BIL Counter Evidence to Ed Reports Alignment
©2019 Big Ideas Math: Modeling Real Life, Grade 3

GATEWAY TWO: Rigor and Mathematical Practices

Rigor and Balance

Each grade's instructional materials reflect the balances in the Standards and help students meet the Standards' rigorous expectations, by helping students develop conceptual understanding, procedural skill and fluency, and application.

Indicator 2a -- Attention to conceptual understanding: Materials develop conceptual understanding of key mathematical concepts, especially where called for in specific content standards or cluster headings.

Ed Reports Review	BIL Counter Evidence
Indicator 2a -- While there are some opportunities for students to demonstrate conceptual understanding independently, the instructional materials do not always provide students opportunities to independently demonstrate conceptual understanding throughout the grade-level. Within the Apply and Grow and Homework and Practice sections, students have limited opportunities to independently demonstrate conceptual understanding.	We intentionally include conceptual problems throughout the Explore and Grow, Apply and Grow: Practice, and Homework & Practice. Students have opportunity to independently demonstrate conceptual understanding in a variety of ways - modeling, written responses, and discussion.
Indicator 2a -- Chapter 2, Lesson 1, Explore and Grow, students “Model 3 x 2 using equal groups.” They answer: “How can you use the model to find 4 x 2?” Throughout the Think and Grow and Apply and Grow sections, students are given representations and tools to show both repeated addition and the math facts. In the Homework and Practice section, students have limited opportunities to use arrays, models, and repeated addition to demonstrate conceptual understanding of multiplication independently. In Problems 3 through 13 students “Find the Product.” Chapter 4, Lesson 3, “Divide by 2, 5, or 10", Explore and Grow, students “Use the number line to model 10 ÷ 2” and answer ‘In your number line model, does 2 represent the number of equal groups or the size of the groups? Explain.’” Students have no additional opportunities to show their conceptual understanding in this lesson.	In all of Chapter 1 and in the first two lessons of Chapter 4, students have ample opportunites to use arrays, models (equal groups, number lines, tape diagrams), and repeated addition to develop and demonstrate deep conceptual understandings of multiplication and division. For example: Apply and Grow: Practice • ***1.1 #3-8, page 5*** • 1.2 #3-6, page 11 • 1.3 #3-6, page 17 • 1.4 #3-5, page 23 • 1.5 #2, page 29 • 1.6 #3, page 35 • 1.7 #4, page 41 • 4.1 #9-10, page 159 • 4.2 #4, page 165 Homework & Practice • 1.1 #1-3 and 7, pages 7 and 8 • ***1.2 #1-4, pages 13 and 14*** • 1.3 #2-3, page 19 • 1.4 #1-2, page 25 • 1.5 #1, page 31 • 1.6 #1, page 37 • 1.7 #1, page 43 • 4.1 #1-2, page 161 • 4.2 #1-3, page 167 In the Teaching Edition, Laurie's Notes suggests to teachers to encourage their students to use any model that they've previously used. • 2.6 page T-83 • ***3.7 page T-131*** • 3.7 page T-133
Indicator 2a -- Chapter 11, Lesson 7, “Compare Fractions", Explore and Grow, students “Use a strategy to find the greater fraction.” Students are given the fractions “2/3” and “2/8”. Students are directed to “Use a different strategy to check your answer. Tell your partner which strategy you prefer. Explain.” In the Think and Grow section, students are provided fraction strips to compare two fractions during the teacher directed activity. As students transition to the independent work in the Apply and Grow section, they are asked to complete many problems with the directions to “Compare,” with examples such as “1/4 ____ 2/4." Scaffolding is available in the Laurie’s Notes section, however, students are not required to demonstrate conceptual understanding during their independent work. The Homework and Practice problems provide limited opportunity for students to demonstrate conceptual understanding using fraction strips.	Chapter 11 Lessons 7 and 8 are the culmination of the previous six lessons where students have already seen and demonstrated the conceptual understanding of fraction equivalence and comparison. In these final two lessons of the chapter, students choose a strategy as they practice and apply those concepts. The Homework & Practice problems in these final two lessons do not require the usage of fraction strips (although the Teaching Edition encourages it, see pages T-520, T-521, T-522, T-523) because students have already demonstrated their conceptual understanding of this concept in Lessons 11.1-11.6. Please see Lessons 11.1-11.6 to see the transition from concrete to pictorial to abstract for comparing fractions. For example: • 11.1 Explore and Grow, page 483 • ***11.2 Explore and Grow, page 489*** • 11.3 Explore and Grow, page 495 • 11.4 Show and Grow, page 502 • 11.5 Explore and Grow, page 507 • 11.5 Show and Grow, page 508 • 11.6 Explore and Grow, page 513

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GATEWAY TWO: Rigor and Mathematical Practices	
Indicator 2c -- Attention to Applications: Materials are designed so that teachers and students spend sufficient time working with engaging applications of the mathematics, without losing focus on the major work of each grade.	
Ed Reports Review	**BIL Counter Evidence**
Indicator 2c -- The materials present opportunities for students to independently demonstrate routine application of mathematics; however, there are few opportunities for students to independently demonstrate application of grade-level mathematics in non-routine settings.	Students have abundant opportunity to engage in routine and non-routine application problems throughout the grade level. Examples of non-routine problems: Show and Grow • 3.8 #13-14, page 140 • 4.8 #24, page 202 • ***10.5 #10, page 472*** Homework & Practice • ***1.4 #6, page 26*** • 3.9 #5, page 148 • 8.8 #14, page 374 Performance Task • Ch 5, #1a, d, and e page 249 • Ch 6, #1d-e, page 285 • ***Ch 15, #1-2, page 711***
Indicator 2c -- In Chapter 4 Lesson 5, Think and Grow: Modeling Real Life, "There are 42 students in gym class. The teacher divides the students into 7 teams. How many more students would be on each team if the teacher divides the students into 6 teams?" This is an example of a routine application as students need to revise the problem to represent a different divisor.	Chapter 4 Lesson 5, Think and Grow: Modeling Real Life is a non-routine problem. This problem does not simply ask students to divide by a different divisor; it asks them to go beyond that and answer how many more students are on each team. • ***4.5 #17, page 184***

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GATEWAY TWO: Rigor and Mathematical Practices	
Indicator 2d -- Balance: The three aspects of rigor are not always treated together and are not always treated separately. There is a balance of the 3 aspects of rigor within the grade.	
Ed Reports Review	**BIL Counter Evidence**
Indicator 2d -- The instructional materials for Big Ideas Grade 3 partially meet expectations that the three aspects of rigor are not always treated together and are not always treated separately.	The Big Ideas Math: Modeling Real Life program consistently across Grades K-8 strives for a balanced approach to rigor. Each section develops a concept from conceptual understanding (Explore and Grow) to procedural fluency (Think and Grow examples) to rigorous application (Think and Grow: Modeling Real Life examples), engaging students in the mathematics and promoting active learning. Every set of practice problems reflects this balance, giving students the rigorous practice they need to achieve mastery. The Teaching Edition front matter was updated in a recent printing to provide detail on the program philosophy concerning rigor. • ***Front matter, page xix***
Indicator 2d -- The instructional materials present opportunities for students to engage in multiple aspects of rigor within a lesson, however, these are often treated separately.	The following examples show two or more aspects of rigor treated together. Conceptual Understanding and Procedural Fluency • 1.7 Example and #1-3, page 40 • 3.6 Example and #1, page 126 • 6.3 Example and #1-2, page 268 • ***11.4 Example and #1-2, page 502*** • 11.5 Example and #1-2, page 508 • 15.2 Example and #1-2, page 688 Application and Conceptual Understanding • 3.5 Example and #17, page 122 • ***6.4 Example and #6, page 276*** • 10.4 Example and #10, page 466 • 12.2 Example and #1-2, page 546 • 12.3 Example and #1-2, page 552 • 12.8 Example and #11, page 584 Conceptual Understanding, Procedural Fluency, and Application • 3.9 Example and #1, page 144 • 8.11 Example and #1, page 388 • ***9.4 Example and #1, page 426***

GATEWAY TWO: Rigor and Mathematical Practices

Mathematical Practice - Content Connections

Materials meaningfully connect the Standards for Mathematical Content and the Standards for Mathematical Practice.

Indicator 2e -- The Standards for Mathematical Practice are identified and used to enrich mathematics content within and throughout each applicable grade.

Ed Reports Review	BIL Counter Evidence
Indicator 2e -- In the Student Edition, the Mathematical Practices are labeled with "MP" and a shortened of version of the MP, such as "Structure, Reasoning, Construct Arguments, Precision, etc." No document correlates the abbreviated title with the Standards for Mathematical Practice. For example, the label "MP Number Sense" could align to several MPs. Additionally, Big Ideas: Modeling for Real Life Grade 3 added "MP Logic" as a Mathematical Practice. This added practice does not align with the CCSSM Standards for Mathematical Practice. MP5 in under-identified, noted only twice in the Teacher's Guide within the 15 chapters.	We will provide a correlation online to students and teachers at bigideasmath.com, aligning the MP labels and other headings in the student edition with the Standards for Mathematical Practice. The correlation will be included in future printings, and is provided below. **MP1 Make sense of problems and persevere in solving them.** • Make Sense of Problems **MP2 Reason abstractly and quantitatively** • Reasoning • Number Sense **MP3 Construct viable arguments and critique the reasoning of others.** • Construct Arguments • Logic • Critique Reasoning • You Be The Teacher • Critique the Reasoning of Others • Which One Doesn't Belong **MP4 Model with mathematics.** • Modeling Real Life **MP5 Use appropriate tools strategically.** • Choose Tools **MP6 Attend to precision.** • Precision **MP7 Look for and make use of structure.** • Structure • Patterns **MP8 Look for and express regularity in repeated reasoning.** • Repeated Reasoning

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GATEWAY TWO: Rigor and Mathematical Practices	
Indicator 2f -- Materials carefully attend to the full meaning of each practice standard	
Ed Reports Review	**BIL Counter Evidence**
Indicator 2f -- The instructional materials do not present opportunities for students to engage in MP4: Model with mathematics. The instructional materials present few opportunities for students to model with mathematics. Throughout the materials, models are provided for students.	Modeling with mathematics is covered throughout our program. Every Think and Grow: Modeling Real Life example is directly followed by corresponding Show and Grow problems for students to engage in MP4. In addition, every Homework & Practice set contains multiple opportunities for students to model with mathematics in the Modeling Real Life exercises.For example: Think and Grow: MRL; Show and Grow • ***1.2, Example and #7-8, page 12*** • 1.3, Example and #9-10, page 18 • 3.4, Example and #18-20, page 116 • 8.7, Example and #9-11, page 366 • 11.5, Example and #14-16, page 510 Homework & Practice • 1.2 #5-6, page 14 • ***1.3 #6-7, page 20*** • 3.4 #17-18, page 118 • 8.7 #7-8, page 368 • 11.5 #12-13, page 512 The Teaching Edition also encourages teachers to engage with students about how to solve problems. For example: • 1.5 page T-30 • 4.4 page T-178 • 6.4 page T-276 • ***3.4 page T-116*** • 4.8 page T-202 • 11.3 page T-498
Indicator 2f -- The instructional materials do not present opportunities for students to engage in MP5: Use appropriate tools strategically. The instructional materials present few opportunities for students to choose their own tool; therefore, the full intent of the MP is not being attended to. MP5 is only identified a total of two times throughout the instructional materials. Big Ideas: Modeling for Real Life Grade 3 presents limited opportunities for students to choose tools strategically, as the materials indicate what tools should be used.	Students to have opportunity to choose tools strategically. In addition to the specific MP5 labels, the Teaching Edition often indicates where students have a choice of tools. For example: • ***9.2 Scaffolding Instruction, page T-415*** • 11.7 Scaffolding Instruction, page T-521 In the Dynamic Student Edition, students have access to the following math tools at all times. • Balance scale • Four function calculator • Geoboard • Money • Number line • Place value • Flash cards • Fraction models • Linking cubes • Number frames • Pattern blocks • Rekenrek
Indicator 2f -- The instructional materials do not present opportunities for students to engage in MP6: Attend to precision. The instructional materials do not support students to attend to precision. In most instances, teachers attend to precision for students.	While the MP6 notes in the Teaching Edition discuss the mathematics of the examples, the note exists for the teacher to encourage precision in the related student work that directly follows, in the Show and Grow, Apply and Grow: Practice, and Homework & Practice problems. For example: • ***10.2 Explore and Grow, page 451*** • 10.2 #7, page 456 • 6.2 #6, page T-263 • 8.5 page T-352
Indicator 2f -- The instructional materials do not present opportunities for students to engage in MP7: Look for and make use of structure. The instructional materials often label content MP7 Structure, but the teaching notes and problems do not attend to the full meaning of the MP.	As stated in the Ed reports Math Grades K-8 Evidence Guides, "Every instance of an MP being marked does not necessarily have to encompass the full meaning of an MP, but taken together there should be evidence that the materials carefully attend to the full meaning of each practice standard." Below are several examples across Grade 3 showing opportunities for students to practice the various aspects of MP7. • 1.1 #1-2, page 4 • 2.1 #18, page 55 • 9.5 Explore and Grow, page 431 • ***10.5 #5-6, page 471***

GATEWAY TWO: Rigor and Mathematical Practices

Indicator 2g.i -- Materials prompt students to construct viable arguments and analyze the arguments of others concerning key grade-level mathematics detailed in the content standards.

Ed Reports Review	BIL Counter Evidence
Indicator 2g.i -- The Student Edition labels Standards of Mathematical Practices with “MP Construct Arguments”, however, these noted activities do not always indicate that the students are constructing arguments or analyzing arguments of others.	We suggest that when explaining or comparing answers, students must use what they have learned in building a logical progression of statements that defends their answer. The ability to critique someone else's reasoning also helps students analyze their own work and formulate good explanations. For example: • 1.1 #6, page 8 • ***3.1 #17, page 97*** • 3.7 #9, page 136 • 4.8 Explore and Grow, page 199 • 5.1 #2, page 230 • 7.4 Explore and Grow, page 309 • 8.11 Explore and Grow, page 387 • 11.4 Explore and Grow, page 501 • 11.7 Explore and Grow, page 519 • 13.2 #10, page 612
Indicator 2g.i -- Chapter 4, Lesson 5, Explore and Grow, students “Complete the statements and the models: 42 6 and 42 7." Students answer, “Without solving, which quotient is greater? Explain how you know.” The students had already solved it, and the model that is created for them shows the answer. There is no thinking, analyzing or arguing that occur.	In Chapter 4, Lesson 5, Explore and Grow, students have not "already solved" the division problem and do need to think, analyze, and argue to complete the exploration. The directions ask "Without solving, which quotient is greater?". Students have to reason and think about which quotient is greater when the same number is divided by a lesser or greater number, and then construct an argument, which should contain the idea that if the number of groups is less, there are more in each group. • ***4.5 Explore and Grow, page 181***

Indicator 2g.ii -- Materials assist teachers in engaging students in constructing viable arguments and analyzing the arguments of others concerning key grade-level mathematics detailed in the content standards.

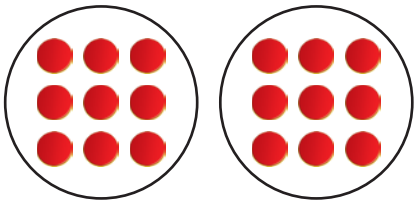
Ed Reports Review	BIL Counter Evidence
Indicator 2g.ii -- There are some missed opportunities where the materials could assist teachers in engaging students in both constructing viable arguments and analyzing the arguments of others.	The Teaching Edition contains many instances of probing questions the teacher can ask to engage students in constructing arguments and analyzing the arguments of others. These are throughout and often indicated with a "MP3 Construct Viable Arguments" heading. For example: • ***3.9 page T-144*** • 7.1 page T-291 • 7.2 page T-298 • 10.2 page T-454 • 12.3 page T-552 • 15.1 page T-682

Name _____

Apply and Grow: Practice

Indicator 2a - In #3, students use an array and repeated addition to demonstrate their conceptual understanding of multiplication.

3. Use the model to complete the statements.



_____ groups of _____

_____ + _____ = _____

_____ × _____ = _____

Draw equal groups. Then complete the equations.

4. 4 groups of 2

_____ + _____ + _____ + _____ = _____

_____ × _____ = _____

5. 3 groups of 5

_____ + _____ + _____ = _____

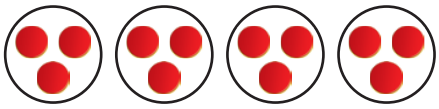
_____ × _____ = _____

Write the addition equation as a multiplication equation.

6. 8 + 8 + 8 = 24

7. 7 + 7 + 7 + 7 + 7 = 35

8. **YOU BE THE TEACHER** Newton says he circled 3 groups of 4 counters. Is he correct? Explain.



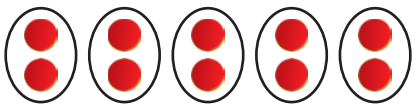
9. **DIG DEEPER!** You wash 5 cars. How many tires do you wash?

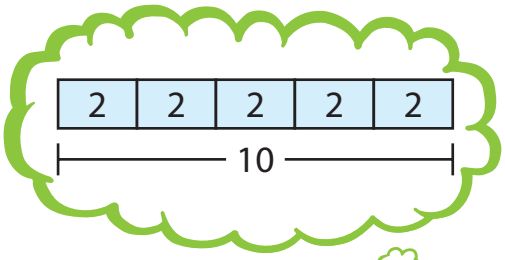
Name _____

Homework & Practice 1.1

Learning Target: Use equal groups to multiply.

Example Use the model to complete the statements.



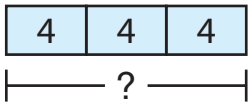


5 groups of 2

2 + 2 + 2 + 2 + 2 = 10

5 × 2 = 10

1. Use the model to complete the statements.



_____ groups of _____

_____ + _____ + _____ = _____

_____ × _____ = _____

Draw equal groups. Then complete the equations.

2. 2 groups of 8

_____ + _____ = _____

_____ × _____ = _____

3. 5 groups of 3

_____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

Write the addition equation as a multiplication equation.

4. $3 + 3 + 3 + 3 + 3 + 3 = 18$

5. $2 + 2 + 2 + 2 + 2 + 2 + 2 = 14$

6. DIG DEEPER! You have 16 action figures. Can you put an equal number of figures on 3 shelves? Explain.

7. **Which One Doesn't Belong?**
Which one does *not* belong with the other two?

2 groups of 3

$2 + 2 + 2 = 6$

8. **Modeling Real Life** You make 7 gift bags for your friends. Each gift bag has 3 pom-pom pets. How many pom-pom pets are there in all?

9. DIG DEEPER! Newton has 2 stacks of 5 books. Descartes has 3 stacks of 4 books. How many books do they have in all?

Review & Refresh

10. $50 + 30 =$ _____

11. $27 + 40 =$ _____

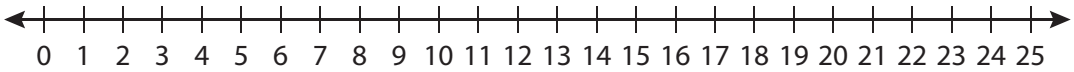
12. $19 + 20 =$ _____

Name _____

Apply and Grow: Practice

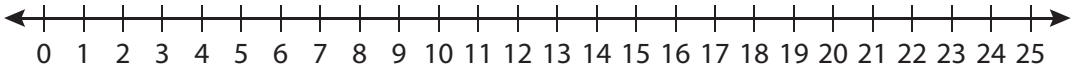
3. Find 3×5.

