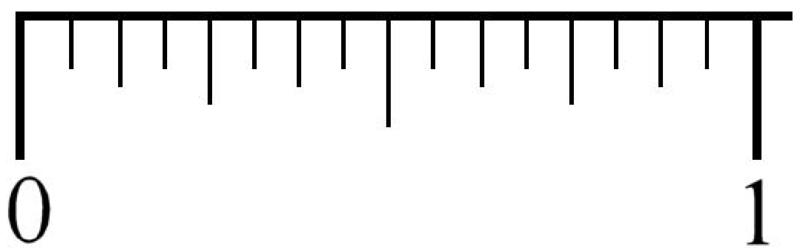
1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16 1/16

Name ____ Date: ____________________

5.6 Entry Homework

1. This section of a ruler shows 1 inch: Label $\frac{1}{2}$, all the fourths, and all the eighths.



a. What is $\frac{1}{2}$ of $\frac{1}{2}$?

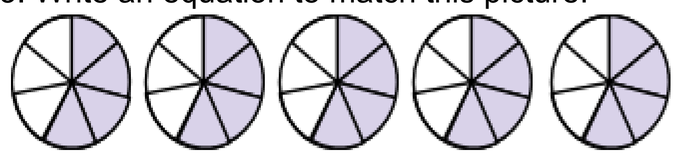
b. What is $\frac{1}{2}$ of $\frac{1}{4}$?

c. What is $\frac{1}{4}$ of $\frac{1}{2}$?

d. What is $\frac{1}{2}$ of $\frac{3}{8}$?

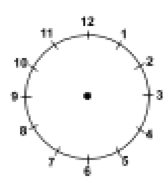
2. Suzanne has 10 cookies. She wants to share them with her three friends. How many cookies will Suzanne and each of her friends get?

3. Write an equation to match this picture:

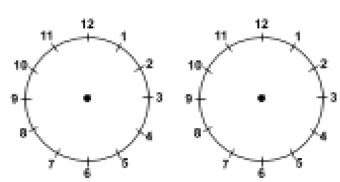


4. Use the clocks to help you solve each problem:

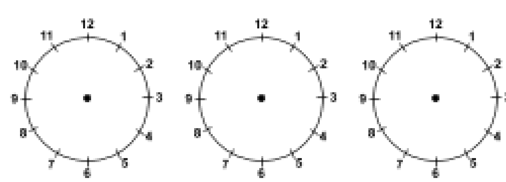
a) How long is $\frac{1}{3}$ of an hour?



b) How long is $\frac{1}{3}$ of 2 hours?



c) How long is $\frac{1}{3}$ of 3 hours?



Name ______________________________________ Date: ___________________

5.6 LS1 Day 1 Homework

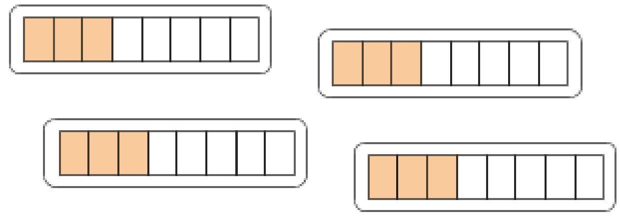
1. Using a rectangle as a whole, draw models of: one-fourth, two-thirds, and five-sixths. Label your drawings.

$\frac{1}{4}$

$\frac{2}{3}$

$\frac{5}{6}$

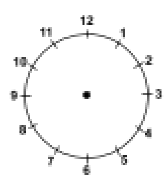
2. Write an expression to match this picture:



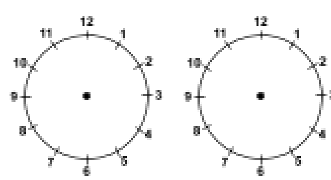
3. There are 15 cars in Michael's toy car collection. Two-thirds of the cars are red. How many red cars does Michael have?

4. Use the clocks to help you solve each problem:

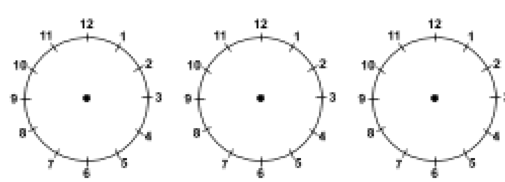
a) How long is $\frac{3}{4}$ of an hour?



b) How long is $\frac{3}{4}$ of 2 hours?



c) How long is $\frac{3}{4}$ of 3 hours?



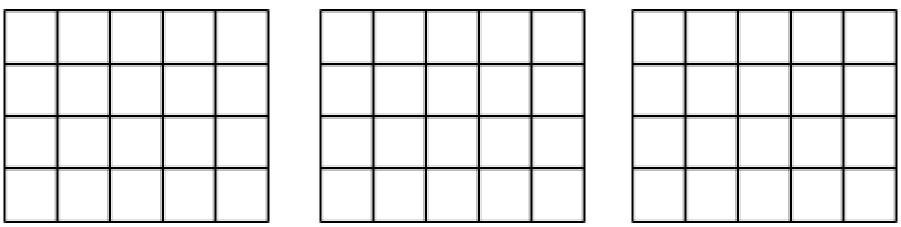
Name ____ Date: ____________________

5.6 LS1 Day 2 Homework

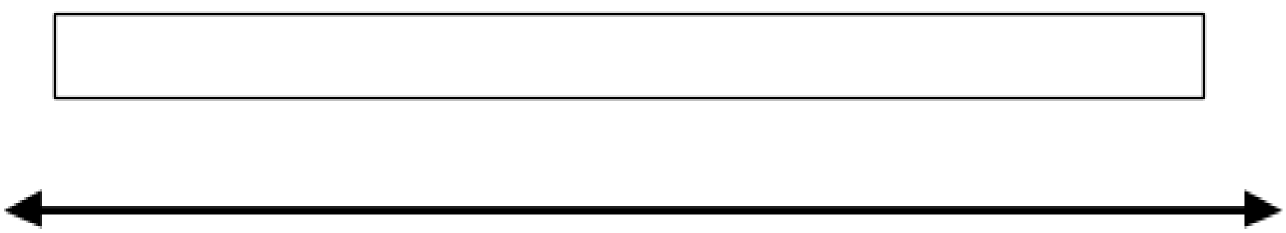
1. If the gray rectangle represents the whole, what fraction does the white rectangle represent?