Number of jumps: _____ Size of each jump: _____



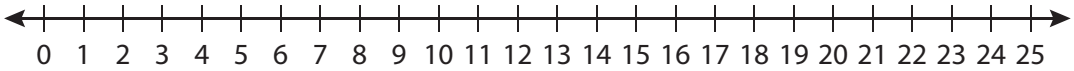
$3 \times 5 =$ _____

4. Find 5×4.



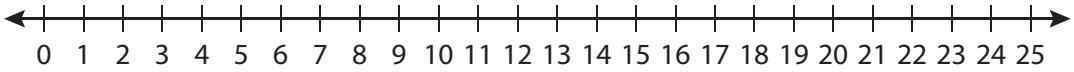
$5 \times 4 =$ _____

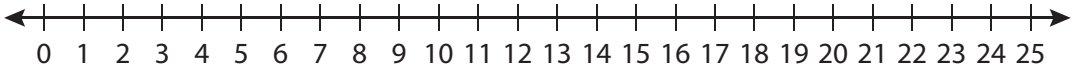
5. Find 3×8.



$3 \times 8 =$ _____

6. MP **Structure** Draw jumps to show 4 groups of 6 and 6 groups of 4.
Think: How are they the same? How are they different?





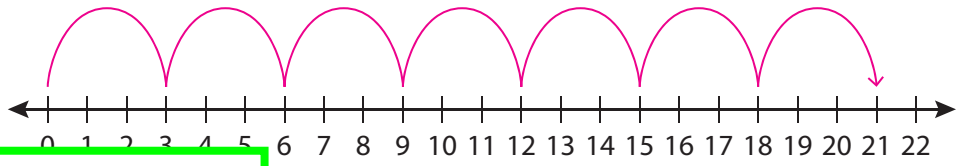
Name _____

Homework & Practice 1.2

Learning Target: Use a number line to multiply.

Example Find 7×3.

Number of jumps: 7 Size of each jump: 3

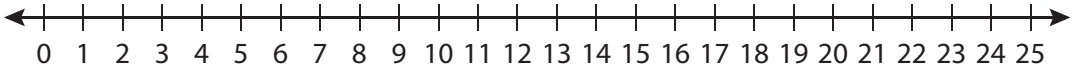


$7 \times 3 = 21$

Indicator 2a - In #1-2, students use number lines to model and solve multiplication problems.

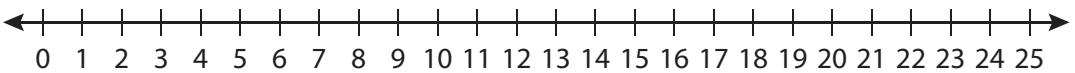
1. Find 3×6.

Number of jumps: _____ Size of each jump: _____



$3 \times 6 =$ _____

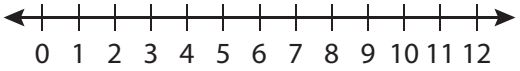
2. Find 4×5.



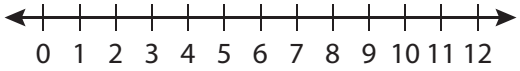
$4 \times 5 =$ _____

3. **Structure** Complete the multiplication equations in two different ways. Model each equation on the number line.

____ × ____ = 12



____ × ____ = 12



4. **Writing** Explain how you can use a number line to find 5 × 3.

5. **Modeling Real Life** You have 6 boxes of blueberry muffins. Each box has 4 muffins. How many muffins do you have in all?

6. **DIG DEEPER!** You fill 8 pages of a photo album. Each page has 3 photos. You have 1 photo left. How many photos did you have to start?

Review & Refresh

7. 9 + 8 + 2 = ____

8. 6 + 5 + 3 = ____

9. 7 + 4 + 7 = ____

Name _____

Apply and Grow: Practice

Draw an array to multiply.

3. $4 \times 8 =$ _____

4. $3 \times 9 =$ _____

5. $7 \times 3 =$ _____

6. $6 \times 5 =$ _____

7. MP **Number Sense** Newton has a 2×10 array of baseballs. He adds another row. How many baseballs does he add? Write a multiplication equation for his new array.

He adds _____ baseballs.

_____ $\times$ _____ $=$ _____

8. DIG DEEPER! Use 6 counters to make as many different arrays as possible using all of the counters. Draw the arrays. Then write a multiplication equation for each array.

Name _____

Homework & Practice 1.3

Learning Target: Use an array to multiply.

Example How many counters are there in all?

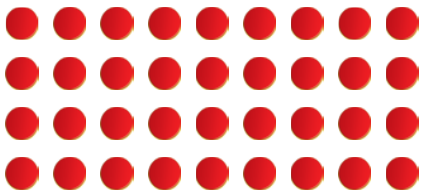
3 rows

5 columns

5 + 5 + 5 = 15

3 × 5 = 15

1. How many counters are there in all?



_____ rows

_____ columns

_____ + _____ + _____ + _____ = _____

_____ × _____ = _____

Draw an array to multiply.

2. 9 × 2 = _____

3. 4 × 5 = _____

Name _____

Apply and Grow: Practice

Draw an array to show the Commutative Property of Multiplication.
Complete the statements.

3. 

_____ × _____ = _____

_____ × _____ = _____

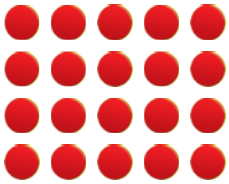
So, _____ × _____ = _____ × _____.

4. 

_____ × _____ = _____

_____ × _____ = _____

So, _____ × _____ = _____ × _____.

5. 

_____ × _____ = _____

_____ × _____ = _____

So, _____ × _____ = _____ × _____.

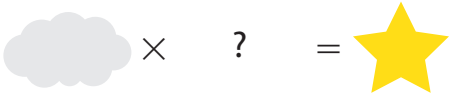
Complete the equation.

6. $8 \times 3 = 3 \times$ _____

7. $10 \times 2 =$ _____ $\times 10$

8. $1 \times$ _____ $= 9 \times 1$

9. MP **Structure** Which shape completes the equation?



Name _____

Homework & Practice 1.4

Learning Target: Multiply factors in any order.

Example Complete the statements.

2 rows of 4

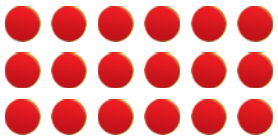
2 × 4 = 8

4 rows of 2

4 × 2 = 8

So, 2 × 4 = 4 × 2.

1. Complete the statements.



_____ rows of _____

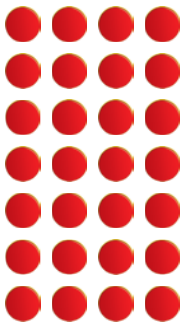
_____ × _____ = _____

_____ rows of _____

_____ × _____ = _____

So, _____ × _____ = _____ × _____.

2. Draw an array to show the Commutative Property of Multiplication. Complete the statements.



_____ × _____ = _____

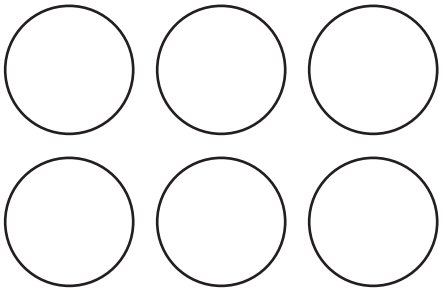
_____ × _____ = _____

So, _____ × _____ = _____ × _____.

Name _____

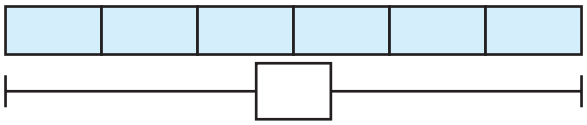
Apply and Grow: Practice

2. Divide 30 counters into 6 equal groups. How many counters are in each group?



30 ÷ 6 = _____

Use the tape diagram to model the equation.



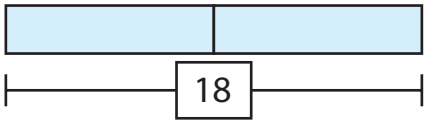
3. Divide 16 counters into 2 equal groups. How many counters are in each group?

16 ÷ 2 = _____

4. Divide 9 counters into 3 equal groups. How many counters are in each group?

9 ÷ 3 = _____

5. MP **Structure** Write the division equation that matches the tape diagram.



_____ ÷ _____ = _____

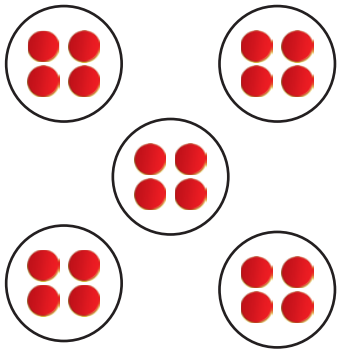
6. DIG DEEPER! Newton has a tennis ball collection. He can divide the balls into 3 equal groups with none left over. He can also divide the balls into 4 equal groups with none left over. How many tennis balls does he have?

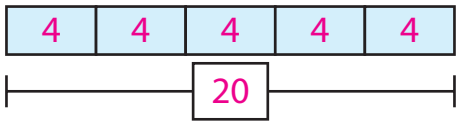
Name _____

Homework & Practice 1.5

Learning Target: Use division to find the size of equal groups.

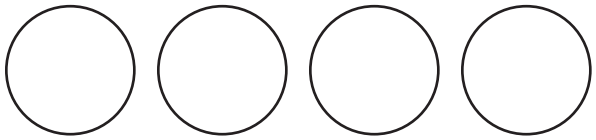
Example Divide 20 counters into 5 equal groups. How many counters are in each group?





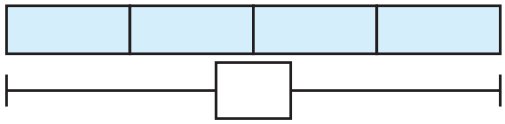
$20 \div 5 = \underline{4}$

1. Divide 16 counters into 4 equal groups. How many counters are in each group?



$16 \div 4 = \_\_\_\_$

Use the tape diagram to model the equation.



2. Divide 28 counters into 7 equal groups. How many counters are in each group?

$28 \div 7 = \_\_\_\_$

3. Divide 27 counters into 3 equal groups. How many counters are in each group?

$27 \div 3 = \_\_\_\_$

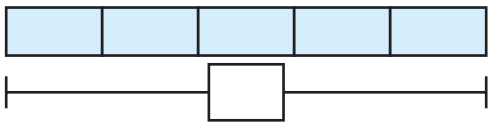
Name _____

Apply and Grow: Practice

3. Divide 30 counters into groups of 6. How many groups are there?

30 ÷ 6 = _____

Use the tape diagram to model the equation.



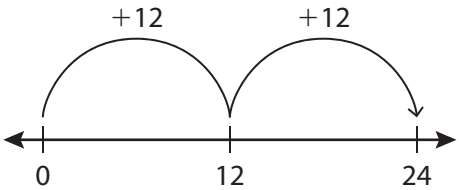
4. Divide 15 counters into groups of 5. How many groups are there?

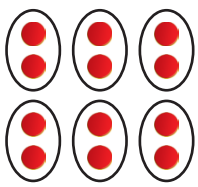
15 ÷ 5 = _____

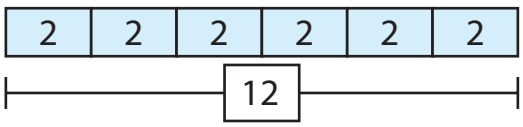
5. Divide 16 counters into groups of 4. How many groups are there?

16 ÷ 4 = _____

6. MP **Structure** You want to bake as many loaves of banana bread as possible with 12 eggs. Each loaf of bread requires 2 eggs. Which models can you use to find how many loaves of bread you can make?





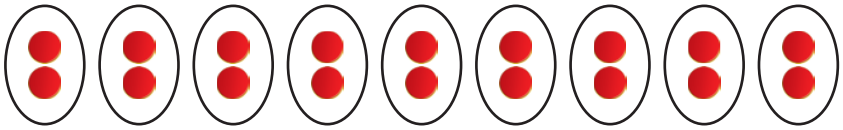


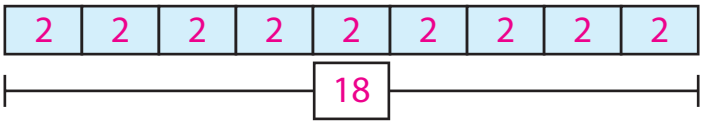
Name _____

Homework & Practice 1.6

Learning Target: Use division to find the number of equal groups.

Example Divide 18 counters into groups of 2. How many groups are there?



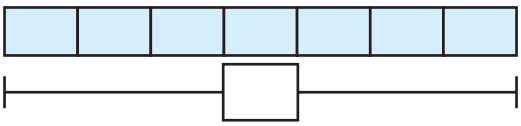


$18 \div 2 = 9$

1. Divide 28 counters into groups of 4. How many groups are there?

$28 \div 4 =$ _____

Use the tape diagram to model the equation.



2. Divide 25 counters into groups of 5. How many groups are there?

$25 \div 5 =$ _____

3. Divide 12 counters into groups of 6. How many groups are there?

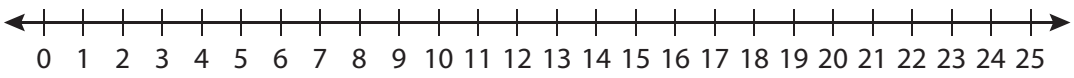
$12 \div 6 =$ _____

Name _____

Apply and Grow: Practice

Complete the equations.

4. 25 ÷ 5 = _____



5. 21 − 7 = _____

_____ − 7 = _____

_____ − 7 = 0

_____ ÷ _____ = _____

6. 36 − 9 = _____

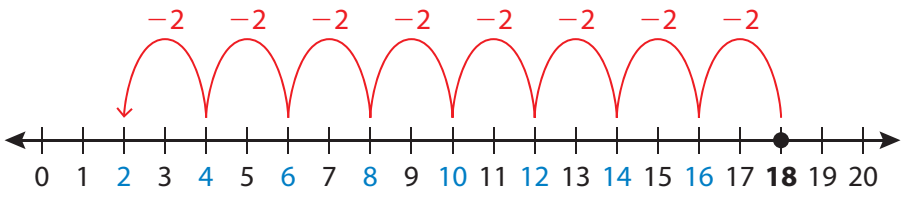
_____ − 9 = _____

_____ − 9 = _____

_____ − 9 = 0

_____ ÷ _____ = _____

7. **YOU BE THE TEACHER** Descartes uses a number line to find 18 ÷ 2. Is he correct? Explain.



18 ÷ 2 = 8

Name _____

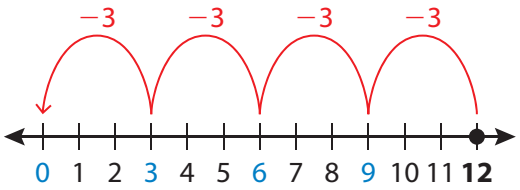
Homework & Practice 1.7

Learning Target: Use a number line to divide.

Example Find 12 ÷ 3.

One Way:

12 ÷ 3 = 4



Another Way:

12 − 3 = 9

9 − 3 = 6

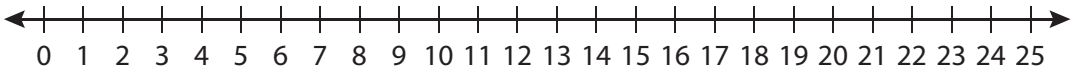
6 − 3 = 3

3 − 3 = 0

12 ÷ 3 = 4

Complete the equations.

1. 9 ÷ 3 = _____



2. 20 − 5 = _____

_____ − 5 = _____

_____ − 5 = _____

_____ − 5 = 0

_____ ÷ _____ = _____

3. 10 − 2 = _____

_____ − 2 = _____

_____ − 2 = _____

_____ − 2 = _____

_____ − 2 = 0

_____ ÷ _____ = _____

Name _____

Apply and Grow: Practice

5. There are 25 counters. The counters are in 5 equal rows. How many counters are in each row?

5 rows of _____

25 ÷ 5 = _____

6. There are 48 counters. The counters are in 8 equal rows. How many counters are in each row?

8 rows of _____

48 ÷ 8 = _____

7. You have 42 counters. You arrange them with 6 counters in each row. How many rows of counters do you make?

_____ rows of 6

42 ÷ 6 = _____

8. You have 27 counters. You arrange them with 9 counters in each row. How many rows of counters do you make?

_____ rows of 9

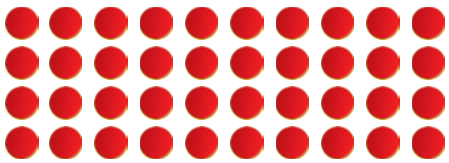
27 ÷ 9 = _____

Write a division equation for the array.

9.

_____ ÷ _____ = _____

10.



_____ ÷ _____ = _____

11. **YOU BE THE TEACHER** Your friend has 63 counters in 7 equal rows. Your friend says that finding 7 ÷ 63 will give the number of columns. Is your friend correct? Explain.

Name _____

Homework & Practice 4.1

Learning Target: Use an array to divide.

Example There are 36 counters. There are 9 counters in each row. How many rows are there?

9 columns

4 rows

$$9\overline{)36}\quad 4$$

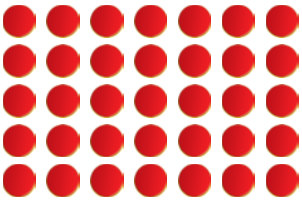
$36 \div 9 = 4$

There are 4 rows.

Find the quotient.

1. 

$10 \div 2 =$ _____

2. 

$35 \div 5 =$ _____

3. There are 9 counters. The counters are in 3 equal rows. How many counters are in each row?

3 rows of _____

$9 \div 3 =$ _____

4. There are 60 counters. The counters are in 6 equal rows. How many counters are in each row?

6 rows of _____

$60 \div 6 =$ _____

5. You have 72 counters. You arrange them with 8 counters in each row. How many rows of counters do you make?

_____ rows of 8

$72 \div 8 =$ _____

6. You have 24 counters. You arrange them with 6 counters in each row. How many rows of counters do you make?

_____ rows of 6

$24 \div 6 =$ _____

Name _____

Apply and Grow: Practice

4. Draw an array to find 3×6. Write the other 3 facts in the fact family.

$3 \times 6 =$ _____

_____

_____

_____

Complete the fact family.

5. $7 \times$ _____ $= 70$ $\quad 70 \div 10 =$ _____

_____ $\times 7 = 70$ $\quad 70 \div$ _____ $= 10$

6. $5 \times$ _____ $= 40$ $\quad 40 \div 8 =$ _____

_____ $\times 5 = 40$ $\quad 40 \div$ _____ $= 8$

Write the fact family for the numbers.

7. 2, 5, 10

8. 4, 3, 12

9. MP **Structure** Find each product. Then match the multiplication fact with the related division fact.

$6 \times 4 =$ _____ $\quad 27 \div 3 = 9$

$8 \times 2 =$ _____ $\quad 7 \div 1 = 7$

$3 \times 9 =$ _____ $\quad 16 \div 2 = 8$

$7 \times 1 =$ _____ $\quad 24 \div 6 = 4$

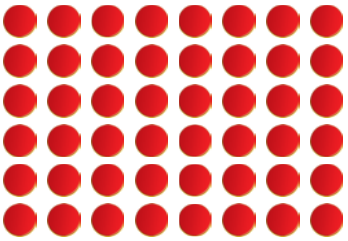
10. DIG DEEPER! Is $4 \times 6 = 24$ part of the fact family for $3 \times 8 = 24$? Explain.

Name _____

Homework & Practice 4.2

Learning Target: Use fact families to relate multiplication and division.

Example



Multiplication

6 rows of 8 counters

$6 \times 8 =$ 48

48 counters

Division

48 counters in 6 equal rows

$48 \div 6 =$ 8

8 counters in each row

Fact family for 6, 8, and 48:

$6 \times 8 =$ 48 $\quad 48 \div 6 =$ 8

$8 \times 6 =$ 48 $\quad 48 \div 8 =$ 6

Use the array to complete the equations.

1. 

$2 \times$ _____ $= 8$

$8 \div 2 =$ _____

2. 

$3 \times$ _____ $= 9$

$9 \div 3 =$ _____

3. Draw an array to find 5×7. Write the other 3 facts in the fact family.

$5 \times 7 =$ _____

Complete the fact family.

4. $9 \times$ _____ $= 9$ $\quad 9 \div 1 =$ _____

_____ $\times 9 = 9$ $\quad 9 \div$ _____ $= 1$

5. $6 \times$ _____ $= 42$ $\quad 42 \div 7 =$ _____

_____ $\times 6 = 42$ $\quad 42 \div$ _____ $= 7$

2.6

Check out the Dynamic Classroom.
BigIdeasMath.com

Laurie's Notes

Learning Target
Use the problem-solving plan to solve word problems.

Success Criteria
- Understand a problem.
- Make a plan to solve.
- Solve a problem.

Warm-Up
Practice opportunities for the following are available in the Resources by Chapter or at *BigIdeasMath.com*.
- Daily skills
- Vocabulary
- Prerequisite skills

ELL Support
Explain that students will solve word problems by multiplying. Point out that many different phrases can signal multiplication, such as *times, multiply by, each have 4, 3 by 4, or three 4s.* Have students keep a record of the different phrases they read in word problems that signal multiplication so that they can become familiar with them.

STATE STANDARDS
3.OA.A.3, 3.OA.A.4, 3.OA.C.7

Preparing to Teach
In this chapter, students have been modeling real-life problems that could be solved with the use of multiplication facts that were taught

presented together in a topic of problem solving. Students select which facts or models will best help them solve the problem. The problem-solving plan helps students outline important information and determine action needed to carry out the plan.

Materials
- Problem-Solving Plan*

**Found in the Instructional Resources*

Dig In (Circle Time)
Students discuss a plan for raising angel fish as an example of how to sort out what you know, what you need to find, and decide how will you solve. The problem-solving plan is introduced. Write the following on the board. "Caring for angelfish is relatively easy to do in an aquarium at home. The tank needs to be at the proper temperature and pH level. Angelfish need a healthy diet and you need to clean the tank regularly."

? "Suppose you decide to have angelfish in your home. What do angelfish need to survive? Let's read the information again to find out." Focus on a tank, proper water temperature, pH level, a healthy diet, and clean tank. Underline aspects as students mention them.

? "What questions do we need answered to provide the things we just underlined?" *Sample answers:* What is the proper temperature? pH level? How often do we feed the fish? How much? What is a healthy diet for fish? How do you clean the tank? How big a tank is needed?

? "Once we have all the information, we need a plan so we can take action. Suppose tomorrow is the day you will get your fish. What is the plan for your day, what actions will you have to take? Is there a special order you must follow? Describe to your partner, what you plan to do." Listen for go to the store, buy aquarium, put in water, test the temp and pH, adjust, buy fish, put them in, feed them.

◉ "We looked at a situation, determined what information we knew, what we still needed to find out, and described a plan for completing the action. In math, we use a very similar structure of steps to help us plan and take action to solve a problem. Here is the plan we will use in this lesson." Show the Problem-Solving Plan.

- Review the plan using the angelfish context. Emphasize re-reading the information and evaluating the information to understand the problem. Revisit their responses, pointing to the corresponding areas of the plan that they used.

3.7

Check out the Dynamic Classroom.
BigIdeasMath.com

Laurie's Notes

STATE STANDARDS
3.OA.A.3, 3.OA.A.4, 3.OA.B.5, 3.OA.C.7

Preparing to Teach

Students have now completed lessons with all the multiplication facts for 0–10. Students will still not have automatic recall of all the facts but they should now have multiple methods for finding unknown facts. Continue to practice skip counting and songs/rhymes to help instill recall. In this lesson, students will revisit different models and strategies that they can use to verify or compute products.

Dig In (Circle Time)

Students review how to use a variety of models and strategies to find the product of two counting numbers.

- "In this chapter, we've learned to multiply using many different models and strategies."
- "For 3 minutes, brainstorm as many different ways as you can think of to find the product of two numbers. If you do not know the name of a model, describe it to your partner."
- Project examples, from the text book, of the different methods with descriptions, or show vocabulary cards. Display a number line, equal groups, an array model, the Distributive Property with addition or with subtraction, a tape diagram, patterns (for 9s, 10s, 5s, and 2s), properties of 1, and properties of 0. As you show each, ask, "If you and your partner discussed this method, show thumbs up."

? "Are there any other methods not shown that you discussed?" Some may mention use of a hundred chart to skip count. "Did anyone talk about using the Commutative Property if you already know a fact?"

- Allow students to share any other ways of thinking. Not all have to be visual models. Encourage students to share any mental math thinking. "What if I know $5 \times 4 = 20$. Is there a way I could reason what six 4s is?" Help lead to strategy of adding one more 4 to 20.

◉ "We discussed ways to find multiplication products. In this lesson, you will have the opportunity to practice using a variety of strategies to multiply two factors."

Indicator 2a - In the Teaching Edition, Laurie's Notes suggests to teachers to encourage their students to use any model that they've previously used.

Learning Target

Use a strategy to multiply two factors.

Success Criteria

- Choose a strategy to multiply two factors.
- Multiply two factors and write the product.
- Explain the strategy I used.

Warm-Up

Practice opportunities for the following are available in the Resources by Chapter or at *BigIdeasMath.com*.

- Daily skills
- Vocabulary
- Prerequisite skills

ELL Support

Before beginning the lesson, review the visual strategies students have learned. These included using a number line, using a tape diagram, drawing equal groups, and completing a multiplication table by using addition. You may also want to review the Distributive Property with addition and subtraction.

Laurie's Notes

Apply and Grow: Practice

SCAFFOLDING INSTRUCTION

Meeting the needs of all learners.

Students continue finding products with factors of 0–10. Students select strategies to assist them in finding products of facts that are not yet automatic recall. Observe as students record their strategies. Are some students dependent on the same model regardless of the factors? Do some students adapt, switching models as they encounter different factors? Which facts are students using models to solve? Are students using mental math strategies in lieu of visual models? Which facts seem to be known?

EMERGING students will use models more frequently and may need support setting up each before they can begin to solve the exercises. Switching between different strategies is not fluid and may cause confusion. Students will likely choose one model to use throughout. Students can sometimes "do" but not explain clearly to others the method they are using.

- **Exercises 5–13:** Encourage students to preview all the exercises and complete those they think they know automatically. Provide access to counters, number lines, hundreds chart.
- **Exercises 14 and 15:** Give students a list of strategies to choose from. They can match each to a name. Oral descriptions will allow students to share as much as they know about the strategy even though it may not be sequential. Can they draw the model to represent Exercise 14?
- **Exercise 16:** "What strategy would you like to try and use?" Help the student to set up their strategy and assist for follow through if needed.

PROFICIENT students are able to select a strategy and follow it through or when stuck, successfully switch to another more effective method. They have some facts memorized and use them to support unknown facts. Students can explain strategies used.

- **Exercises 5–13:** Encourage students to first complete the facts they know. Can they visualize any of the models or use mental strategies to complete the unknown facts?
- **Exercise 16:** Did other students use the same or a different strategy?

Extension: Adding Rigor

- Give an example of how it is possible to use the Distributive Property with subtraction for a set of factors that does not include 9. If possible, show with a multiplication fact that is unknown for you.

Laurie's Notes

ELL Support

After reviewing the examples, have students work in pairs to practice language. Have each partner choose a different strategy to use. Have pairs discuss the exercise, compare their strategies and write the appropriate symbol. Expect students to perform according to their language level.

Beginner students may draw diagrams and write numbers and symbols to solve.
Intermediate students may draw, write, and use simple sentences to explain.
Advanced students may draw, write, and use complex sentences to explain.

Think and Grow

Getting Started

- The lesson has three examples, the first uses a strategy not yet introduced. Spend time explaining and discussing the first example. The second and third examples can be used as a review of strategies students already know. These two examples should draw attention to choosing a specific strategy when certain conditions exist.

Teaching Notes

? **Model:** Before reading the example, draw attention to the visual model. Ask questions to get students to focus on the fraction strips. "How many sixths are shaded? Is $\frac{5}{6}$ close to one whole? How can you tell?" If students do not mention it is only $\frac{1}{6}$ away from 1, ask how much more is needed to reach one whole. Repeat the same type of questioning for $\frac{2}{3}$. Then read through the example. Each strip is missing only one of its unit fractions to reach a whole. Complete the inequality $\frac{1}{6} < \frac{1}{3}$ and ask, "How do you know that? Turn and tell your partner. Since a larger piece is missing to get from $\frac{2}{3}$ to one whole, the existing shaded part is farther from being one whole. Write in the correct symbol to show this." Check to see that students complete this correctly.

- The next two examples use same denominators and same numerators. These strategies were learned earlier. Check for conceptual understanding by asking questions.

? "When we compare 3 and 5, are these numbers the size of the fraction pieces or the number of pieces?"

? "Why is the fraction with the greater denominator less?"

- **Supporting Learners:** Remind students of all the strategies they can use in addition to the ones shown. Provide access to Fraction Strips, number lines, grid paper, and anchor charts.
- **Exercise 3:** Students may not be used to seeing fractions with numerators of 0. Discuss, "How can you show these with Fraction Strips?" nothing shaded "How can you show these with a number line?" show increments, plot at 0, $\frac{0}{2}$, $\frac{0}{3}$

◉ "One of our success criteria is to choose a strategy to compare fractions. In these exercises did you use the same strategy for all of them? Select one exercise and tell your partner the strategy you used and why."

Laurie's Notes

Meeting the needs of all learners.

Apply and Grow: Practice

SCAFFOLDING INSTRUCTION

Students have learned many strategies for comparing fractions. Encourage students to look at the fractions before deciding on a strategy. Can they flexibly change strategies based on the current situation? Do they always need to draw a model? Can they reason about the fractions by thinking of the model? by understanding what the numerator and denominator represent? When it is more difficult to decide which fraction is greater, what strategy helps them the most?

EMERGING students will rely on models to show which fraction is greater. They will have difficulty determining which strategy to use and may not realize which is most efficient. Emerging students have a tendency to mix up the conditions for different strategies and may in the process find it difficult to remember whether the larger denominator or larger numerator makes a fraction greater.

- **Exercises 5–13:** Help students identify which pairs of fractions have the same denominator. Have students look at an anchor chart to determine what strategy can be used when the denominators are the same. "Which part of the fraction do you compare when you know you are using the same size pieces? What do these numbers tell you?" Repeat similarly with finding same numerators. Choose one remaining exercise to complete.

- **Exercises 14–17:** Use Fraction Strips. Reduce the number of exercises, having students choose one.

PROFICIENT students can use a variety of strategies to compare. They begin to see when one strategy is more efficient than another. Proficient students may reason by visualizing a model without always needing to physically build or draw it.

- **Exercises 14–16:** Can students find fractions with a different denominator than the first fraction?

Extension: Adding Rigor

- "For Exercise 18, make an answer key of all the possible solutions."

Laurie's Notes

ELL Support

Read each story aloud as students follow along. Clarify unknown vocabulary and discuss the contexts presented. Discuss the multiple meanings of the word *floor*. Allow students to work in pairs and provide time to complete each exercise. Ask the questions provided and have pairs write their answers on a whiteboard and hold them up for your review.

Think and Grow: Modeling Real Life

These applications allow students to show their ability to problem solve by selecting a strategy and use it to compare two fractions.

? **Preview:** Review the problem-solving plan. "How do we make sure we understand the problem? Read the problem more than once. Identify what it asks us to find. Circle key words or facts given. What does the plan help us do?" get organized and make a plan "When we solve we show our work, our method, and/or our explanation."

? Read the example. "How many people are there in the problem? What are they doing? How far does each go?" Summarize this information in the Understand the Problem. "How can we find out who walks farther?" Compare the distances they walk, so compare $\frac{3}{8}$ and $\frac{5}{6}$. Note that both distances are using one mile as their whole, so we can compare even though Descartes and Newton aren't walking from the same starting place. "To solve we compare using a strategy we know. Go ahead and solve using a strategy you know." Once finished, have students check in with their partner. Did they get the same result? Did they use the same strategy?

- **MP1 Make Sense of Problems:** As students work on Exercise 19, they may question whether two different buildings with two different possible floor sizes can be compared. Congratulate them on checking to see that the wholes are the same. Point out that the problem is only comparing the number of floors that get carpet, not how much carpet is used, so the number of floors can be compared. In Exercise 20, what are we using for

- **Supporting Learners:** Provide extra paper and access to Fraction Strips and number lines. Work with a partner.

Extension: In Exercise 20, how much of a pound would you have to add to make the two amounts equivalent?

◉ "Can you compare two fractions? Do you know how to use more than one strategy to compare? How many different strategies did you use in Exercises 19–21?"

Closure

- Have students share some of the different ways they compared in Exercises 19–21.
- **Exit Ticket:** "Compare the fractions $\frac{2}{6}$ and $\frac{2}{3}$. Use two different strategies."

Connect and Extend Learning

Homework & Practice Notes

- Provide students with Fraction Strips and extra paper to draw number lines for support.

Assignment Guide and Concept Check

Level	Assignment	Concept Check
Emerging	1–15 odd 16	7, 9, 11, 13, 15
Proficient	1–16	

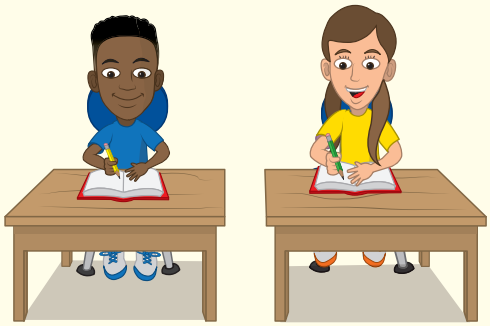
Prior Skills

- **Exercise 16:** Grade 3, Problem Solving: Multiplication

Cross-Curricular Connections

Language Arts

- Have students create a story about a student who does not compare two fractions accurately. Have them leave the story unfinished. They can exchange their stories with a partner and have their partner add on to the story and explain how to compare the fractions correctly. The students will exchange stories back to the original authors to read and illustrate.



Name _____

Equivalent Fractions 11.1

Learning Target: Model and write equivalent fractions.

Success Criteria:
- I can model equivalent fractions.
- I can write equivalent fractions.

Explore and Grow

Use the model to write fractions that are the same size as $\frac{1}{2}$.

1 whole							
$\frac{1}{2}$				$\frac{1}{2}$			
$\frac{1}{3}$			$\frac{1}{3}$			$\frac{1}{3}$	
$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$	
$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$		$\frac{1}{6}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

MP **Reasoning** Can you write a fraction with a denominator of 8 that is the same size as $\frac{3}{4}$? Explain.

Name _____

Equivalent Fractions on a Number Line

11.2

Learning Target: Use a number line to find equivalent fractions.

Success Criteria:

- I can plot fractions on a number line.
- I can find equivalent fractions on a number line.
- I can explain how to use a number line to find equivalent fractions.

Indicator 2a - In the Explore and Grow, students use Fraction Strips to develop a conceptual understanding of equivalent fractions.

Explore and Grow

Use Fraction Strips to label thirds on the number line.

Use Fraction Strips to label sixths on the number line.

Use the number lines to complete the equivalent fraction.

$$\frac{1}{3} = \frac{\square}{6}$$

MP **Structure** How can you tell whether fractions are equivalent using a number line?

Name _____

11.3 Relate Fractions and Whole Numbers

Learning Target: Relate fractions and whole numbers.

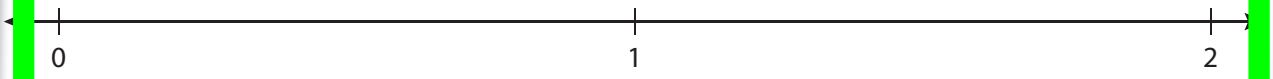
Success Criteria:

- I can label fractions on a number line.
- I can write whole numbers as fractions.
- I can use a number line to relate fractions and whole numbers.

Explore and Grow

Use Fraction Strips to complete the fractions. Draw to show your models.

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



$$2 = \frac{\square}{4}$$

MP **Repeated Reasoning** How many more fourths did you use to model 2 than you did to model 1? How many more fourths would you need to model 3? Complete the fraction.

$$3 = \frac{\square}{4}$$

Think and Grow: Compare Fractions That Have the Same Denominator

Example Compare $\frac{3}{8}$ and $\frac{7}{8}$.

One Way: Use Fraction Strips.

The fractions have the same denominator, 8.

Three $\frac{1}{8}$s is $\frac{3}{8}$. Seven $\frac{1}{8}$s is $\frac{7}{8}$. Shade the Fraction Strips.

	1							
$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{7}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

You can only compare two fractions when they both refer to the same whole.

More $\frac{1}{8}$s are shaded to show $\frac{7}{8}$.

So, $\frac{3}{8}$ is _____ $\frac{7}{8}$, and $\frac{3}{8}$ ◯ $\frac{7}{8}$.

Another Way: When the denominators are the same, the whole is divided into the same number of equal parts. So, look at the numerators 3 and 7 to compare. The fraction with the greater numerator is the greater fraction.

Because 3 ◯ 7, $\frac{3}{8}$ ◯ $\frac{7}{8}$.

Show and Grow *I can do it!*

Shade to compare the fractions.

1.

1					
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$\frac{5}{6}$ ◯ $\frac{2}{6}$

2.

1		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{1}{3}$ ◯ $\frac{3}{3}$

Name _____

Compare Fractions with the Same Numerator

11.5

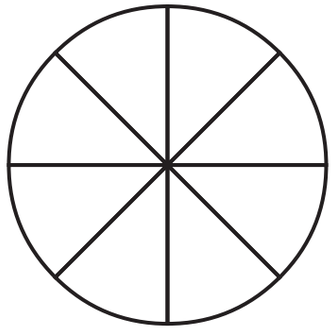
Learning Target: Compare fractions that have the same numerator.

Success Criteria:

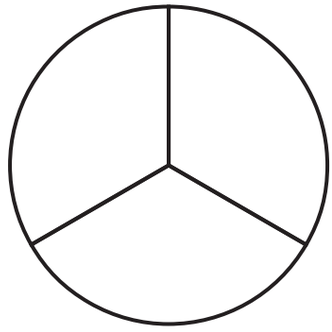
- I can model fractions that have the same numerator.
- I can use the denominators to compare fractions.
- I can explain how to compare fractions that have the same numerator.

Explore and Grow

Color to show each fraction. Circle the greater fraction.



$\frac{1}{8}$



$\frac{1}{3}$

MP **Precision** How can you use Fraction Strips to check your answer? Draw to show.

Think and Grow: Compare Fractions That Have the Same Numerator

Example Compare $\frac{2}{4}$ and $\frac{2}{6}$.

One Way: Use Fraction Strips.

Both fractions have the same numerator, 2. Two $\frac{1}{4}$s is $\frac{2}{4}$. Two $\frac{1}{6}$s is $\frac{2}{6}$.

Shade the Fraction Strips. Compare the parts.

Think: $\frac{1}{6}$ is not as long as $\frac{1}{4}$.

	1			
$\frac{2}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{2}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

So, $\frac{2}{4}$ is _____ $\frac{2}{6}$, and $\frac{2}{4}$ ◯ $\frac{2}{6}$.

Another Way: When the numerators are the same, look at the denominators 4 and 6 to compare the sizes of the parts.

- The more parts the whole is divided into, the smaller the parts are.
- The fewer parts the whole is divided into, the larger the parts are.

The fraction with the greater denominator is the lesser fraction.

So, $\frac{1}{4}$ is _____ $\frac{1}{6}$, and $\frac{2}{4}$ ◯ $\frac{2}{6}$.

Show and Grow *I can do it!*

Shade to compare the fractions.

1.

1					
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{3}{6}$ ◯ $\frac{3}{8}$

2.

1			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{2}{4}$ ◯ $\frac{2}{3}$

Name _____

Compare Fractions on a Number Line

11.6

Learning Target: Use a number line to compare fractions.