Explain how you decided.

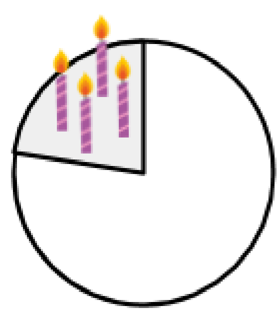
2. Show $\frac{2}{5}$ in three different ways on these rectangles. Write an equation to match the pictures.



3. Use a **bar model** and a **number line** to show $\frac{3}{5} \times 15$.



4. Here is a piece of Rongopai's birthday cake. Each piece of cake has the same number of candles. How old is Rongopai?



Name: ______________________________ Date: ________________________

5.6 LS1 Day 3 Situation HW

$$\frac{2}{3} \times 24 = 16$$

Write a situation for this equation and draw a picture that goes with it.

Name ____ Date: ___________________

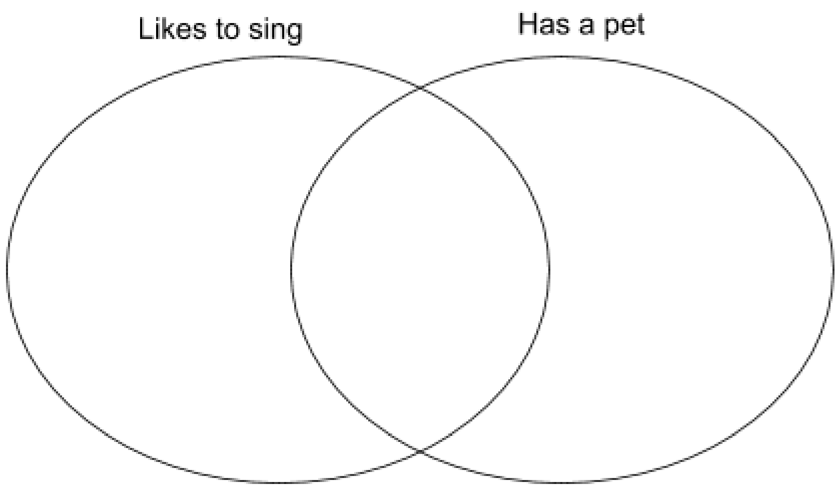
5.6 LS1 Day 4 Homework

Venn Diagrams and Fractions

The 5th grade class had a survey to find out who likes to sing and who has a pet.

1) Place each student's name in the correct part of the diagram:

Name	Likes to Sing	Has a Pet
Scott	yes	no
Peter	yes	no
Nora	yes	yes
Paulina	no	no
Gary	yes	yes
Olivia	no	yes
Kai	no	yes
Asher	no	no
Xavier	yes	no



2) How many students like to sing and don't have a pet?

What fraction of the students is that?

3) How many students have a pet but don't like to sing?

What fraction of the students is that?

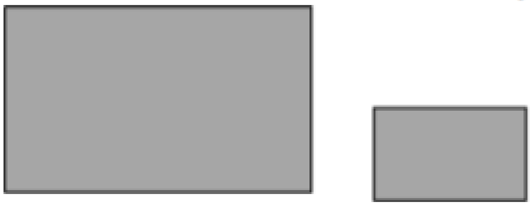
4) How many students like to sing and have a pet?

What fraction of the students is that?

Name ________________________________ Date: __________________

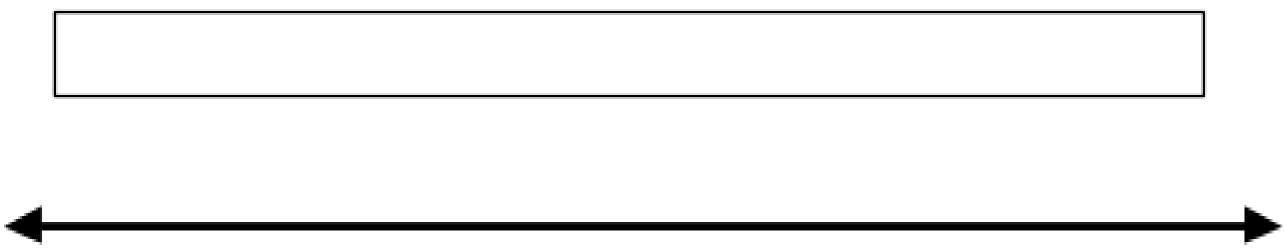
5.6 Apprentice Homework

1. What fraction of the big rectangle does the small rectangle represent? Explain your reasoning.



2. Mohammed delivered $\frac{3}{8}$ of the newspapers on his route in the first hour and $\frac{4}{5}$ of the rest in the second hour. What fraction of all the newspapers did Mohammed deliver in the second hour?