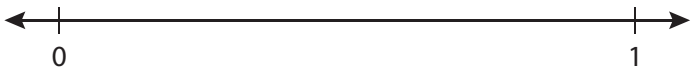
Success Criteria:

- I can plot fractions on a number line.
- I can tell which fraction is closer to 0.
- I can compare fractions on a number line.

Explore and Grow

Use Fraction Strips to plot each fraction on the number line. Circle the greater fraction.

$\frac{2}{8}$ $\frac{7}{8}$



MP **Construct Arguments** Tell your partner how to use a number line to compare the fractions.

$\frac{1}{7}$ ◯ $\frac{3}{7}$

Think and Grow: Modeling Real Life

There are 26 students in your class. Your teacher brings in 4 boxes of muffins. Each box has 4 packages with 2 muffins in each package. Are there enough muffins for the class?

Multiplication equation:

There _____ enough muffins for the class.

Show and Grow *I can think deeper!*

13. Newton needs to send out 50 letters. He buys 4 sheets of stamps. Each sheet has 2 rows with 6 stamps in each row. Does Newton have enough stamps to send out all the letters?

14. **DIG DEEPER!** There are 60 people in line to ride the tram at a zoo. There are 5 benches on each tram car. Two people fit on each bench. The tram is 5 cars long. How many people will have to wait for the next tram?

Think and Grow: Modeling Real Life

There are 72 oranges at a grocery store arranged into an array with 9 columns. There are 80 lemons arranged into an array with 8 columns. Which fruit has more rows?

Models:

Division equations:

The _____ have more rows.

Show and Grow *I can think deeper!*

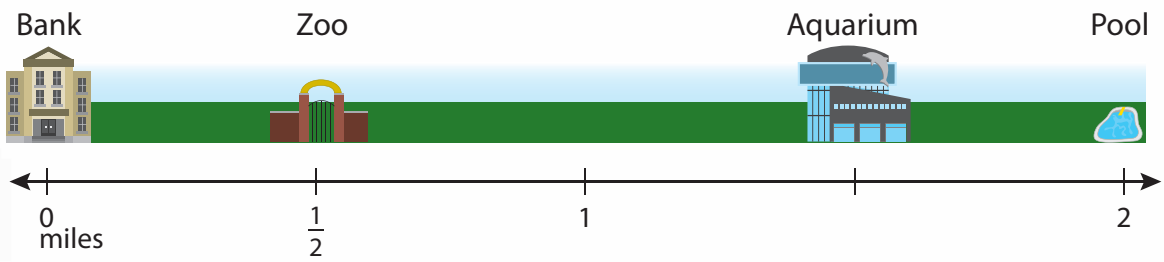
23. There are 63 peaches arranged into an array with 7 rows. There are 70 pears arranged into an array with 10 rows. Which fruit has more columns?

24. Newton has 20 quarters. He wants to trade all of them for bills. How many $1 bills would he get? How many $5 bills would he get?

25. A box of fruit snacks costs $5. Each box has 8 bags. Descartes spends $20 on fruit snacks. How many bags of fruit snacks does he get?

Think and Grow: Modeling Real Life

How far is the aquarium from the bank?

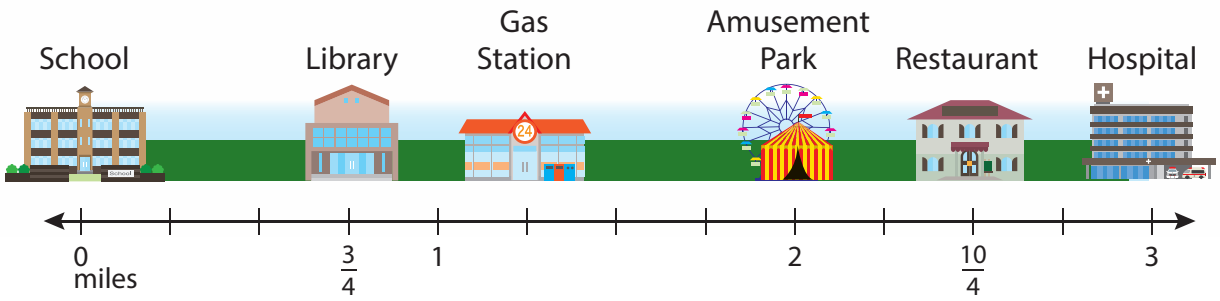


The aquarium is _____ miles from the bank.

Show and Grow

I can think deeper!

Use the number line to answer the questions.



9. How far is the gas station from the school?

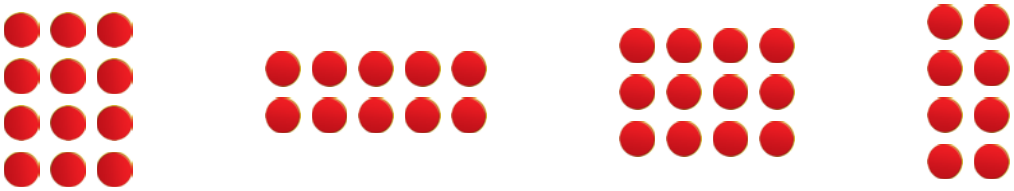
10. A post office is the same distance from the restaurant as it is from the hospital. How far is the post office from the school?

11. DIG DEEPER! How far is the gas station from the hospital?

12. DIG DEE
from the

Indicator 2c - #10 is non-routine because students must first use reasoning to determine the location of the post office, which is not shown on the diagram. Then they must determine that location's value on the number line and use that value to answer the question.

3. **Structure** Which two arrays can you use to show the Commutative Property of Multiplication?



4. **Precision** Write two equations that show the Commutative Property of Multiplication.

_____ × _____ = _____ × _____ | _____ × _____ = _____ × _____

5. **Modeling Real Life** A computer lab has 6 rows of 5 computers. A technology teacher wants to rearrange the computers into 5 rows. How many computers does the teacher put in each row? Explain.

Indicator 2c - #6 is non-routine because students solve a problem to answer a bigger question. They first determine how many pennies each person has, but then must find the difference of these two numbers and determine how many rows of pennies your friend must add to the array.

6. **DIG DEEPER!** You have 6 rows of 4 pennies. Your friend has 2 rows of 6 pennies. How many rows does your friend need to add so that you both have the same number of pennies?

Review & Refresh

7. Newton hits a ball 5 fewer times than Descartes does. Newton hits the ball 9 times. How many times does Descartes hit the ball?

2. A landlord is replacing windows in an apartment complex. There are 6 apartments. Each apartment has 8 windows. Seven windows do not need replacing. How many windows does the landlord need to replace?

3. Women's boxing consists of four 2-minute rounds. There is a 1-minute rest interval between each round. What information do you know that will help you find how long a boxing match lasts?

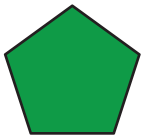
4. **Writing** Write and solve your own word problem that involves multiplication.

5. **Modeling Real Life** You play a trivia game with your friends. Team A answers 3 hard questions and 6 easy questions. Team B answers 5 hard questions and 2 easy questions. Which team is winning? by how many points?

Trivia Game		
Question Type	Hard	Easy
Number of Points	5	2

Review & Refresh

6.

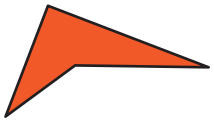


_____ sides

_____ vertices

Shape: _____

7.



_____ sides

_____ vertices

Shape: _____

12. **Reasoning** To find 765 − 246, Newton adds 5 to each number, and then subtracts. To find the difference, Descartes adds 4 to each number, and then subtracts. Will they both get the correct answer? Explain.

13. **Modeling Real Life** A custodian has 350 desks to clean. She cleans 124 desks on the first floor and 147 desks on the second floor. Does she clean all of the desks?

14. **Modeling Real Life** A fashion designer has $725 to spend on new supplies. She buys the sewing machine. Does she have enough money left for either of the other two items? If so, which one?

Mannequin

Fashion Design Software

Sewing Machine

DIG DEEPER! How much more money does the fashion designer need to buy both the mannequin and the fashion design software?

Review & Refresh

Draw equal groups. Then complete the equations.

15. 3 groups of 6

____ + ____ + ____ = ____

____ × ____ = ____

16. 4 groups of 9

____ + ____ + ____ + ____ = ____

____ × ____ = ____

Name _____

Performance Task 5

1. You help organize teams and equipment for a youth baseball league.

a. Complete the table to find the equipment you need for the given number of teams.

Equipment	Number of Teams				
	1	4	5	☐	9
Balls	4				36
Bats			25		
Helmets		28			
Uniforms	10			70	

b. This year there are 100 players signed up to play. Each team has 10 players. How many teams are there this year?

c. Draw and complete a column in the table for the number of teams there are this year.

d. Each team will receive an odd number of baseball hats. Will the league order an even or an odd number of hats? Explain.

e. Twenty-four people volunteer to coach. Each team needs 2 coaches. Do you have enough coaches for each team? Explain.

f. All but 4 teams play at the same time tonight. Two teams play on each field. How many baseball fields will be used?

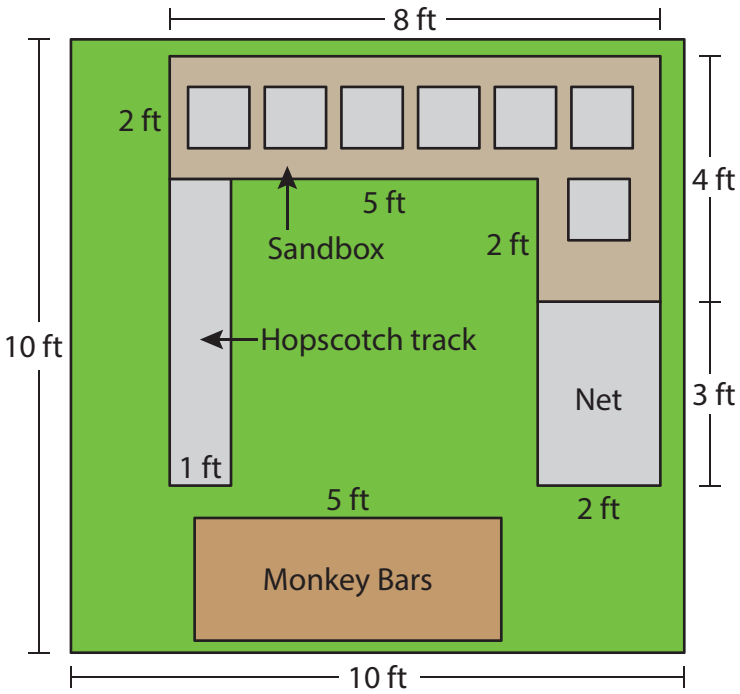
Performance Task 6

1. The map shows the top view of an obstacle course.

a. What is the area of the net?

b. What is the area of the hopscotch track?

c. The area of the mud pit under the monkey bars is 10 square feet. What is the missing side length of the mud pit?



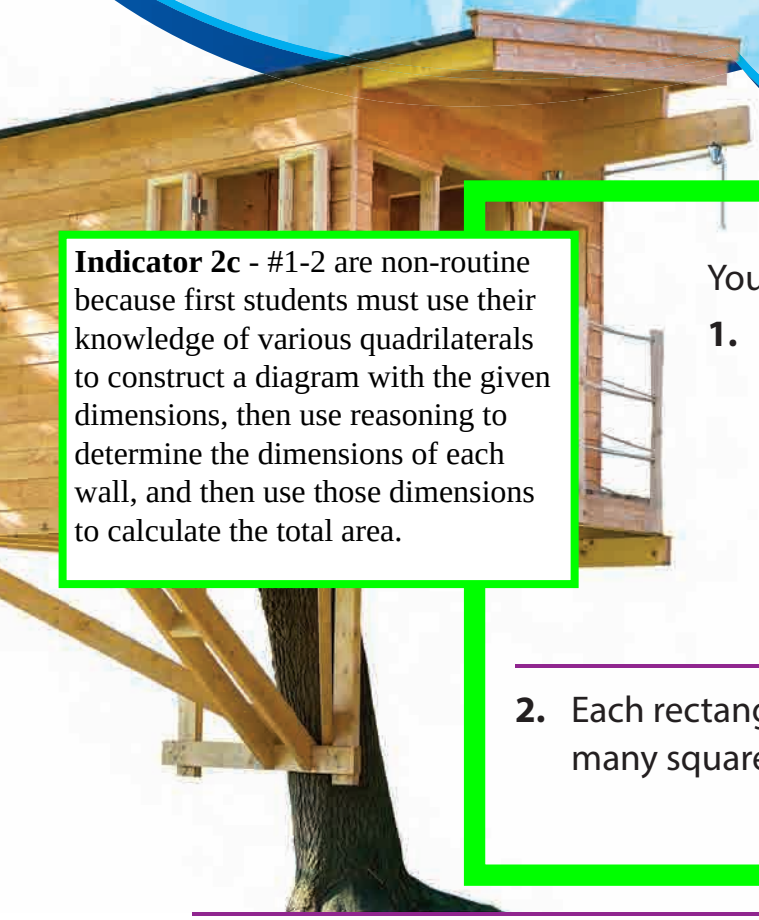
d. Each stepping-stone in the sandbox covers 1 square foot. What is the area of the sandbox *not* covered with stones?

e. What is the area of just the grass?

2. The obstacle course opens at 1 o'clock. It is half past 12. How many more minutes until the course opens?

Name _____

Performance Task 15



Indicator 2c - #1-2 are non-routine because first students must use their knowledge of various quadrilaterals to construct a diagram with the given dimensions, then use reasoning to determine the dimensions of each wall, and then use those dimensions to calculate the total area.

You and your cousin build a tree house.

1. The floor of the tree house is in the shape of a quadrilateral with parallel sides that are 4 feet long and 10 feet long. The other 2 sides are equal in length. The perimeter is 24 feet. Sketch the floor and label all of the side lengths.

2. Each rectangular wall of the tree house is 5 feet tall. How many square feet of wood is needed for all of the walls?

3. You cut out a door in the shape of a rectangle with sides that are whole numbers. Its area is 8 square feet. What is the height of the door?

4. You want to paint the floor and walls on the inside of your tree house. The area of the floor is 28 square feet. Each quart of paint covers 100 square feet.

a. How many quarts of paint do you need to buy?

b. Do you have enough paint to paint the outside walls of the tree house? Explain.

Think and Grow: Modeling Real Life

You have 54 craft sticks. You use all of the sticks to make hexagons. How many hexagons can you make?

Division equation:

You can make _____ hexagons.

Show and Grow *I can think deeper!*

16. You use 35 craft sticks to make 7 polygons. You use the same number of craft sticks for each polygon. How many craft sticks do you use for each polygon?

Indicator 2c - #17 is non-routine because it does not simply ask students to divide by a different divisor; it asks them to go beyond that and answer a bigger question: how many more students would be on each team?

17. There are 42 students in gym class. The teacher divides the students into 7 teams. How many more students would be on each team if the teacher divides the students into 6 teams?

18. You have a tray of 12 oatmeal bars. You keep 6 of them. How many bars can you give to each of your 6 friends?

Professional Development

Rigorous by Design

Name _____

Relate Multiplication and Division 4.2

Learning Target: Use fact families to relate multiplication and division.

Success Criteria:
- I can use an array to write related multiplication and division equations.
- I can explain the relationship between multiplication and division.

Explore and Grow

Use 24 counters to make an array. Draw the array. Write a multiplication equation and a divisio

Conceptual Understanding

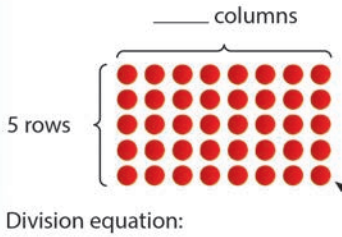
Explore and Grows give students a hands-on approach to develop conceptual understanding.

Procedural Fluency

Think and Grows follow a gradual release model and give teachers opportunities for flexible instruction, providing opportunities for all levels of learners to attain procedural fluency.

Think and Grow: Division and Arrays

Example There are 40 counters. The counters are in 5 equal rows. How many counters are in each row?



You can write a division problem in more than one way.

Division equation:

40 ÷ 5 = _____
dividend divisor quotient

_____ ← quotient
divisor → 5)40
dividend

There are _____ counters in each row.

Think and Grow: Modeling Real Life

You arrange 36 chairs in 4 equal rows. You arrange 21 music stands in 3 equal rows. How many more chairs are in each row than music stands?

Division equations:

There are _____ more chairs in each row.

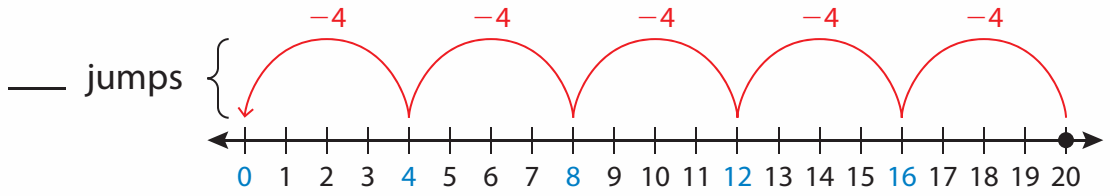
Application

Think and Grow: Modeling Real Life brings problem solving into the classroom, promoting application of concepts and skills and reaching higher levels of DOK.

Think and Grow: Number Lines and Repeated Subtraction

Example Find 20 ÷ 4.

One Way: Use a number line. Start at 20. Count back by 4s until you reach 0.



There are 5 groups of 4. So, 20 ÷ 4 = _____.

Another Way:

Use repeated subtraction. Start with 20. Subtract 4 until you reach 0.

20 − 4 = 16
16 − 4 = 12
12 − 4 = 8
8 − 4 = 4
4 − 4 = 0

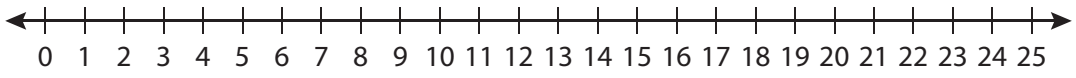
You subtract 4 _____ times.

20 ÷ 4 = _____

Show and Grow *I can do it!*

Complete the equations.

1. 24 ÷ 6 = _____



2. 16 ÷ 8 = _____

16 − 8 = _____

_____ − 8 = 0

3. 27 ÷ 9 = _____

27 − 9 = _____

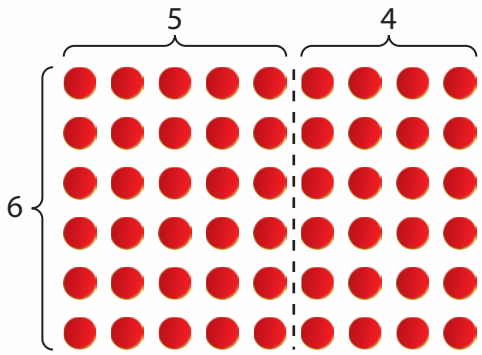
_____ − 9 = _____

_____ − 9 = 0

Think and Grow: Multiply by 9

Example Find 6×9.

One Way: Use the Distributive Property. Rewrite 9 as $5 + 4$.



$6 \times 9 = \quad 6 \times (5 + 4)$

$6 \times 9 = (6 \times 5) + (6 \times 4)$

$6 \times 9 =$ _____ + _____

$6 \times 9 =$ _____

Distributive Property (with subtraction)

$3 \times (5 - 2) = (3 \times 5) - (3 \times 2)$

$(5 - 2) \times 3 = (5 \times 3) - (2 \times 3)$

Another Way: Use the Distributive Property. Rewrite 9 as $10 - 1$.

$6 \times 9 = \quad 6 \times (10 - 1)$

$6 \times 9 = (6 \times 10) - (6 \times 1)$

$6 \times 9 =$ _____ − _____

$6 \times 9 =$ _____

Show and Grow *I can do it!*

1. Find 3×9.

$3 \times 9 = \quad 3 \times ($_____ − _____$)$

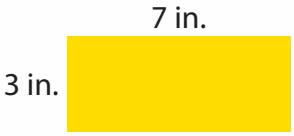
$3 \times 9 = ($_____ × _____$) - ($_____ × _____$)$

$3 \times 9 =$ _____ − _____

$3 \times 9 =$ _____

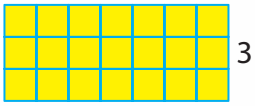
Think and Grow: Find Area by Multiplying

Example Find the area of the rectangle.