3. Use a **bar model** and **number line** to show and solve $\frac{3}{4} \times 10$.



4. Three Bean Salad Puzzle #1

A bean salad has 20 beans in all. It is made up of:

$\frac{1}{2}$ lima beans
$\frac{2}{5}$ red beans
$\frac{1}{10}$ black-eyed peas

How many of each type of bean are in the salad?

Name ______________________________________ Date: ___________________

5.6 LS2 Day 1 Homework

1. Solve on a number line and explain your thinking: $\frac{5}{4} \times \frac{1}{3}$

2. Sophie's friend gave her 1/2 of a chocolate bar. She ate 1/5 of it. How much did she eat?

3. Three Bean Salad Puzzle #2

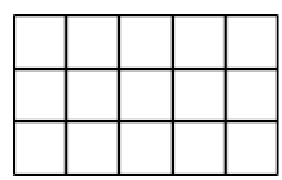
A bean salad has 6 beans in all. It is made up of:

$\frac{1}{6}$ lima beans
$\frac{1}{3}$ red beans
$\frac{1}{2}$ black-eyed peas

How many of each type of bean are in the salad?

4. Solve and show your solution on the grid:

$\frac{2}{3} \times \frac{3}{5}$



Name: ______________________________ Date: ________________________

5.6 LS2 Day 2 Situation HW

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

Write a situation for this equation and draw a picture that goes with it.

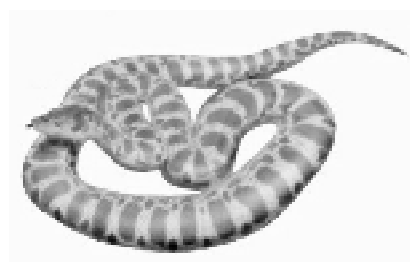
Name ______________________________________ Date: ____________________

5.6 LS2 Day 3 Homework

1) Use an area diagram to show $\frac{1}{4} \times \frac{5}{6}$.

1) Zack's classroom has a carpet that is $\frac{2}{3}$ of the classroom long and $\frac{3}{4}$ of the classroom wide. How much of the classroom area does the carpet take up?

3) The prehistoric Titanaoboa is believed to be the longest land animal that ever lived on Earth. The Reticulated Python is the longest of the living species of snake and can reach lengths of about 20 feet. If the Titanaoboa was $2\frac{1}{5}$ as long as the Reticulated Python, how long was it?



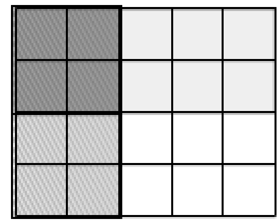
4) Solve on a number line and explain your thinking: $\frac{2}{3} \times \frac{1}{5}$

Name ____ Date: ____________________

5.6 LS2 Day 4 Homework

Use an area diagram to show ¾ x ⅖.

Write a fraction multiplication equation to match this picture:



Emily wants to plant a vegetable garden in her backyard. Emily's mom says she can make a garden that has a width of ⅚ yard and a length of ¼ yard. What is the area of Emily's new garden?

Solve on a number line and explain your thinking: $\frac{1}{3} \times \frac{1}{2}$

Name ____ Date: ___________________

5.6 LS2 Day 5 Homework

Coral runs down 23rd Street. Each block is $\frac{1}{4}$ mile long. She runs $\frac{2}{3}$ of a block before she gets tired and stops. What part of a mile does she run?

Show the problem on a number line.

Explain why the line is divided into twelfths.

Solve the same problem using a square.

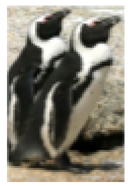
Write the problem as an equation.

Name ____ Date: _____________________

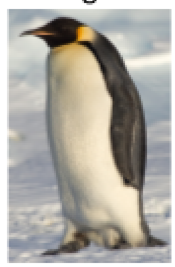
5.6 Expert Homework

1. African Penguins are about ⅔ the height of Emperor Penguins. If Emperor Penguins are about 36 inches, how tall are African Penguins?

African Penguin



Emperor Penguin



2. Is 14 x 1½ greater than or less than 14? How do you know?

3. Show that $\frac{1}{3} \times \frac{2}{2} = \frac{1 \times 2}{3 \times 2} = \frac{2}{6}$ by making an area model. Connect your drawing to the equation.

4. Solve on a number line and explain your thinking:

$3 \times \frac{2}{3}$

Name ____ Date: ____________________

5.6 LS3 Day 1 Homework

Min's hose can pump 21 gallons of water every hour. How many gallons of water will he fill up if he runs the hose for $\frac{2}{3}$ of an hour?

Show the problem on a number line:

Solve using a picture:

Write an equation:

Explain how your picture matches the number line and equation.

Name ____ Date: ____________________

5.6 LS3 Day 2 Homework

1. Write a story that matches this equation:

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

2. Draw a rectangle with these dimensions and calculate its area:

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

3. Estimate the value of each expression and decide which box it goes in.

$1\frac{1}{3} \times \frac{3}{4}$	$\frac{1}{9} \times \frac{4}{5}$	$\frac{1}{5} \times 5\frac{1}{3}$	$2\frac{1}{8} \times \frac{1}{2}$

Less than 1	Equal to 1	More than 1

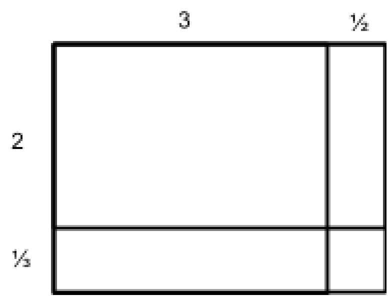
Explain one of your choices.

4. Mr. Salam bought a $2\frac{1}{2}$-pound wheel of cheese. His family ate $\frac{1}{4}$ of the wheel. How much cheese did they eat?

Name ____ Date: ____________________

5.6 LS3 Day 3 Homework

1. Write an equation to match this picture and calculate the area of the whole rectangle.



2. Estimate each product to the nearest whole number. Will the product be greater than or less than your whole number estimate? Find the product.

Equation	Whole number estimate	Predict: Will the product be greater or less than estimate?	Product
$1\frac{1}{2} \times 2\ \frac{7}{8}$			
$3\frac{1}{4} \times 2\frac{1}{2}$			

3. Which is greater? How do you know? $2\frac{1}{2} \times \frac{1}{2}$ or $\frac{1}{2} \times \frac{5}{2}$

4. Draw a rectangle with these dimensions and calculate its area:

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

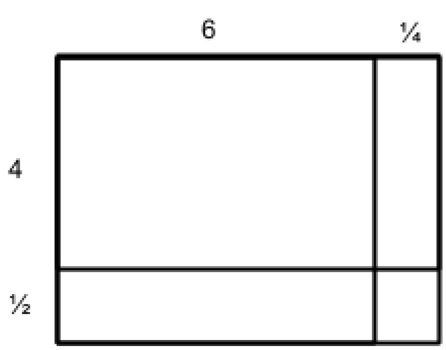
Name ____ Date: ____________________

5.6 Milestone HW

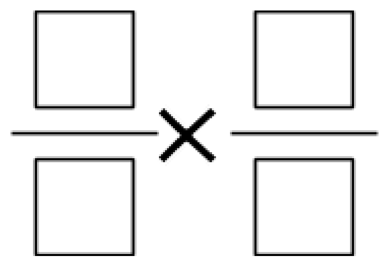
1. Which is greater? How do you know? $\frac{8}{3} \times \frac{9}{7}$ or $\frac{8}{3} \times \frac{9}{4}$

2. Sam sold ¼ of his raffle tickets. He has 60 left to sell. How many tickets has he sold? Draw a picture or diagram that explains your thinking.

3. Write an equation to match this picture and calculate the total area of the rectangle.



4. What's the greatest product you can make using only the whole numbers 1–9 no more than one time each?



How do you know it's the greatest product?

Unit 5.7 Dividing Fractions

Homework

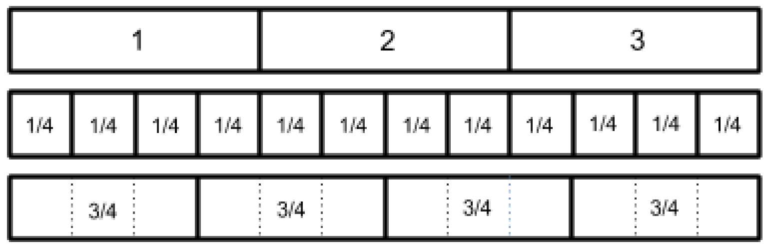
Fifth Grade Family Letter

Unit 7: Dividing Fractions

The ideas that apply to dividing whole numbers and decimals also apply to dividing fractions. In this unit, fifth graders continue to work with division, extending their understanding to fractions, and building on work done in Unit 5.6: Multiplying Fractions.

Understanding Fractions as Division

One new way 5th graders think about fractions is as a whole number divided by another whole number. This model shows 3 cut into 4 equal parts. We can see that each one of the 4 equal parts is ¾. (Imagine a 3-inch wire cut into four 3/4-inch pieces.) Three divided by four can also be expressed as ¾.



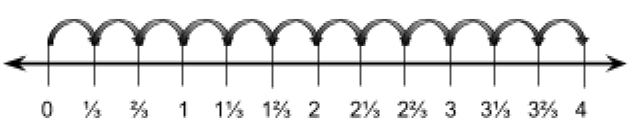
Division With Fractions and Whole Numbers

In Grade 4 students worked with both of the basic types of division situations: Partitive and Quotitive. In this unit, students will continue solving problems based on both division situations, now with fractions.

A **quotitive division** problem asks, "How many groups are there?" These are sometimes called measurement division problems.

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

How many groups of ⅓ are in 4?



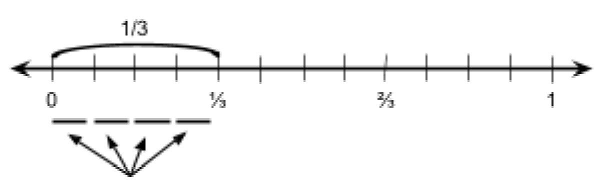
This number line helps us see that there are 12 groups of 1/3 in 4, as indicated by the 12 arrows.

Quotitive situation: *I have 4 cups of flour, and my recipe calls for 1/3 cup. How many batches can I make?*

A **partitive division** problem asks, "How many are in each group?" These are sometimes called sharing division problems.

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

If I divide ⅓ into 4 groups, how many will be in each group?



⅓ divided by 4

This number line helps us see that the whole group is 12, as indicated by the number of divisions of the whole.

Partitive situation: *I used ⅓ cup of flour to make 4 cookies. How much flour is in each cookie?*

A Note About Algorithms

An algorithm is a step-by-step set of directions, usually quite efficient, for solving a problem. Many adults, for example, will have learned shortcuts for dividing fractions (such as "invert and multiply") without understanding why those shortcuts work. In this unit, fifth graders focus on reasoning through division problems, rather than relying on the rote memorization of the algorithm. The algorithm will be more fully addressed in Grade 6 mathematics.