One Way:

Count the unit squares to find the area.

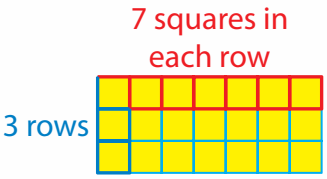


☐ = 1 square inch

There are _____ unit squares.

Another Way:

Think of the rectangle as an array. Then use repeated addition or multiplication to find the area.



☐ = 1 square inch

3 rows of _____ unit squares

$7 + 7 + 7 =$ _____

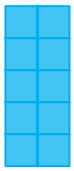
$3 \times 7 =$ _____

So, the area is _____.

Show and Grow *I can do it!*

Find the area of the rectangle.

1.



☐ = 1 square centimeter

_____ rows of _____ unit squares

_____ + _____ + _____ + _____ + _____ = _____

Area = _____

2.

_____ × _____ = _____

Area = _____

Think and Grow: Compare Fractions That Have the Same Denominator

Example Compare $\frac{3}{8}$ and $\frac{7}{8}$.

One Way: Use Fraction Strips.

The fractions have the same denominator, 8.

Three $\frac{1}{8}$s is $\frac{3}{8}$. Seven $\frac{1}{8}$s is $\frac{7}{8}$. Shade the Fraction Strips.

	1							
$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{7}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

More $\frac{1}{8}$s are shaded to show $\frac{7}{8}$.

So, $\frac{3}{8}$ is _____ $\frac{7}{8}$, and $\frac{3}{8}$ ◯ $\frac{7}{8}$.

You can only compare two fractions when they both refer to the same whole.

Indicator 2d - Two aspects of rigor are shown to solve the same problem two different ways: In One Way, students use Fraction Strips (conceptual understanding) and in Another Way, students use a procedure already learned (procedural fluency).

Another Way: When the denominators are the same, the whole is divided into the same number of equal parts. So, look at the numerators 3 and 7 to compare. The fraction with the greater numerator is the greater fraction.

Because 3 ◯ 7, $\frac{3}{8}$ ◯ $\frac{7}{8}$.

Show and Grow *I can do it!*

Shade to compare the fractions.

1.

1					
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$\frac{5}{6}$ ◯ $\frac{2}{6}$

2.

1		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{1}{3}$ ◯ $\frac{3}{3}$

Think and Grow: Compare Fractions That Have the Same Numerator

Example Compare $\frac{2}{4}$ and $\frac{2}{6}$.

One Way: Use Fraction Strips.

Both fractions have the same numerator, 2. Two $\frac{1}{4}$s is $\frac{2}{4}$. Two $\frac{1}{6}$s is $\frac{2}{6}$.

Shade the Fraction Strips. Compare the parts.

Think: $\frac{1}{6}$ is not as long as $\frac{1}{4}$.

	1					
$\frac{2}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$		
$\frac{2}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

So, $\frac{2}{4}$ is _____ $\frac{2}{6}$, and $\frac{2}{4}$ ◯ $\frac{2}{6}$.

Another Way: When the numerators are the same, look at the denominators 4 and 6 to compare the sizes of the parts.

- The more parts the whole is divided into, the smaller the parts are.
- The fewer parts the whole is divided into, the larger the parts are.

The fraction with the greater denominator is the lesser fraction.

So, $\frac{1}{4}$ is _____ $\frac{1}{6}$, and $\frac{2}{4}$ ◯ $\frac{2}{6}$.

Show and Grow *I can do it!*

Shade to compare the fractions.

1.

1					
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{3}{6}$ ◯ $\frac{3}{8}$

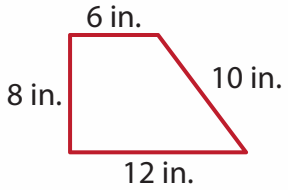
2.

1			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	

$\frac{2}{4}$ ◯ $\frac{2}{3}$

Think and Grow: Find Perimeter

Example Find the perimeter of the trapezoid.



You can find the perimeter of a figure by adding all of the side lengths.

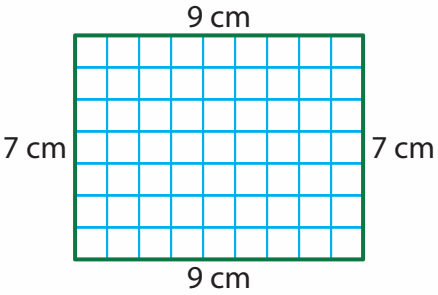
_____ + _____ + _____ + _____ = P

_____ = P

Write an equation. The letter P represents the unknown perimeter. Add the side lengths.

So, the perimeter is _____.

Example Find the perimeter of the rectangle.



Because a rectangle has two pairs of equal sides, you can also use multiplication to solve.

Remember, you can count each unit around the rectangle to find the perimeter.

One Way:

_____ + _____ + _____ + _____ = P

_____ = P

Another Way:

2 × _____ + 2 × _____ = P

_____ + _____ = P

_____ = P

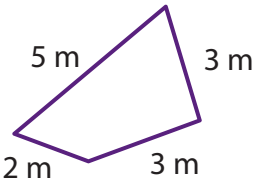
So, the perimeter is _____.

Show and Grow

I can do it!

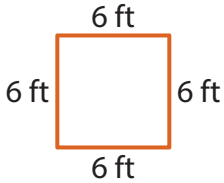
Find the perimeter of the polygon.

1.



The perimeter is _____.

2.



_____.

Think and Grow: Modeling Real Life

A marching band has 7 rows with 8 musicians in each row. There is also a row of 6 people who carry flags. How many people are in the marching band in all?

Multiplication equation:

Addition equation:

There are _____ people in the marching band in all.

Show and Grow *I can think deeper!*

17. A table has 3 rows with 8 prizes in each row. There is also a row of 4 prizes on the floor. How many prizes are there in all?

18. **DIG DEEPER!** One section of a parking lot has 2 rows of 8 cars. Another section of the parking lot has 8 rows of 6 cars. How many cars are in the parking lot in all?

19. **DIG DEEPER!** One building has 8 rows of 5 windows. Another building has 9 rows of 8 windows. How many windows are on the two buildings in all?

Think and Grow: Modeling Real Life

Descartes cuts 1 rectangular piece of construction paper into 2 rectangles. One rectangle is 8 inches wide and 10 inches long. The other rectangle is 8 inches wide and 2 inches long. What were the dimensions and total area of the paper before it was cut?

Draw a picture:

Multiplication equation:

Distributive Property:

Indicator 2d - Two aspects of rigor are treated together as students use models and equations (conceptual understanding) to solve a real-life problem (application).

The piece of paper was _____ inches wide and _____ inches long before it was cut.

The total area of the piece of paper was _____ square inches.

Show and Grow *I can think deeper!*

6. You cut 1 rectangular piece of fabric into 2 rectangles. One rectangle is 3 feet wide and 6 feet long. The other rectangle is 3 feet wide and 9 feet long. What were the dimensions and total area of the fabric before it was cut?

Think and Grow: Modeling Real Life

Three laps around a walking trail is 1 mile. How many laps does it take you to walk $\frac{2}{3}$ mile?

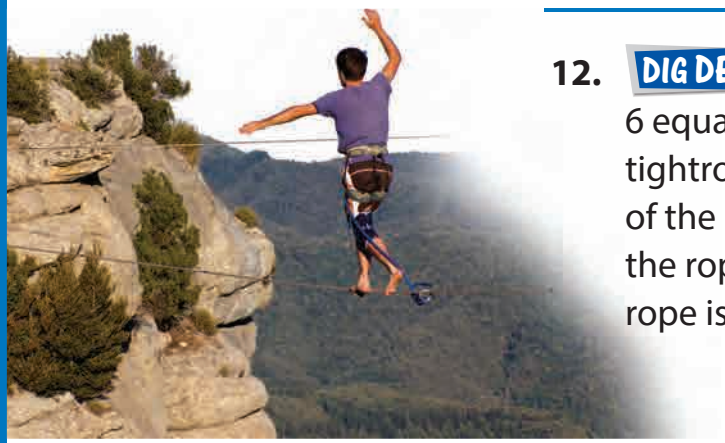
Model:

You need to walk _____ laps to walk $\frac{2}{3}$ mile.

Show and Grow *I can think deeper!*

10. You follow a recipe and make four servings. How many servings can you make using $\frac{1}{4}$ of each ingredient in the recipe?

11. **DIG DEEPER!** A gymnast needs to take 8 equal-sized steps to get from one end of a balance beam to the other. She starts on the left end of the beam and takes 6 steps. What fraction of the beam is behind her? What fraction of the beam is in front of her?



12. **DIG DEEPER!** A tightrope walker needs to take 6 equal-sized steps to get from one end of a tightrope to the other. He starts on the left side of the rope and takes 5 steps. What fraction of the rope is behind him? What fraction of the rope is in front of him?

Think and Grow: Measure Elapsed Time

Elapsed time is the amount of time that passes from a starting time to an ending time.

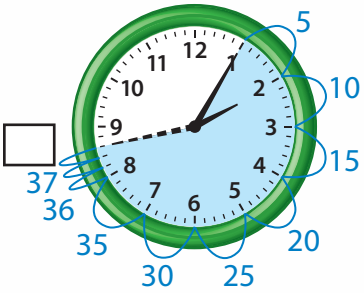
Example Find the elapsed time between 2:05 P.M. and 2:43 P.M.

One Way: Use an analog clock.

Step 1: Draw the starting time.

Step 2: Mark the ending time.

Step 3: Count the minutes by 5s and 1s until you reach the ending time.



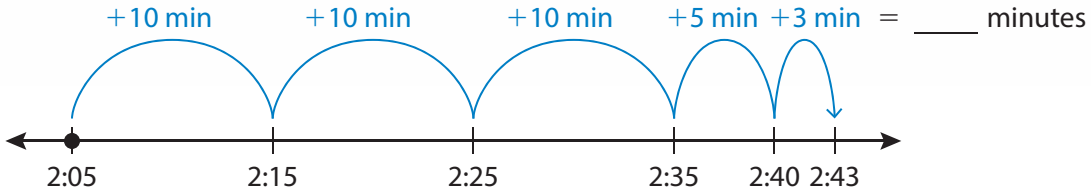
So, the elapsed time is _____ minutes.

Another Way: Use a number line.

Step 1: Plot the starting time on a number line.

Step 2: Count on until you reach the ending time.

Step 3: Add the jumps to find the elapsed time.

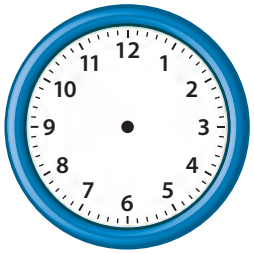


So, the elapsed time is _____ minutes.

Show and Grow *I can do it!*

Find the elapsed time.

1. Start: 11:10 A.M. End: 11:34 A.M.



_____ minutes

2. Start: 1:25 P.M. End: 1:56 P.M.

_____ minutes

Think and Grow: Measure Elapsed Time Across an Hour

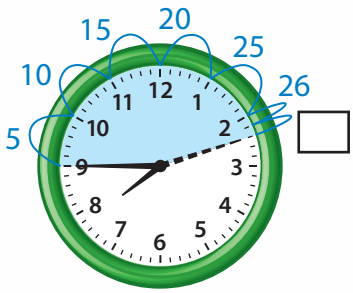
Example Find the elapsed time between 7:45 A.M. and 8:12 A.M.

One Way: Use an analog clock.

Step 1: Draw the starting time.

Step 2: Mark the ending time.

Step 3: Count the minutes by 5s and 1s until you reach the ending time.



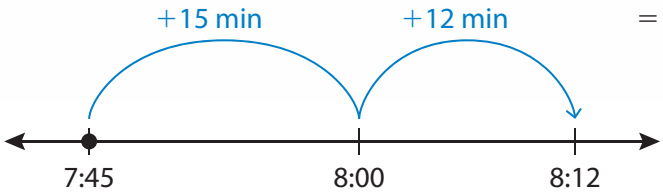
So, the elapsed time is _____ minutes.

Another Way: Use a number line.

Step 1: Plot the starting time on a number line.

Step 2: Count the minutes from the starting time to the next hour. Then count the minutes from the hour to the ending time.

Step 3: Add the jumps to find the elapsed time.



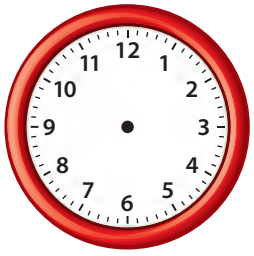
= _____ minutes

So, the elapsed time is _____ minutes.

Show and Grow *I can do it!*

Find the elapsed time.

1. Start: 3:55 P.M. End: 4:41 P.M.



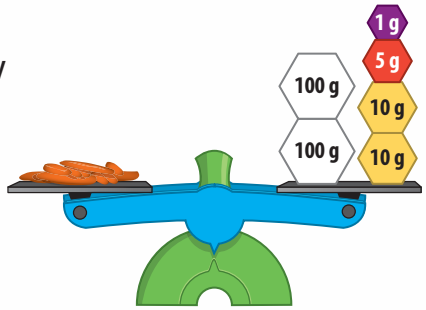
_____ minutes

2. Start: 10:40 A.M. End: 11:19 A.M.

_____ minutes

Think and Grow: Modeling Real Life

Third graders should eat 454 grams of vegetables each day. You eat the vegetables shown on the balance. How many more grams of vegetables should you eat today?

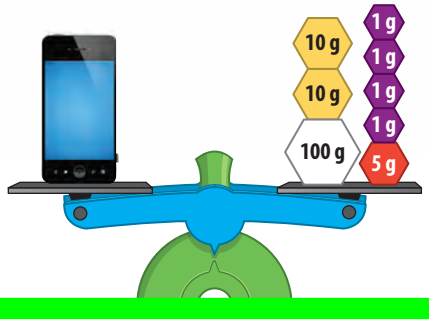


Equation:

You should eat _____ more grams of vegetables.

Show and Grow *I can think deeper!*

11. A tablet's mass is 324 grams more than the cell phone's mass. What is the mass of the tablet?



12. The mass of a nickel is 5 grams. There are 40 nickels in a standard roll. What is the mass of a standard roll of nickels?

13. Newton eats 6 kilograms of dog food each week. He buys a 24-kilogram bag of dog food. For how many weeks will Newton eat from the bag of dog food?

14. DIG DEEPER! You make fruit smoothies using 369 grams of strawberries, 227 grams of raspberries, and 283 grams of blueberries. Do you use more than 1 kilogram of fruit? Explain.

Think and Grow: Using the Problem-Solving Plan

Example You want to make 8 dream catchers. You have 30 feathers. You tie 3 feathers to each dream catcher. How many feathers do you have left?

Understand the Problem

What do you know?

- You want to make _____ dream catchers.
- You have _____ feathers in all.
- You tie _____ feathers to each dream catcher.

What do you need to find?

- You need to find how many _____ are left after you make _____ dream catchers.

Make a Plan

How will you solve?

- Multiply _____ by _____ to find how many _____ you used to make 8 dream catchers.
- Subtract the product from _____.

Solve

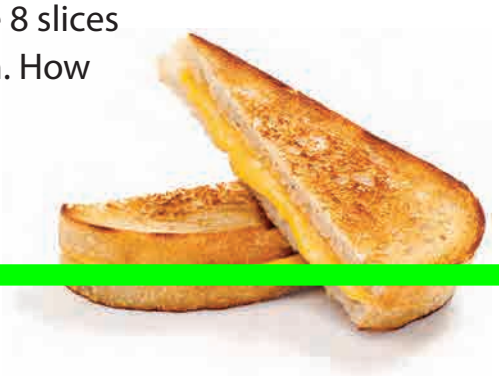
$8 \times 3 =$ _____

$30 -$ _____ $=$ _____

You have _____ feathers left.

Show and Grow *I can do it!*

1. You want to make 6 cheese sandwiches. You have 8 slices of cheese in all. You put 2 slices on each sandwich. How many more slices of cheese do you need?



Think and Grow: Using the Problem-Solving Plan

Example Newton has 368 baseball cards. He gives away 139 of them. He buys 26 more. How many cards does he have now?

Understand the Problem

What do you know?

- Newton has _____ cards.
- He gives away _____ of them.
- He buys _____ more.

What do you need to find?

- You need to find how many _____ he has now.

Make a Plan

How will you solve?

- Subtract _____ from _____ to find how many _____ he has left after he gives some away.
- Then add _____ to the difference to find how many he has now.

Solve

Draw a part-part-whole model and write an equation.
Use a letter to represent the unknown number.

Step 1:

139	c

368

368 − 139 = c

c is the unknown difference.

$$\begin{array}{r} 368 \\ -\ 139 \\ \hline \square \end{array}$$

c = _____

Step 2:

c = _____	26

n

_____ + 26 = n

n is the unknown sum.

$$\begin{array}{r} \square \\ +\ 26 \\ \hline \square \end{array}$$

n = _____

Newton has _____ cards now.

Show and Grow *I can do it!*

1. Explain how you can check whether your answer above is reasonable.

Think and Grow: Using the Problem-Solving Plan

Example A box of 8 burritos costs $9. How much does it cost a group of friends to buy 40 burritos?

Understand the Problem

What do you know?

- A box has _____ burritos.
- The box costs _____.
- A group of friends wants to buy _____ burritos.

What do you need to find?

- You need to find how much it costs to buy _____.

Indicator 2d - On this page, all three aspects of rigor are treated together. Students use the problem-solving plan to solve a real-life problem (application) by drawing models to write division and multiplication equations (conceptual understanding) and using facts to divide and multiply (procedural fluency).

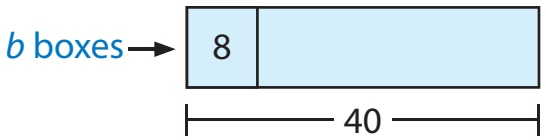
Make a Plan

How will you solve?

- Divide _____ by _____ to find how many _____ needs to buy.
- Then multiply the quotient by _____ to find the total cost.

Solve

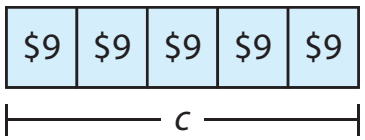
Step 1: How many boxes does the group need to buy?



b is the unknown quotient.

$b = 40 \div 8$ $b =$ ☐

Step 2: Use *b* to find the total cost.



c is the unknown product.

$c = 5 \times 9$ $c =$ ☐

It costs $_____ for 40 burritos.

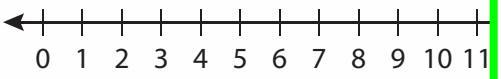
Show and Grow *I can do it!*

1. You make 9 shots in a basketball game. Each shot is worth 2 points. Your friend has the same number of points. All of her shots are worth 3 points. How many shots does your friend make?

Think and Grow: Modeling Real Life

A group of lions is called a *pride*. There are 2 prides in a savanna. Each pride has 9 lions. How many lions are there in all?

Model:

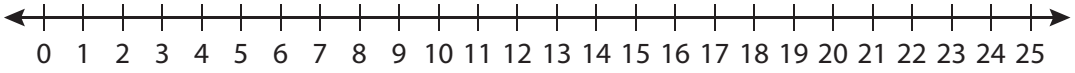


Indicator 2f - In this example and #7-8, students engage in MP4 to solve real-life problems.