Activities You Can Do to Support Math at Home

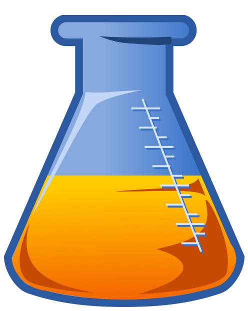
Helping Your Child with Homework

The Standards for Mathematical Practice describe ways students behave as they learn math. While the mathematics content changes from grade to grade, these standards are the same for kindergarten through high school. Mathematical Practice Standard 4 says: ***Model with mathematics.*** We often think of a model as a physical representation, such as the number lines above or other physical tools used in classrooms.

A more complex understanding of this standard might sound like: *What questions do I have, and what math can I use to help me think about those questions?* With this understanding, we see that students who are modeling with mathematics are doing the same kinds of thinking as professionals such as architects and engineers. A student might use language like this to explain this standard: *I see math in everyday life and I can use math to solve everyday problems.* Many of the problems in this unit, such as scaling recipes up and down, or understanding how much of something is needed, use this idea of modeling with mathematics.

Questions that you can ask that support this practice are:

- Do you know a math idea that fits this situation?
- How are the numbers in your equation or drawing related to the question you are asking?
- Does your answer have units? What are they?
- Does your answer make sense? Why or why not?
- Can you ask this question a different way?



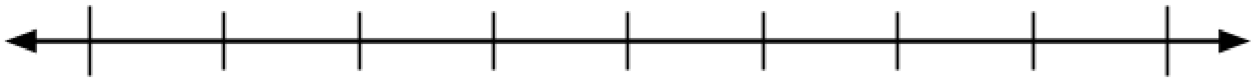
Connections to Science

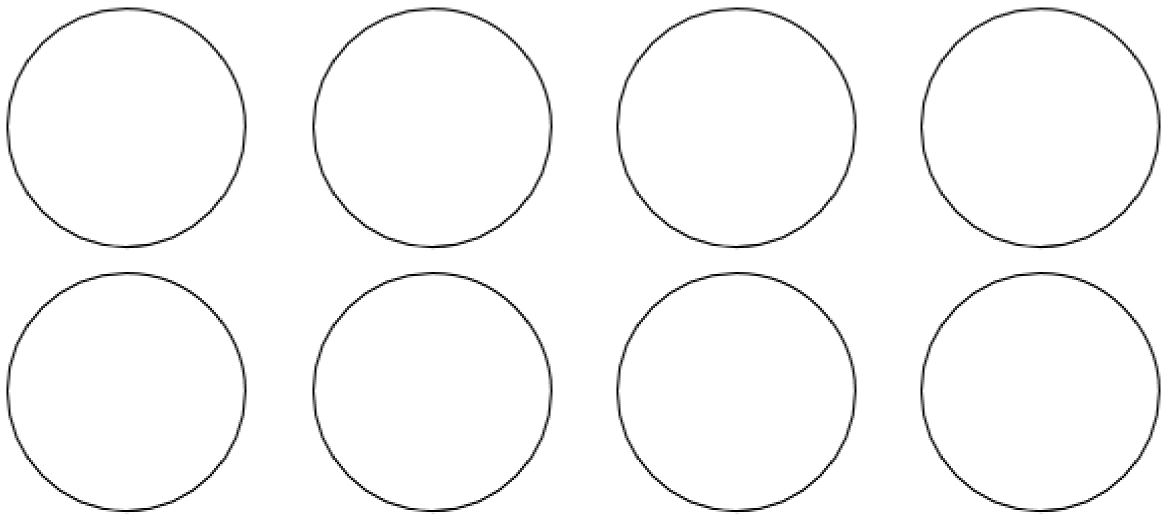
The Next Generation Science Standards (NGSS) are new K – 12 standards for science that value many of the same behaviors in science that we talk about in math. These standards define engineering as designing solutions to real world problems. This is very closely related to ***Math Practice 4: Model with mathematics***, which is also about real world applications. Many students find that what they are learning in math makes sense to them when they get to practice it in a scientific application.

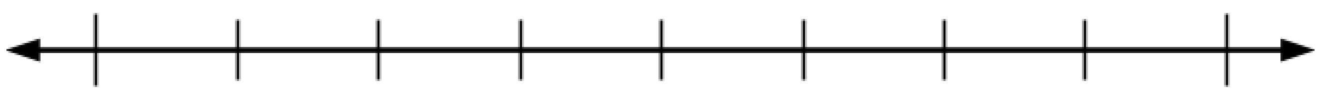
Other math practices specified in the Next Generation Science Standards as relevant to science are:

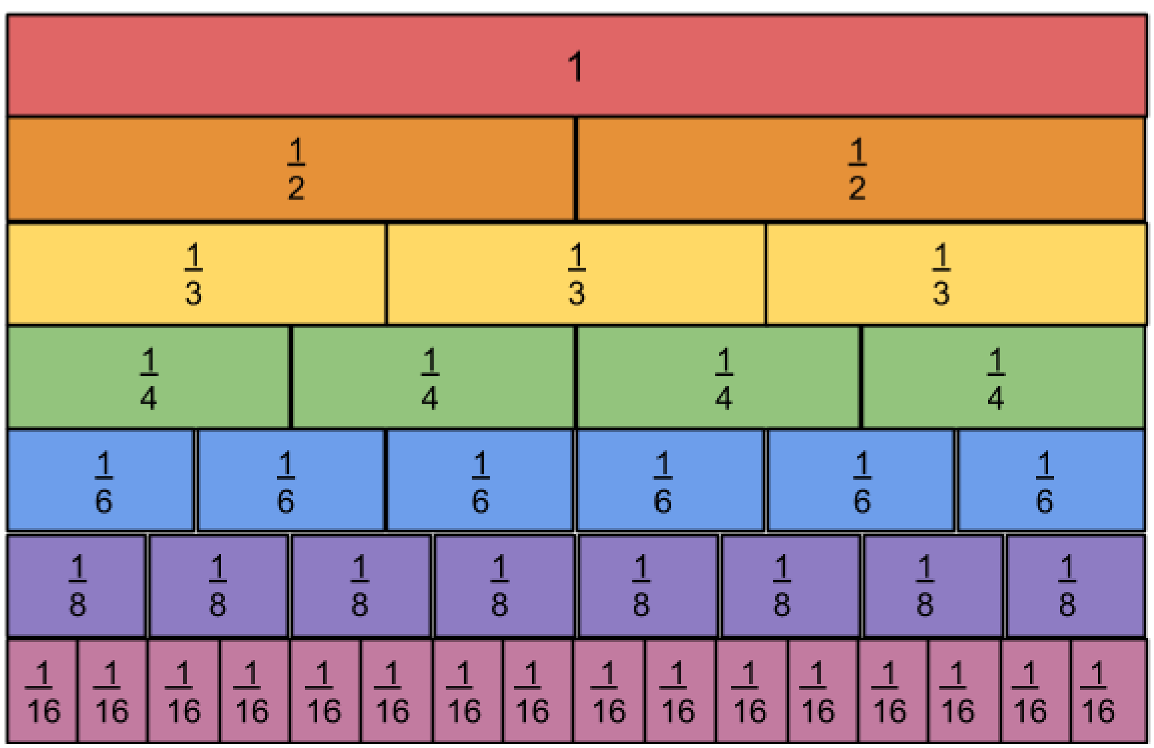
- **Math Practice 2: Reason abstractly and quantitatively**
- **Math Practice 5: Use appropriate tools strategically.**

You can learn more about SFUSD's approach to these exciting new standards at www.sfusdscience.org





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Name ____ Date: _____________________

5.7 Entry HW

1. A pirate found three pounds of gold. In order to protect his riches, he hid the gold in two treasure chests, with an equal amount of gold in each chest. How many pounds of gold were in each chest?

2.

Three people shared 4 pizzas. How much do they each get?

5 people shared 2 pizzas. How much do they each get?

5 people shared 3 pizzas. How much do they each get?

5 people shared 8 pizzas. How much do they each get?

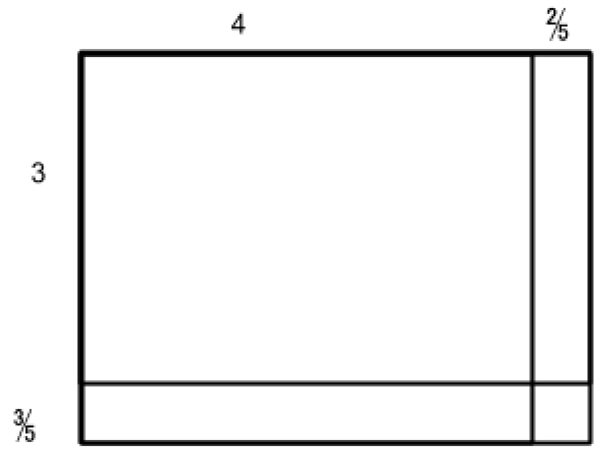
Name ______________________________________ Date: _____________________

5.7 LS1 Day 1 HW

1. Which is greater? How do you know?

$$3\tfrac{1}{2} \times \tfrac{1}{3} \text{ or } \tfrac{2}{3} \times \tfrac{3}{2}$$

2. Write an equation to match this picture:



3. A class of 23 students is going to take a field trip. Each car can take 5 students. How many cars are needed to take all the children on the field trip? Show with numbers, words, and a picture or diagram.

4. Sam has 3 candy bars and he wants to divide them into 8 equal portions to give to friends. What fraction will each person receive? Show with numbers, words, and a picture or diagram.

Name: ______________________________ Date: _____________________

$$5 \div 6 = \frac{5}{6}$$

Write a situation for this equation and draw a picture that goes with it.

Name________________________________ Date __________________

Daisy is going to make dinner for herself and her sister.

RICE + VEGETABLES

- $\frac{1}{3}$ cup extra firm tofu
- 1 cup brown rice, rinsed
- 4 cloves garlic, minced
- $\frac{1}{4}$ cup chopped green onion
- $\frac{1}{2}$ cup peas
- $\frac{1}{2}$ cup carrots, finely diced

Serves 6

1. What is this situation about?

2. What are the quantities in this situation?

3. What mathematical questions could you ask?

4. Answer one of your questions!

Name ____ Date: _____________________

5.7 LS2 Day 1 HW

1. Ms. Hussein is wrapping presents. She has 2 yards of ribbon to use for 3 presents. How many yards of ribbon can she use for each present? Show with numbers, words, and a picture or diagram.

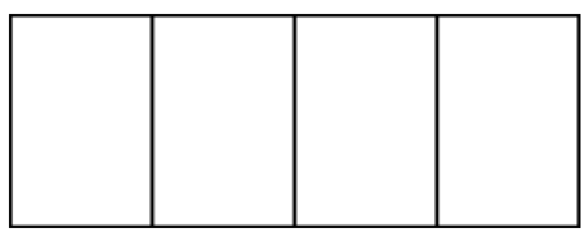
2. Jessa has 23 one-dollar bills that she wants to divide equally among her 5 children.

   i. How much money will each child receive? How much money will Jessa have left over?

   ii. Jessa exchanged the remaining one-dollar bills for dimes. If she divides the dimes equally between her 5 children, how much money will each child get?