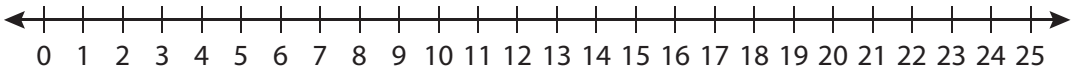
MP4 Model with mathematics - Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation.... Mathematically proficient students who can apply what they know... are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Show and Grow *I can think deeper!*

7. There are 3 bike racks at a park. Each bike rack has 4 bikes. How many bikes are there in all?

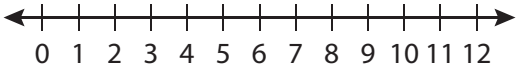


8. DIG DEEPER! You dig 8 holes. You plant 2 flower bulbs in each hole. You have 5 bulbs left. How many flower bulbs did you have to start?

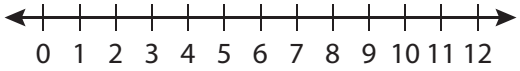


3. MP **Structure** Complete the multiplication equations in two different ways. Model each equation on the number line.

____ × ____ = 12



____ × ____ = 12



4. **Writing** Explain how you can use a number line to find 5 × 3.

5. **Modeling Real Life** You have 6 boxes of blueberry muffins. Each box has 4 muffins. How many muffins do you have in all?

6. DIG DEEPER! You fill 8 pages of a photo album. Each page has 3 photos. You have 1 photo left. How many photos did you have to start?

Review & Refresh

7. 9 + 8 + 2 = ____

8. 6 + 5 + 3 = ____

9. 7 + 4 + 7 = ____

Think and Grow: Modeling Real Life

A phone has 6 rows of apps with 4 apps in each row. How many apps are on the phone?

Draw:

Equation:

There are _____ apps on the phone.

Show and Grow *I can think deeper!*

9. Your classroom has 3 rows of desks with 10 desks in each row. How many desks are in your classroom?

10. **DIG DEEPER!** A square array has an equal number of rows and columns. A farmer has 9 corn seeds to plant in a square array. Draw the square array the farmer can use to plant all of the seeds. How many rows and columns are there?

4. **YOU BE THE TEACHER** Descartes h… 24 counters. He says he can use all the counters to make an array w…

5. **Number Sense** Newton has a 4 × … adds 2 more rows. How many domino… multiplication equation for his new ar…

He adds _____ dominoes.

6. **Modeling Real Life** An art teacher hangs 2 rows of paintings with 10 paintings in each row. How many paintings does she hang?

7. **DIG DEEPER!** A museum has 16 shark teeth to display in a square array. Draw the square array the museum can use to display all of the teeth. How many rows and columns are there?

Indicator 2f - In #6 and 7, students engage in MP4 to solve real-life problems.

MP4 Model with mathematics - Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation.... Mathematically proficient students who can apply what they know... are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Review & Refresh

Complete the equation.

8. 3 + 8 = 8 + _____

9. 10 + 0 = _____ + 10

10. 6 + _____ = 7 + 6

11. _____ + 8 = 8 + 9

Think and Grow: Modeling Real Life

A child ticket costs $7. An adult ticket costs 4 times as much as the child ticket. Descartes has $40. Can he buy an adult ticket?

Multiplication equation:

Descartes _____ buy an adult ticket.

Show and Grow

I can think deeper!

18. A small painting costs $5. A large painting costs 7 times as much as the small painting. Newton has $30. Can he buy a large painting?

19. DIG DEEPER! You study your spelling words for 5 minutes twice a day. How many minutes do you spend studying your spelling words in one week?

20. DIG DEEPER! Your dentist tells you to brush your teeth for 3 minutes three times a day. How many minutes should you spend brushing your teeth in one week?

Find the missing factor.

11. $7 \times \_\_\_\_ = 7$

12. $\_\_\_\_ \times 7 = 14$

13. $56 = \_\_\_\_ \times 7$

14. You go to school 5 days each week. You spend 7 hours at school each day. How many hours do you spend at school in one week?

15. MP **Number Sense** Circle the multiples of 7.

63 24 35 21 32 56

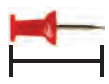
16. MP **Structure** Find 7×6 in two different ways.

17. **Modeling Real Life** A pair of regular shoes costs $9. A pair of light-up shoes costs 7 times as much as the pair of regular shoes. Newton has $60. Can he buy the pair of light-up shoes?

18. DIG DEEPER! A veterinarian tells you to feed your dog 2 cups of food twice a day. How many cups of food should you feed your dog in one week?

Review & Refresh

19. What is the best estimate of the length of a thumbtack?



2 centimeters

1 meter

15 centimeters

20. What is the best estimate of the height of a trampoline?

4 centimeters

2 meters

30 meters

Think and Grow: Modeling Real Life

Each member of a marching band and a football team is awarded a ribbon. The marching band has 123 members. The football team has 66 members. How many more ribbons are needed for the marching band than for the football team?

Subtraction equation:

Model: ◄——————————————►

_____ more ribbons are needed for the marching band.

Show and Grow *I can think deeper!*

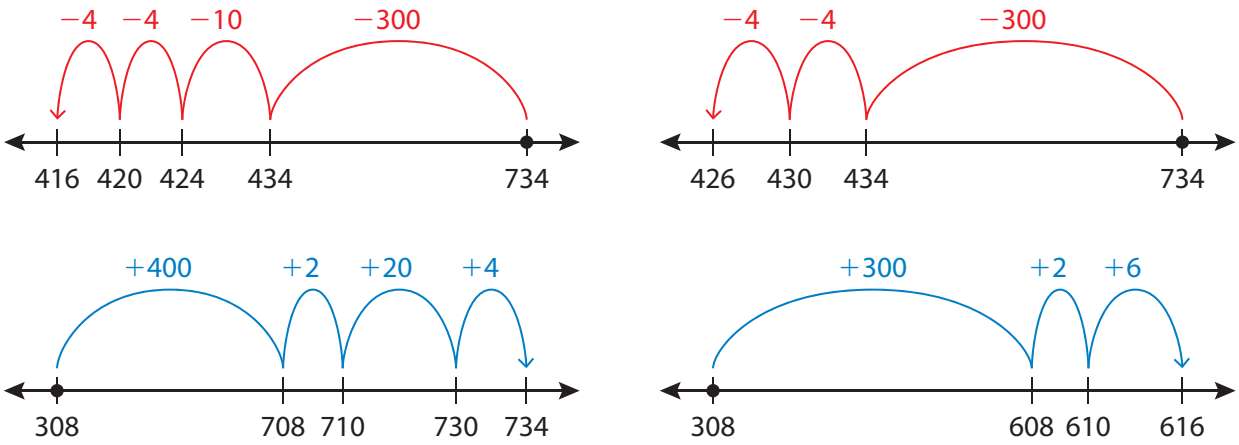
9. A marine biologist feeds 435 pounds of fish to an orca and 50 pounds of fish to a sea lion. How many more pounds did the orca eat than the sea lion?

10. There are 620 paper lanterns for a festival. Some are let go. There are 42 left. How many paper lanterns were let go?

11. **DIG DEEPER!** There are some guests at an amusement park. 387 of them leave when it rains. 474 of them stay. How many guests were there before it rained?

5. **Writing** Write and solve a subtraction word problem using 995 and 238.

6. DIG DEEPER! Which number lines can you use to find 734 − 308?



7. **Modeling Real Life** You take 107 pictures on a field trip to a zoo. Your friend takes 73 pictures. How many more pictures do you take than your friend?

8. **Modeling Real Life** An author has 350 copies of her book. Some are signed. 115 copies are *not* signed. How many copies are signed?

Review & Refresh

Find the quotient.

9. Divide 25 by 5.

10. Divide 40 by 4.

11. Divide 72 by 8.

Think and Grow: Modeling Real Life

Newton and Descartes have piggy banks that are the same size. Newton fills $\frac{3}{4}$ of his bank with pennies. Descartes fills $\frac{3}{6}$ of his bank with pennies. Whose bank is filled more?

Model:

Explain: _____ bank is filled more.

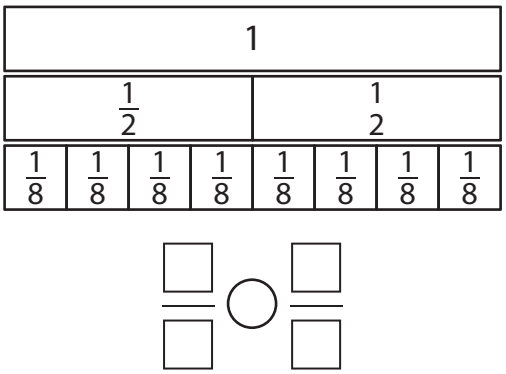
Show and Grow *I can think deeper!*

14. You use $\frac{1}{3}$ of a bottle of glitter for an art project. Your friend uses $\frac{1}{4}$ of a bottle for his art project. The bottles are the same size. Who uses more glitter?

15. A train and a plane are traveling the same distance from New York to Pittsburgh. The train completes $\frac{5}{8}$ of its journey. The plane completes $\frac{5}{6}$ of its journey. Which is farther away from Pittsburgh? Explain.

16. DIG DEEPER! You cut a piece of lasagna that is $\frac{1}{8}$ of a tray. Your friend cuts a piece of lasagna that is $\frac{1}{6}$ of a tray. Your piece is larger than your friend's piece. Explain how this is possible.

9. Use the models to compare two fractions that have the same numerators.



10. **YOU BE THE TEACHER** Newton says that if two fractions have the same numerator, then the fraction with the greater denominator is the greater fraction. Is Newton correct? Explain.

11. **Writing** How is comparing fractions with the same numerator similar to comparing fractions with the same denominator? How is it different?

12. **Modeling Real Life** You play a video game for $\frac{1}{2}$ of an hour. Your friend plays the video game for $\frac{1}{6}$ of an hour. Who plays the video game longer? Explain.

13. **Modeling Real Life** Two cars have the same-sized gasoline tank. Tank A is $\frac{4}{6}$ full. Tank B is $\frac{4}{8}$ full. Which tank is less full? Explain.

Review & Refresh

Plot the fraction on the number line.

14. $\frac{1}{4}$

15. $\frac{2}{3}$

Laurie's Notes

ELL Support

To check for comprehension of Lesson 1.5, have students work in pairs to complete the page and answer all questions. Clarify unknown vocabulary. Explain that American coins have names, such as *penny, nickel, dime,* and *quarter*. Provide the value of each. Then check their understanding by asking the following questions and having them display answers on whiteboards.

1. How many seashells are in each bag?
2. How many rocks are in each pile?
3. Who has more quarters in each group?

Think and Grow: Modeling Real Life

This application allows students to show their understanding of how a division equation can be used to solve a word problem.

- **Preview:** "Look at each picture of objects. Are the objects separated into equal groups?" Point out that Newton and Descartes each start with 40 coins, 2 people means 2 groups of 40 at the start.

? Choral read the example. "Let's set up the number of groups. How could we do that for equal groups?" make 5 circles "for a tape diagram?" draw a rectangle with 5 sections

- **MP4 Model with Mathematics:** "Explain to your partner why you chose that model and how it represents the situation."
- "Let's set up the division equation." Draw a template with blanks

? "Which value do we write first? The number in each group, the number of groups, or the total objects? Write this number in the first blank."

- "Fill in the rest of the values where you think they go."
- "Compare your equation to your partner's. Do you agree?"
- "30 shells divided into 5 bags will have 6 shells in each bag. Is your equation in this order?"
- **Supporting Learners:** Provide counters. Set up the structure for each division equation. Assist students in filling in the first blank to always correspond to the starting number of objects in the total collection. Read through the meaning of their equation with them and ask them if it matches the situation given in the problem.
- Students can work in pairs in Exercise 8, each taking on the role of either Newton or Descartes, creating their model and then comparing to answer the question.

◉ "Think about writing a division equation. Hold up 1 finger if you can do 1 of these criteria, 2 if you can do 2, and 3 if you can do all. I can use a model to complete a division equation when the equation is written for me. I can draw an equal groups model when needed. I can write the equation without any structure provided."

Closure

- "Today we used division to find the size of equal groups. What does the equation $35 \div 5 = 7$ tell you about the groups and size of equal groups?"

Laurie's Notes

ELL Support

Read each story aloud as students follow along. Clarify unknown vocabulary and discuss cultural contexts. Allow time to complete each exercise. Ask the following questions and have students signal thumbs up to indicate *yes* and thumbs down to indicate *no*.

1. Can Descartes buy an adult ticket?
2. Can Newton buy a large painting?
3. Do you spend more than 1 hour per week studying your spelling words?
4. Do you spend more than 1 hour per week brushing your teeth?

Think and Grow: Modeling Real Life

This application allows students to show their understanding of multiplying by 7 in contexts with time and money.

? **Preview:** The first two problems are about money. The units of measurement are dollars. "What units of measurement do you see in the last two problems?" Both are about time, there are minutes, days, and weeks mentioned. "How many times during the day does twice mean? How many days are in a week?"

- Read the example. Follow the problem-solving plan while students help identify what you know, what you need, the plan, and the solution. "We know the price of a child ticket ($7). We know how an adult ticket compares to a child's (4 times a child's). We know Descartes has $40. To decide if he can buy an adult ticket, first we need to find out how much one adult

? **MP4 Model with Mathematics:** "What multiplication equation can we use to figure out the cost of an adult ticket?" Write it on the example. "Once we know this information, how can we decide if he has enough money? Explain to your partner the plan for finding the answers to these questions." Pause. "Now decide if he can buy the ticket."

your answers with your partner. Discuss how you solved the problem and how you know your solution is correct."

- **Teaching Tip:** Exercises 19 and 20 involve finding a product and then multiplying again. Observe, do students calculate the time for the activity over 7 days and then double to account for twice or do they find the daily total and then multiply by 7?

ork with a partner to solve Exercises
r for students to mark on. For "twice"
t color counters to show once for
ct same again to represent evening.
iplying by 7 and found the product.
u used other multiplication facts to help

se a hundred chart to review multiples

day you learned to multiply a number
of $8 \times (3 + 4)$ the same as 8×7?"

Indicator 2f - In the Teaching Edition, teachers are encouraged to engage with students about how to solve real-life problems.

MP4 Model with mathematics - Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation.... Mathematically proficient students who can apply what they know... are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Laurie's Notes

ELL Support

Read each story aloud as students follow along. Words that may cause confusion are stands, punch, and sticks due to their multiple meanings. Explain each. Allow time to complete each exercise. Ask the following questions and have students hold up the appropriate number of fingers to show the answer.

1. How many cups of fruit punch are in a row?
2. How many cups of lemonade are in a row?
3. How many carrot sticks do you give each friend?
4. How many desks are in the class?

Think and Grow: Modeling Real Life

These application problems allow students to show their understanding of division story problems involving equal groups and equal shares.

- "Read the first problem and circle what you know. Tell your partner what you are thinking." Discuss.
- ? "What are we trying to figure out?" How many more chairs are in each row than music stands. "Do you know how many chairs or music stands are in each row?" no "Is there information that would help you find that out?" yes
- **Think-Pair-Share:** "Think about what information you know that could help you find out how many chairs and music stands are in each row." Ask a volunteer to share their work.
- **MP4 Model with Mathematics:** Students can draw an array or use counters to answer this question and the next.
- "Read the next problem. See if solving the last problem helps you with this problem."
- **MP1 Make Sense of Problems:** "Read Exercise 24. Think what is happening in this problem. What information do you know? What are you trying to answer? Tell your partner what you are thinking."
- ◉ "You have solved many division problems today. Are you making progress in your learning? Are you getting better at thinking about problems and knowing what steps to take next?" Discuss strategies students have when they get stuck.
- **Supporting Learners:** Continue to make the connection to the multiplication and division fact families.

Closure

- Use your whiteboard to record the quotient for each problem. Write division problems in both forms and with divisors of 3 and 4. Mix in a few with divisors of 2, 5, and 10.

Laurie's Notes

ELL Support

Read each story aloud as students follow along. Clarify unknown vocabulary and discuss contexts. You may want to explain that a bill is paper money and 4 quarters are worth the same as a $1 bill. Allow time to complete each exercise. Ask the following questions and have students hold up the appropriate number of fingers to show the answer.

1. How many rows of oranges are there?
2. How many rows of lemons are there?
3. How many columns of peaches are there?
4. How many columns of pears are there?
5. How many dollars are 20 quarters worth?
6. How many $1 bills are worth $5?
7. How many boxes of fruit snacks does Descartes buy?

Think and Grow: Modeling Real Life

These application problems allow students to apply their division skills.

? **Preview:** "What do you notice in the picture?" Students should comment on the fruit being displayed in arrays. Discuss how the fruit display would be built. The first row is placed, meaning you know how many columns wide the array will be. Additional rows are added until all of the fruit is placed.

- **MP1 Make Sense of Problems:** Students read the problem. Circle what is known. Underline what the problem is asking. "How can you draw an array to help you solve the problem?"
- Students may draw the arrays and lose sight of what the problem was asking. Re-read the problem. Ask how the two models help to answer the question. Be sure students write the division equations.
- **Common Error:** Students know there are 4 quarters in a dollar and multiply 20 by 4. They are confusing which denomination

- **MP4 Model with Mathematics:** Exercise 25 has 3 numbers which students need to make sense of. Sometimes it is helpful to summarize the known information by making a simple sketch as shown. The model helps students visualize the money available ($20) and how many boxes they can buy for $5 each.

while we worked on learning our division facts. The goal is to *just know* the facts. The strategies help you to get there. Where are you in your learning right now? What do you need to do next so that the strategies will not be needed?"

◉ You want students to self-assess their own learning. Sharing the learning target and success criteria each day improves teacher clarity and enables students to assess where they are in the learning progression.

- **Supporting Learners:** Guide students as they identify the known information and what the question is asking. Ask them to explain what the information is telling them. Ask guiding questions. Example: "Who has 20 quarters? What can you tell me about a quarter? If you have a quarter and I have a dollar, do we have the same amount? Who has more?" Draw a picture to show how a quarter and a dollar are related.

Closure

- "We began the lesson with the problem 8 ÷ 2. Think of a story problem where you would need to find this quotient. Tell your partner the story problem."

Laurie's Notes

ELL Support

Read each story aloud as students follow along. Clarify unknown vocabulary. Ask students to display their equations on a whiteboard or piece of paper and hold them up for your review. Then ask the following questions.

1. How many inches wide was the paper?
2. How many inches long was the paper?
3. What was the area of the paper?
4. How many feet wide was the fabric?
5. How many feet long was the fabric?
6. What was the area of the fabric?

Think and Grow: Modeling Real Life

This application allows students to show their ability to compute the areas of smaller rectangles to find the area of the whole rectangle.

- **Teaching Tip:** Students have not seen the word dimensions. Discuss the difference of one, two, and three dimensions. "A rectangle has two-dimensions. One of the dimensions is length and the other is width. When a question asks for the dimensions of a rectangle, it is asking for the length and the width."
- Read the example aloud. "Tell your partner what has happened to the sheet of paper." Pause. "Work together to make a sketch that shows how the paper was cut." Circulate, observing sketches.
- **Supporting Learners:** Have students cut a sheet of paper to form two non-congruent rectangles. On each piece, label the sides as given in the problem. Write the area on each. Piece it back together to find the total length and the width.

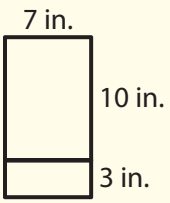
? **MP4 Model with Mathematics:** "How can you use your sketch to find the length of the original sheet of paper?" Write the area expression of the full sheet, 8×12. "Why is it helpful to find the area by cutting the rectangle apart into smaller ones?" Listen for not knowing 12 multiplication facts or difficulty of having to add 12 eight times.

- **MP7 Look for and Make Use of Structure:** "The Distributive Property guarantees us that $8 \times (10 + 2)$ will be the same area as 8×12." Record $8 \times (10 + 2)$ and prompt students to represent the individual rectangles as $(8 \times 10) + (8 \times 2)$. "So, to find the large rectangle area we can add $80 + 16$. The area is 96 square inches." Summarize the process used and have students complete the blanks for each statement.
- Observe students as they complete Exercise 6 with a partner. Encourage them to draw the situation and record the expressions, areas, and lengths on their drawings.