3. Colson had ¼ of a candy bar left. Shade in ¼ of this diagram.

Colson is going to share the ¼ of a candy bar with 2 friends. What portion of the candy bar will each friend get? Explain your answer with the diagram and words.



Name ____ Date: ______________________

5.7 LS2 Day 2 HW

Mr. Davis's students are going to run in a relay tournament.

- In the first round, 3 students will run a ⅓ mile relay race.
- In the second round, 4 students will run a ⅓ mile relay.

Show your thinking about each problem 3 ways:

First Round - 3 students run a total of ⅓ mile

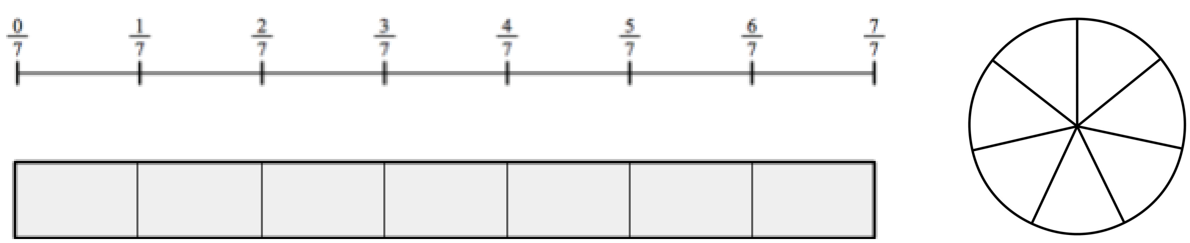
Words	Diagrams or Pictures
Numbers	

Second Round - 4 students run a total of ⅓ mile

Words	Diagrams or Pictures
Numbers	

Who ran farther, the students in the first or second round?

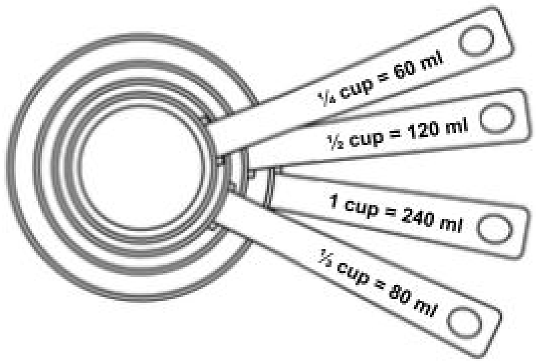
Show $\frac{1}{7} \div 3$ on the number line, tape diagram, and fraction circle.



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

What multiplication equation corresponds to these diagrams?

Name________________________________ Date ____________________



1. What is this situation about?

2. What are the quantities in this situation?

3. What mathematical questions could we ask?

4. Answer one of your questions!

Name: ______________________________ Date: ____________________

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

Write a situation for this equation and draw a picture that goes with it.

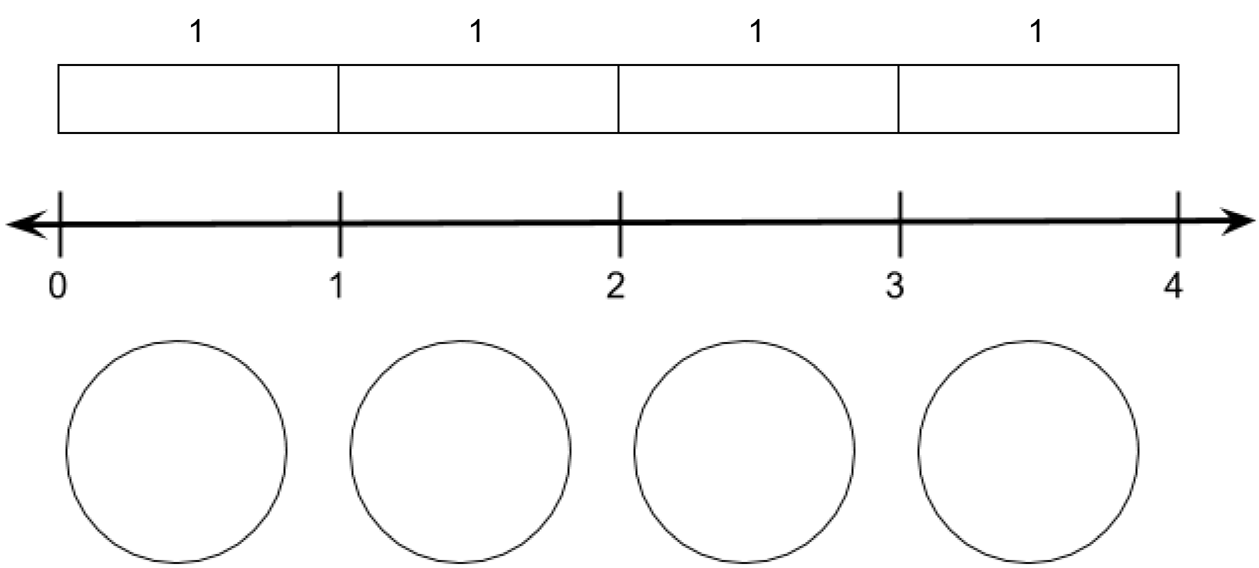
Name ____ Date: ______________________

5.7 LS3 Day 2 HW

1. Larry had ⅓ of a submarine sandwich left over from a field trip. He decided to share it with his 3 friends after school. How much of the original sandwich did each person get? Show with numbers, words, and a picture or diagram.

2. A group of 5 students are running a relay race. If the race is 7 miles long and each student runs the same distance, how far does each student need to run? Show with numbers, words, and a picture or diagram.

3. How many sixths are in 4? Show $4 \div \frac{1}{6}$ on a tape diagram, number line, and with circles:



$4 \div \frac{1}{6} =$

What multiplication equation could this represent? ______________________________

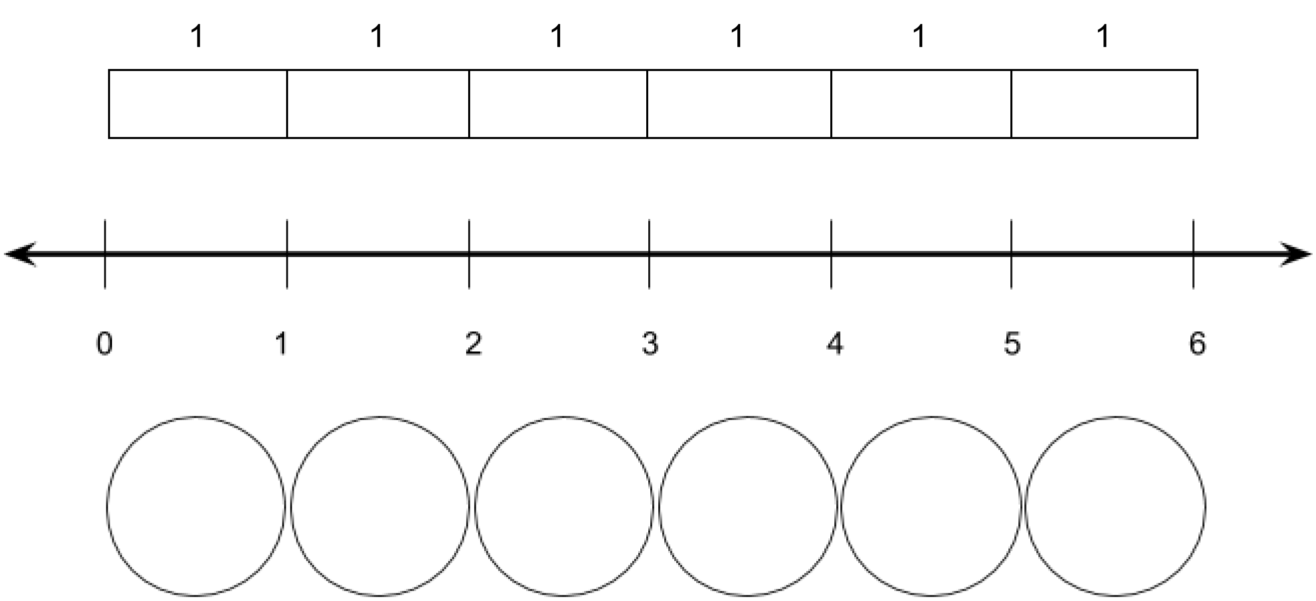
Name ____ Date: __________________

5.7 LS3 Day 3 HW

1. Drew has 4 submarine sandwiches. She decides to cut each sandwich into thirds to share with her friends. How many friends can she share with? Show with numbers, words, and a picture or diagram.

2. Rob has 7 yards of fabric. He needs ½ yard to make one pillow cover. How many pillow covers can he make if he uses all his fabric? Show with numbers, words, and a picture or diagram.

3. Show $6 \div \frac{1}{5}$ on the tape diagram, the number line, and with circles.



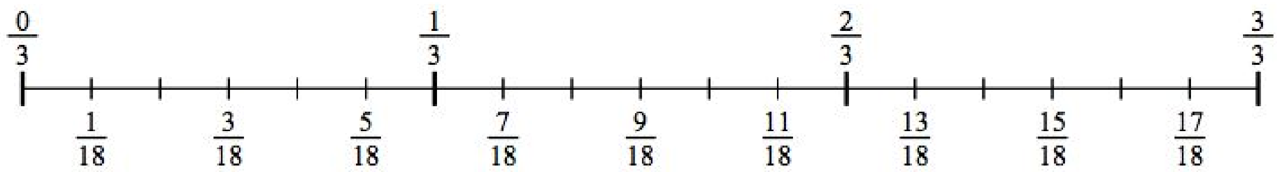
$6 \div \frac{1}{5} =$

What multiplication equation could this represent? ______________________________

Name ____ Date: ______________________

5.7 Milestone HW

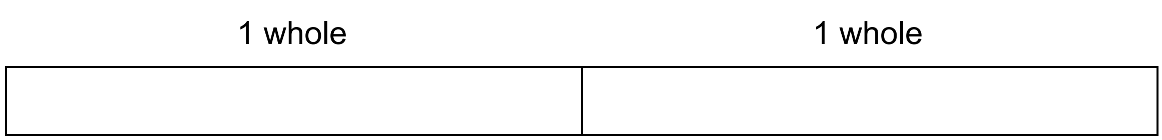
1. Show $\frac{1}{3} \div 6$ on this number line. $\frac{1}{3} \div 6$ =



2. The face-painting booth at a carnival has ¼ pint of paint. There are five fifth graders who want their faces painted. How much paint can be use for each child? Show with numbers, words, and a picture or diagram.

3. Colleen has ½ hour in the Computer Lab. She wants to complete 5 levels of the game, Typing Club, in order to beat her classmates. If she spends the same amount of time on each level, how much time should she spend per level? Show with numbers, words, and a picture or diagram.

4. Show $2 \div \frac{1}{6}$ on this bar model. $2 \div \frac{1}{6}$ =



What multiplication equation also goes with this diagram?