◉ "Today you used a new strategy for finding the area of a rectangle. Explain to your partner how the Distributive Property can be used to find the area of a rectangle."

Closure

- Use this rectangle to review the strategy of breaking it into smaller rectangles and applying the Distributive Property. "What multiplication expression can be used to find the area of this rectangle?" Write 10×7 inside the upper rectangle. Repeat the question for bottom rectangle and write 3×7. "How do we use these products to find the area of a 7 inch-by-13 inch rectangle?"



- Distribute exit cards. "Show a different way to break the 7 inch-by-13 inch rectangle apart. Inside each smaller rectangle, write the multiplication expression you would use to find each area."

Laurie's Notes

ELL Support

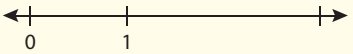
Read each problem aloud as students follow along. Clarify unknown vocabulary and references. Allow students to work in pairs and provide time to complete each exercise. Ask the questions provided at the end of each and have pairs write their answers on a whiteboard and hold them up for your review.

Think and Grow: Modeling Real Life

These applications allow students to show their understanding of how fractions can be equivalent to whole numbers.

? Read the example. "Make an estimate about the number of miles you run. Write it on the side of your paper. Did you think

? **MP4 Model with Mathematics:** "To solve this problem, first we can set up our number line. What number should we start with?" 0 "Since we don't know how far to go, we can use just a part of the number line to represent 0 to 1.



"How should we divide 0 to 1?" into 4 parts or fourths "How do you know?" one lap is $\frac{1}{4}$ As you make the divisions and label the fractions, decide as a class if you have reached 12 laps. If not, extend the number line to 2, then to 3. Complete the blanks with $\frac{12}{4}$ and 3. "Look at your estimate. How close was it?"

- Circulate as students complete Exercises 12–14. Provide access to Fraction Strips and rulers for setting up number lines. Observe if students are using number lines or Fraction Strips to solve. Some might use circles for Exercise 14 about pizzas. This is fine. You might ask after they solve, how they could see the leftover pieces on a number line. They can make a rough sketch or explain verbally what would happen when they found $\frac{16}{8}$ in comparison to 3.
- **Supporting Learners:** Watch for yellow and red traffic lights. Assist as needed. Provide an option to work with a partner for support. Use partially completed number lines for students to use.
- **Extension:** Redo Exercise 12 using fractions other than $\frac{1}{6}$. How does that change the result?

◉ "Today you related a fraction and a whole number using a number line. Were you able to count beyond one whole and find fractions equivalent to 2 wholes?"

Closure

- Show a number line of fourths up to 3. Review how each whole is divided into fourths, emphasizing the fraction at 1, 2, and 3. Let students discuss what they notice. Some might see $\frac{8}{4}$ is two groups of $\frac{4}{4}$ and $\frac{12}{4}$ is 3 groups of $\frac{4}{4}$. "How would this change if the number line where divided into sixths?"

Laurie's Notes

Apply and Grow: Practice

SCAFFOLDING INSTRUCTION

Meeting the needs of all learners.

Students begin with several exercises in which the problem is structured with groups of tens for each multiple of ten factor. The exercises following this do not provide scaffolded responses. Are students thinking about multiples of ten as a specific number of tens units? Are they recognizing the similarity to single digit multiplication? Are students still relying on models to determine the product or are they using the pattern of adding a zero?

EMERGING students continue to need the support of structured response alongside visual aids or manipulatives to find the product involving a multiple of ten.

- **Exercises 3–6:** Make sure students understand that the second and third blanks are each found by looking at the previous line.
- **Exercises 7–12:** Have students choose one problem to solve using the structure from Exercises 3–6.

cise.

e to think of multiples of ten as a
. Most students recognize the pattern
product.

ts to describe how they are
ithout writing all of the steps from

t with products of 6 × 3 and 4 × 5.

place value disks

o numbers where one of the factors
ed (for example, 4 × 200). "What
uct, check with a calculator, try
epresent the problem."

Indicator 2f - The Teaching Edition indicates that students can continue to use tools as needed.

MP5 Use appropriate tools strategically. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations.... Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Laurie's Notes

Apply and Grow: Practice

SCAFFOLDING INSTRUCTION

Meeting the needs of all learners.

Students have learned many strategies for comparing fractions. Encourage students to look at the fractions before deciding on a strategy. Can they flexibly change strategies based on the current situation? Do they always need to draw a model? Can they reason about the fractions by thinking of the model? by understanding what the numerator and denominator represent? When it is more difficult to decide which fraction is greater, what strategy helps them the most?

EMERGING students will rely on models to show which fraction is greater. They will have difficulty determining which strategy to use and may not realize which is most efficient. Emerging students have a tendency to mix up the conditions for different strategies and may in the process find it difficult to remember whether the larger denominator or larger numerator makes a fraction greater.

- **Exercises 5–13:** Help students identify which pairs of fractions have the same denominator. Have students look at an anchor chart to determine what strategy can be used when the denominators are the same. "Which part of the fraction do you compare when you know you are using the same size pieces? What do these numbers tell you?" Repeat similarly with finding same numerators. Choose one remaining exercise to complete. Students can decide on a model to help them compare.
- **Exercises 14–17:** Use Fraction Strips. Reduce the number of exercises, having students choose one.

PROFICIENT students can use a variety of strategies to compare. They begin to see when one strategy is more efficient than another. Proficient students may reason by visualizing a model without always needing to physically build or draw it.

- **Exercises 14–16:** Can students find fractions with a different denominator than the first fraction?

Extension: Adding Rigor

- "For Exercise 18, make an answer key of all the possible solutions."

Understand a Unit Fraction 10.2

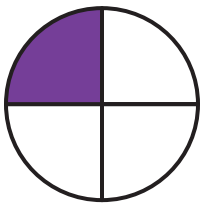
Learning Target: Identify and write a unit fraction.

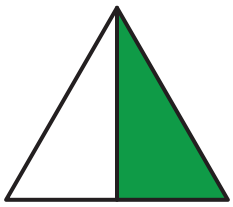
Success Criteria:
- I can identify a unit fraction.
- I can write a unit fraction.
- I can explain what a unit fraction is.
- I can explain what the numerator and denominato in a fraction.

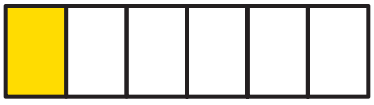
Indicator 2f - In this Explore and Grow, students must carefully analyze the given shapes and precisely communicate what is the same and what is different.

MP6 6 Attend to precision. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other.

Match each shaded part to its name.





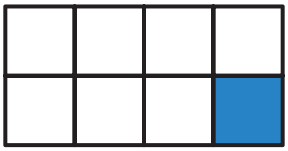


one-fourth

one-half

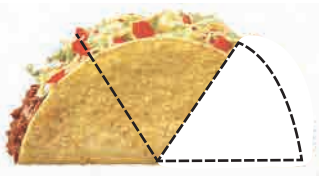
MP **Precision** What is the same about each shape? What is different?

7. **Precision** Did Descartes label the shaded part correctly? Explain.

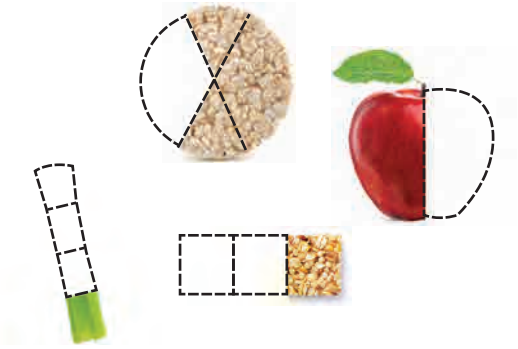


8. **DIG DEEPER!** You want to make a card. You fold a sheet of paper in half, then in half again. What fraction of the sheet of paper represents the front of the card?

9. **Writing** Explain how you know Newton ate $\frac{1}{3}$ of his taco.



10. **Modeling Real Life** For which foods can you use a unit fraction to represent the amount eaten? Explain.



11. **Modeling Real Life** You prepare a rectangular dip tray that has 6 equal parts. Three parts are hummus, one part is *queso*, and one part is guacamole. The rest of the tray is salsa. What fraction of the tray is salsa?

Review & Refresh

Compare.

12. $4 \times 6 \bigcirc 6 \times 6$

13. $6 \times 5 \bigcirc 4 \times 5$

14. $42 \bigcirc 6 \times 7$

Laurie's Notes

Apply and Grow: Practice

SCAFFOLDING INSTRUCTION

Meeting the needs of all learners.

Students find the area of rectangles and one irregular shape shown on grid paper. Do students use the key to identify the standard measurement unit? Do they write the labels on their answers? Are students able to visualize the difference in size between an area in square centimeters and an area in square feet and choose a reasonable unit?

EMERGING students can count and record the number of squares in a figure. They may forget to include the units of measure or may write labels incorrectly.

- **Exercises 2–5:** Highlight the measurement unit. Students can write the label on the line for each exercise before they count th
- **Exercise 6:** Students may choose both rectangles that cover 12 squares. Did students check the key for the size each unit square represents. What unit does the question ask for?
- **Exercise 7:** Provide a visual of 1 square centimeter and 1 square foot.

PROFICIENT students are able to find the area and record the unit of measure correctly. They may need to be reminded that we always write a unit of measure when recording the area of a figure.

- **Exercise 6:** Did students notice the last key is a different measurement? What unit does the question ask for?
- **Exercise 7:** Provide access to centimeter and inch rulers.

Extension: Adding Rigor

- One foot is 12 inches long. How about a square foot? How many square inches does it take to make 1 square foot? Provide students with color tiles, masking tape to mark off a square foot, and 1 inch grid paper.

Laurie's Notes

ELL Support

After reviewing the example, have students work in pairs to complete Exercises 1–6. Have one student ask another, "What is your estimate? What is your actual sum? Is your estimate reasonable?" Have them alternate roles.

Beginner students may provide numbers and yes or no answers. **Intermediate** and **Advanced** students may provide sentences, such as "My estimate is 600."

Think and Grow

Getting Started

- It is important to have a discussion about why we estimate first. Proficient students will find the sum and then write an estimate that is close to the actual sum. That is not what we want them to do! Rounding to the nearest hundred (or ten or compatible number) lets us know *about* what our answer should be in the event we make a careless mistake. Share that you always estimate first.

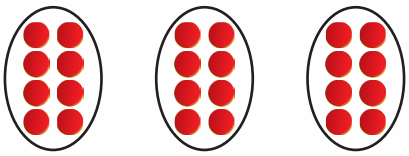
Teaching Notes

- "We want to find 236 + 378. We will estimate first by rounding each addend, then find the actual sum, and compare it to our estimate to decide if our answer is reasonable. These are the three success criteria today to show we have learned to add three-digit numbers."
- **Model:** "Begin by rounding each addend to the nearest hundred." Pause as students find the estimated sum, 200 + 400 = 600. "Now write the problem in a vertical format. How does this format help us in finding the sum?" The like place values are in the same column.
- **Supporting Learners:** A number line is still helpful in understanding rounding.
- **MP6 Attend to Precision:** Work through each step. "6 + 8 is 14. That is 4 ones and 1 group of ten. 1 + 3 + 7 is 11 and this is the tens place value so we have 11 tens. That is 1 ten and 1 group of one hundred. 1 + 2 + 3 is 6 and this is the hundreds place value. The sum is 614."
- "We estimated a sum. We found the sum. Now we want to see if our answer is reasonable. Is 614 close to 600?" yes "So, is our answer reasonable?"
- "Are you clear about your learning today? There are three success criteria I want you to think about. Use your thumb signal to show me how confident you are with each success criterion."
- Have students complete Exercises 1–6. Model how they can record the rounded addends and record the estimate above the problem.
- Have small groups of students work together at the board or in a cluster in the room.
- **Supporting Learners:** If additional room is needed, the problems can be written on the Grid Paper Instructional Resource. Provide base ten blocks.
- "You have added three-digit numbers and sometimes you needed to regroup. How confident are you feeling about adding three-digit numbers?" Have students share challenges they may still be feeling.

Think and Grow: Using Equal Groups to Multiply

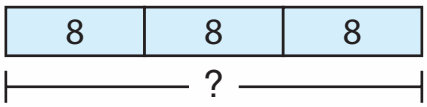
Multiplication is an operation that gives the total number of objects when you combine equal groups.

Example How many counters are there in all?



Each group has the same number of counters, so they are **equal groups**.

tape diagram



3 groups of 8

Repeated addition equation: $8 + 8 + 8 = \_\_\_\_$

multiplication symbol

Multiplication equation: $3 \times 8 = \_\_\_\_$

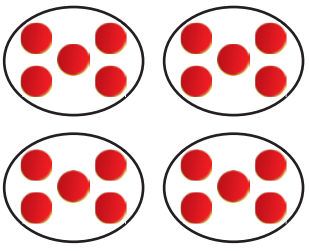
number of equal groups | size of equal groups | total

An **equation** is a mathematical sentence that uses an equal sign, =, to show that two expressions are equal.

Show and Grow *I can do it!*

Use the model to complete the statements.

1.

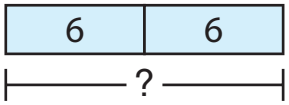


____ groups of ____

____ + ____ + ____ + ____ = ____

____ × ____ = ____

2.



____ groups of ____

____ + ____ = ____

____ × ____ = ____

Name _____

Apply and Grow: Practice

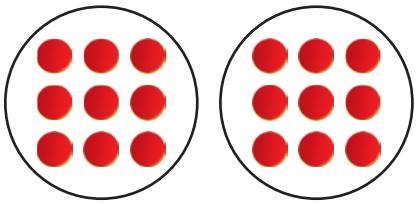
Complete the equations for the model.

4.

_____ + _____ + _____ + _____ + _____ = _____

_____ × _____ = _____

5.



_____ + _____ = _____

_____ × _____ = _____

Find the product.

6. $\begin{array}{r} 2 \\ \times\ 2 \\ \hline \end{array}$

7. $\begin{array}{r} 3 \\ \times\ 2 \\ \hline \end{array}$

8. $\begin{array}{r} 2 \\ \times\ 10 \\ \hline \end{array}$

9. $\begin{array}{r} 1 \\ \times\ 2 \\ \hline \end{array}$

10. $\begin{array}{r} 6 \\ \times\ 2 \\ \hline \end{array}$

11. $\begin{array}{r} 2 \\ \times\ 8 \\ \hline \end{array}$

12. $\begin{array}{r} 4 \\ \times\ 2 \\ \hline \end{array}$

13. $\begin{array}{r} 7 \\ \times\ 2 \\ \hline \end{array}$

Find the missing factor.

14. $2 \times \_\_\_\_ = 14$

15. $2 \times \_\_\_\_ = 20$

16. $5 \times \_\_\_\_ = 10$

17. How many gloves are in 9 pairs of gloves?

18. MP **Structure** How are the models similar? How are they different?

Name _____

Problem Solving: All Operations

9.5

Learning Target: Use the problem-solving plan to solve two-step word problems involving different operations.

Success Criteria:

- I can understand a problem.
- I can make a plan to solve a problem using letters to represent the unknown numbers.
- I can solve a problem using one equation.

Explore and Grow

Use any strategy to solve the problem.

You are making 6 fruit baskets. Each basket has 3 pieces of fruit in it to start. You buy 18 bananas and divide them equally among the baskets. How many pieces of fruit are in each fruit basket now?

There are _____ pieces of fruit in each fruit basket now.

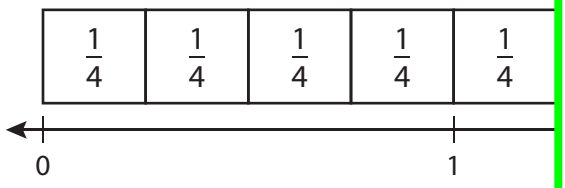
MP **Structure** How can you solve this problem using one equation?

Name _____

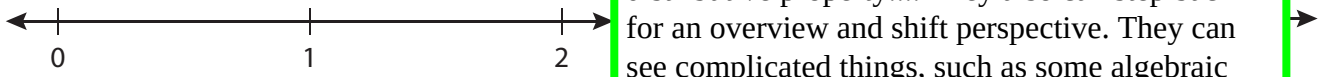
Apply and Grow: Practice

Plot the fraction on the number line.

2. $\frac{7}{4}$



3. $\frac{9}{6}$

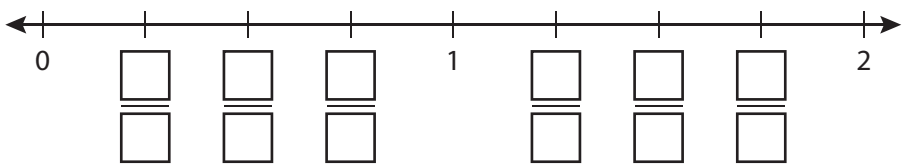


Indicator 2f - In #5-6, students must see how the number line is divided to realize what each tic increment represents.

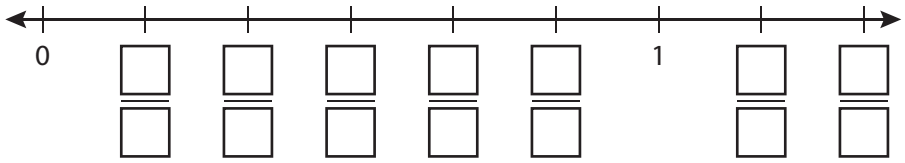
MP7 Look for and make use of structure. Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property.... They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects....

MP Structure Complete the number line.

5.

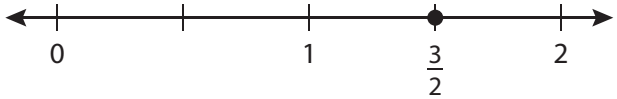


6.

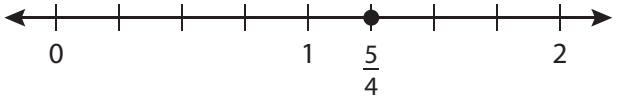


MP Number Sense Draw and shade a model for the plotted fraction.

7.



8.



Write the addition equation as a multiplication equation.

4. $3 + 3 + 3 + 3 + 3 + 3 = 18$

5. $2 + 2 + 2 + 2 + 2 + 2 + 2 = 14$

6. **DIG DEEPER!** You have 16 action figures. Can you put an equal number of figures on 3 shelves? Explain.

7. **Which One Doesn't Belong?** Which one does *not* belong with the other two?

2 groups of 3

$2 + 2 + 2 = 6$

8. **Modeling Real Life** You make 7 gift bags for your friends. Each gift bag has 3 pom-pom pets. How many pom-pom pets are there in all?

9. **DIG DEEPER!** Newton has 2 stacks of 5 books. Descartes has 3 stacks of 4 books. How many books do they have in all?

Review & Refresh

10. $50 + 30 =$ _____

11. $27 + 40 =$ _____

12. $19 + 20 =$ _____

Name _____

Apply and Grow: Practice

Find the product.

3. 2×3

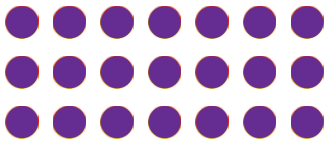
$2 \times 3 =$ $\quad 2 \times (\_\_\_\_ + \_\_\_\_)$

$2 \times 3 = (\_\_\_\_ \times \_\_\_\_) +$

$2 \times 3 =$ $\_\_\_\_$ $+$

$2 \times 3 =$ $\_\_\_\_$

4. 3×7



$3 \times 7 =$ $\quad (\_\_\_\_ + \_\_\_\_) \times 7$

5. $3 \times 8 = \_\_\_\_$

9.
$$\begin{array}{r} 3 \\ \times\ 6 \\ \hline \end{array}$$

Compare.

13. $8 \times 3 \bigcirc 3 \times 6$

16. A baseball game ha
inning. How many

Indicator 2g.i - In #17, students must critique the reasoning of a friend and use what they have learned to build a logical argument to defend their answer.

MP3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and — if there is a flaw in an argument — explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades.... Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

17. **YOU BE THE TEACHER** Your friend says 23 is a multiple of 3 because there is a 3 in the ones place. Is your friend correct? Explain.

9. **Logic** Without multiplying, how can you tell which product will be greater, 6×3 or 6×4? Explain.

10. **YOU BE THE TEACHER** Descartes uses the Distributive Property to solve 5×8. Is he correct? Explain.

$5 \times 8 = 5 \times (10 - 2)$
$5 \times 8 = (5 \times 10) + (5 \times 2)$
$5 \times 8 = 50 + 10$
$5 \times 8 = 60$

11. **Modeling Real Life** You order 24 eggs from a farmer. The farmer has 8 chickens. Each chicken lays 3 eggs. Does the farmer have enough eggs for your order? Explain.

12. **DIG DEEPER!** You have 3 piles of sports cards. There are 3 baseball cards, 2 basketball cards, and 4 football cards in each pile. How many sports cards do you have in all?

Review & Refresh

Find the sum.

13.
$$\begin{array}{r} 32 \\ 13 \\ +\ 47 \\ \hline \end{array}$$

14.
$$\begin{array}{r} 46 \\ 14 \\ +\ 24 \\ \hline \end{array}$$

15.
$$\begin{array}{r} 55 \\ 10 \\ +\ 12 \\ \hline \end{array}$$

16.
$$\begin{array}{r} 21 \\ 13 \\ +\ 29 \\ \hline \end{array}$$

Name _____

Practice Division Strategies 4.8

Learning Target: Use a strategy to divide.

Success Criteria:

- I can choose a strategy to solve a division problem.
- I can divide and write the quotient.
- I can explain the strategy I used.

Explore and Grow

Use any strategy to find the quotient.

$36 \div 4 =$ _____

Construct Arguments What other strategies can you use to solve? Explain the strategy to your partner.

2. **YOU BE THE TEACHER** Descartes says the product of a number and 6 is double the product of that same number and 3. Is he correct? Explain.

×	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	2	4	6	8	10	12	14	16
3	3	6	9	12	15	18	21	24
4	4	8	12	16	20	24	28	32

3. **Modeling Real Life** A 10-pound Great Dane puppy gains the same number of pounds each week. The multiplication table shows how many pounds she gains after 2 weeks, 4 weeks, and 6 weeks. How many pounds does she gain each week?

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

How much does the puppy weigh after 6 weeks?

If she continues to gain the same number of pounds each week, how much will she weigh after 7 weeks?

Another puppy gains 6 pounds in 2 weeks and 12 pounds in 4 weeks. How many pounds does he gain each week?

Review & Refresh

4. A total of 20 horses are divided equally into 4 races. How many horses are in each race?

Name _____

Estimate Sums 7.4

Learning Target: Use rounding or compatible numbers to estimate sums.

Success Criteria:

- I can use rounding to estimate a sum.
- I can use compatible numbers to estimate a sum.
- I can explain different ways to estimate a sum.

Explore and Grow

Round each addend. Then find the sum.

$$\begin{array}{rcl} 83 & \rightarrow & \square \\ +\ 119 & \rightarrow & +\ \square \\ \hline & & \square \end{array} \qquad \begin{array}{rcl} 156 & \rightarrow & \square \\ +\ 103 & \rightarrow & +\ \square \\ \hline & & \square \end{array}$$

MP **Construct Arguments** Compare your answers to your partner's answers. Explain why they are the same or why they are different.

Problem Solving: Addition and Subtraction

8.11

Learning Target: Use the problem-solving plan to solve two-step addition and subtraction word problems.

Success Criteria:

- I can understand a problem.
- I can make a plan to solve a problem using letters to represent the unknown numbers.
- I can solve a problem and check whether my answer is reasonable.

Explore and Grow

You read 150 pages in three weeks.

Week	Number of Pages Read
1	56
2	47
3	p

What does p represent?

$p =$ _____

MP **Construct Arguments** Explain to your partner how to find what n represents.

$$250 + n = 580$$

Name _____

11.4 Compare Fractions with the Same Denominator

Learning Target: Compare fractions that have the same denominator.

Success Criteria:

- I can model fractions that have the same denominator.
- I can use the numerators to compare fractions.
- I can explain how to compare fractions that have the same denominator.

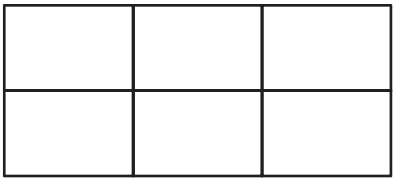
Explore and Grow

Color to show each fraction. Circle the greater fraction.

$\frac{1}{4}$

$\frac{3}{4}$

$\frac{5}{6}$



$\frac{2}{6}$

MP **Construct Arguments** Explain to your partner how you can compare fractions with the same denominator.

Name _____

Compare Fractions 11.7

Learning Target: Compare fractions.

Success Criteria:

- I can choose a strategy to compare two fractions.
- I can compare two fractions.

Explore and Grow

Use a strategy to find the greater fraction.

$\frac{2}{3}$ $\frac{2}{8}$

Use a different strategy to check your answer.

MP **Construct Arguments** Tell your partner which strategy you prefer. Explain.

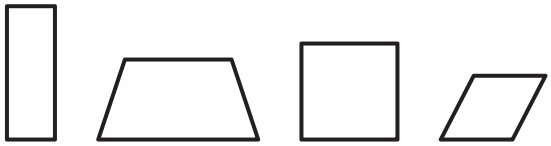
7. **Writing** Explain how a trapezoid is different from a parallelogram.

8. MP **Reasoning** Explain why the rectangle shown is *not* a square.

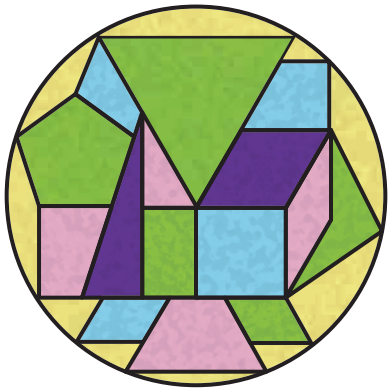
9. DIG DEEPER! What is Descartes's shape?

My quadrilateral has four right angles and two pairs of parallel sides. One pair of sides is greater in length than the other pair.

10. **Which One Doesn't Belong?** Which does *not* belong with the other three? Explain.



Modeling Real Life Use the mosaic.



11. Write all of the names for the purple quadrilateral.

12. How many parallelograms are in the mosaic? Circle them.

Review & Refresh

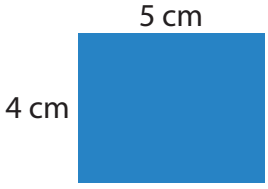
Find the area of the rectangle.

13.

____ × ____ = ____

Area = _____

14.



____ × ____ = ____

Area = _____

Name _____

Divide by 6 or 7

4.5

Learning Target: Divide a number by 6 or 7.

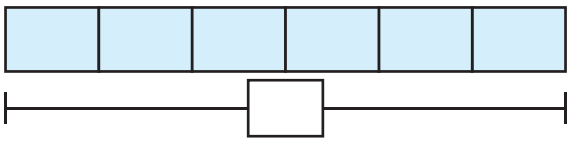
Success Criteria:

- I can model dividing by 6 or 7.
- I can find the quotient of a number and 6 or 7.

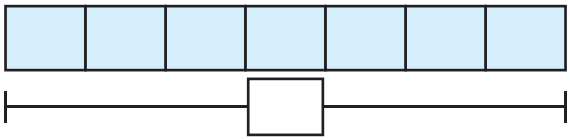
Explore and Grow

Complete the statements and the models.

42 ÷ _____



42 ÷ _____



MP **Reasoning** Without solving, which quotient is greater? Explain how you know.

Indicator 2g.i - Students have not "already solved" the division problem and do need to think, analyze, and argue to complete the exploration. The directions ask "Without solving, which quotient is greater?". Students have to reason and think about which quotient is greater when the same number is divided by a lesser or greater number, and then construct an argument, which should contain the idea that if the number of groups is less, there are more in each group.

Laurie's Notes

ELL Support

After discussing the example, have students work in groups to complete Exercise 1. Lead groups to discuss the following questions: What do we know? What do we need to know? What math do we perform? What is the answer? Monitor discussion and provide support as needed. Expect students to perform according to their proficiency level.

Beginner students may state numbers or one-word answers.

Intermediate students may use simple sentences, such as, "There are thirty fe

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Think and Grow

Getting Started

- **Preview:** What do you notice about the example? Students should recognize the problem-solving plan.

Teaching Notes

- Students use the problem-solving plan to solve a problem that involves multiplication and subtraction.
- **Model:** Read the problem. "Let's make sure we understand the problem." Point to *What do you know?* and read the first statement. Demonstrate how to return to the problem, reading it again to find the information. Write in 8. Read the next statements, returning to the problem, reading it and asking students to find the information for the class to fill in. Do the same for *What do you need to find?* "Now we are ready to make a plan." Show how to use the information in the *Understand the Problem* to complete the *How will you solve?*

? **MP3 Construct Viable Arguments:** "How do we know we should multiply the 8 and 3 to find the number of feathers used?" Students might mention it is an equal groups situation since there are 3 on each dream catcher. Others may draw a picture to model the situation. Prompt justifications with questions like, "Why not 30 × 3? Why subtract the product from 30?"

visual model, especially if students know their multiplication facts. Multiply 8 × 3, and subtract 24 from 30 to answer the

Indicator 2g.ii - The Teaching Edition encourages teachers to ask probing questions to engage students in constructing arguments and analyzing the arguments of others.

MP3 Construct viable arguments and critique the reasoning of others.
Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and — if there is a flaw in an argument — explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades.... Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

7.1

Learning Target

Identify the values of digits in three-digit numbers.

Success Criteria

- Model three-digit numbers.
- Identify the values of digits in three-digit numbers.
- Use place value to compare two numbers.

Warm-Up

Practice opportunities for the following are available in the Resources by Chapter or at *BigIdeasMath.com.*

- Daily skills
- Vocabulary
- Prerequisite skills

ELL Support

Explain that the term *place value* refers to the amount represented by the place or position of a digit within a number. Use the number 130 to point out place values. In the number 130, the value of 1 is 100 and 3 is 30.

Laurie's Notes

Check out the Dynamic Classroom.
BigIdeasMath.com

STATE STANDARDS
Preparing for 3.NBT.A.1

Preparing to Teach

Knowledge of the base ten system through the hundreds place is assumed knowledge from prior grades. This section reviews making a concrete model of numbers, drawing quick sketches of numbers, and writing numbers in word, expanded, and standard forms. Given these skills, the learning target of the lesson is to identify the value of each digit in a number. This understanding is necessary in making sense of rounding numbers.

Materials

- base ten blocks

Dig In (Circle Time)

This activity gives insight into the background knowledge students have of the base ten system. Responses will guide questions for the Explore and Grow.

? Show some base ten blocks. "Tell your partner what you know about these pieces." Listen for understanding of names and

? Give one student three rods and another three units. "Who is holding pieces with the greater value? How do you know?" Three rods equal 30, three units equal 3; 30 is greater than 3.

Big Idea: Any [illegible] greater than a digit in the tens or ones place value.

? **MP4 Model with Mathematics:** Model two- and three-digit numbers with base ten blocks. Have students record the number in one of the various forms: standard, expanded, or word. Each time, discuss the following: "Explain how you know your answer is correct. What digit is in the tens (hundreds) place? What is its value? How do the blocks show this? How does the form show this? What if I add a rod? What if I add a flat, how does the standard (expanded, word) form of the number change?"

- **Turn and Talk:** "Which form of a number: standard, expanded, or word, do you find easiest to write from the model? Why?"

◉ "Today you are going to represent the values of digits in three-digit numbers. You will be using standard, expanded, or word form. With your partner, describe each of these forms. Are there any of these forms you are not comfortable with?"

? Teaching Prompt ◉ Learning Target

Laurie's Notes

ELL Support

After completing the examples, have students work in pairs to practice verbal language as they solve Exercises 1 and 2. Have one student ask another, "To what place value do you round? Which numbers is it between? Which is closest/the answer?" Have them alternate roles asking and answering questions.

Beginner students may state numbers and one-word answers. **Intermediate** students may use phrases, such as, "between 20 and 30." **Advanced** students may use sentences, such as, "23 is between 20 and 30."

Think and Grow

Getting Started

- Introduce the vocabulary card for **round**. Discuss half-way numbers. Show several halfway numbers between two multiples of ten. "What do you notice about all the halfway numbers?" Same tens digit as the multiple of 10 to the left, and always ends in a 5. Then show the numbers halfway between multiples of 100. "What do you notice?" They end in 0. There is always a 5 in the tens place. The hundreds digit is the same as the multiple of 100 to the left. Discuss the significance of halfway numbers to help round numbers.

Teaching Notes

- The number line serves as a visual tool. Work through the first example.

? "How do you know which ten 23 is closer to?"

? **MP 7 Look for and Make Use of Structure:** "How does the halfway number help you round 23 to the nearest ten?" 23 is between 20 and 25 and not halfway or more to 30, so 23 rounds to 20.

- **Common Error:** Students may plot their number on the wrong side of the halfway number. Have them add additional tick marks and count the numbers from 20 to 30.
- "We can also round three-digit numbers to the nearest ten. 175 is between 170 and 180. Notice the hundreds are the same, but the tens are 7 tens and 8 tens." Point to 175 on the number line. "Does 175 round to 170 or 180?" Remind students that although it is the halfway number, the decision in mathematics is to round it up, so 175 rounds up to 180.

? **Model:** "When we round to the nearest ten, we label our number line by multiples of 10 and then find the halfway numbers. To round to the nearest hundred, we label our number line by multiples of 100 and find the halfway number." Model how to use the hundreds digit to set up the number line for rounding 465 to the nearest hundred. "What is the halfway number between 400 and 500?"

- **Supporting Learners:** Provide number lines with tick marks labeled for Exercises 1 and 2. Use a hundred chart as an alternative visual tool. For additional practice have partners take turns giving each other numbers to round using number lines on their whiteboards.

◉ Discuss how the three success criteria lead to the learning target. Ask students to reflect on their learning. "How confident are you that you have successfully met the learning target?" To help students self-assess, ask them to write how they know which ten 68 rounds to.

- **Extension:** "When you replace a number with its nearest ten, is it equivalent to the original number? Explain." Only if the original number ends in a 0. "What is 6 rounded to the nearest 100?" 0

Laurie's Notes

ELL Support

Explain that in the left column are names of countries and in the right column each country's flag is pictured. Read each question aloud as students follow along. Ask the questions provided at the end of each exercise and have students write their answers on a whiteboard and hold them up for your review.

Think and Grow: Modeling Real Life

These applications allow students to show their understanding of identifying unit fractions when different shaded fractions exist within the same whole.

- **Preview:** Look at the different flags in the example. Identify the countries on a map and practice pronouncing each. "How could you describe each flag?"
- Read the example. "All the flags have green on them. What do we need to have to make a unit fraction?" Listen for a numerator of 1, so only one equal part is shaded green. "Which flag has this?"
- **MP2 Reason Abstractly and Quantitatively:** "Why do the other flags not show green as a unit fraction?" Seychelles has 1 green section out of 5, but it does not have equal parts, so it cannot be written as fifths. Nigeria has equal parts, but 2 of the 3 parts are
- **MP3 Construct Viable Arguments and Critique the Reasoning of Others:** "How can you argue that there is only one flag in Exercise 13 that represents a unit fraction for the amount of red? Present your argument to your partner. Answer any questions your partner asks about your choice."
- **Supporting Learners:** Provide crayons and a paper plate for Exercises 14 and 15.
- Review the success criteria. "Place a check next to each criterion you can do. Circle any criteria you still need to practice."

Closure

- Use exit cards. "Describe a unit fraction to someone who has never heard of this type of number before. You can include words, pictures, and symbols in your description."

Laurie's Notes

ELL Support

After discussing the examples, have students work in pairs to practice verbal language as they solve Exercises 1 and 2. Have one student ask another, "How much time elapsed?" Have them alternate roles.

Beginner students may write numbers.
Intermediate students may state phrases such as "twenty-seven minutes."
Advanced students may use sentences, such as, "Twenty-seven minutes elapsed."

Think and Grow

Getting Started

- Students should be comfortable using number lines to represent elapsed time within the same hour. They can use number lines to show elapsed times across an hour.

Teaching Notes

? "Look at the example. What is the elapsed time for this problem? Could we use ten-minute jumps and then five-minute jumps to solve the problem?" yes "Who can show a clock with ten-minute jumps?"
- Many students will begin with ten-minute jumps and use a single five-minute jump.
- Ask students to solve the problem using a number line.

? "Can a number line for elapsed time use a fifteen-minute jump and a twelve-minute jump?"
- **Model:** Explain why the number line has a fifteen-minute jump. "The fifteen-minute jump is the elapsed time from the starting time to the hour (8:00). The twelve-minute jump is the elapsed time from the hour (8:00) to the ending time. Adding the two

- **MP3 Construct Viable Arguments:** Ask students to solve Exercise 1. Have students compare the jumps they used with their partner. Ask a student pair to describe the jumps they used and why.
- **MP3 Critique the Reasoning of Others:** Discuss Exercise 2. Compare different number lines that students use. Ask students to explain the jumps they used to get the answer.

Review the success criteria. "How is your learning going right now? Is there anything about these problems that you are confused about?" Students' self-assessments will help show the support they need.
- **Supporting Learners:** Be sure students are comfortable using different jumps for elapsed time problems. Encourage students to think of elapsed time across an hour as two problems, a jump from the start time to the hour, and a jump from the hour to the end time.

Laurie's Notes

ELL Support

After demonstrating the example, have students work in pairs to practice language while completing Exercises 1–3. Be sure that at least one student within each pair is at an Intermediate or Advanced language level so they can read each problem. Have them discuss the answers.

Beginner students may draw and write numbers.
Intermediate students may draw and read aloud answer statements.
Advanced students may draw and describe using sentences.

Think and Grow

Getting Started

- It is important that students recognize that perimeter is a single length. When students find the perimeter of any figure, they will likely find the sum of all the sides. Perimeter is a single length. The perimeter is the sum of the lengths of all the sides.

Teaching Notes

- When students try to find the perimeter of a figure on a geoboard or on a grid, it is important that they count the spaces between pegs or grid lines. A common mistake is for students to count pegs or grid line intersections instead.
- Emphasize that perimeter is the length around the figure.
- **Model:** Count aloud as you trace around the rectangle in the example: 1, 2, 3, … 20. You might write the length of each side as you go.

? "How long is each unit that we counted? So, how many units is it around the rectangle? Why do you think it is good to start at the end of one of the lines and not in the middle?" easier to keep track of where you started counting

? "What is the perimeter of this rectangle?"

- "Try Exercise 1 and compare your answer with your partner's answer." Circulate and look for the incorrect answer of 26 meters. This might indicate the student counted grid line intersections and not the spaces between the grid lines.
- **MP3 Construct Viable Arguments:** "Solve Exercise 2. Turn to your partner and convince them your answers are correct. Respond to your partner's thinking." Look for students to display the lengths of each line in the figure and then sum the individual lengths.

Circulate as students complete Exercise 3. There are four possible answers on this grid, 4 × 4 rectangle, 5 × 3 rectangle, 6 × 2 rectangle, and 7 × 1 rectangle. Look for a student to display a 6 × 2 rectangle as 'standing up' and stipulate it is not the same as a 6 × 2 rectangle 'lying down.' Show one 6 × 2 rectangle on a piece of paper, then rotate the paper to show the other orientation of the 6 × 2 rectangle. Both rectangles are identical.

- **Supporting Learners:** Check for any students who are still counting grid line intersections instead of spaces between grid lines.
- **Extension:** "A rectangle has a perimeter of 12 units. Draw all the possible rectangles it could be."

◉ "You found the perimeters of rectangles on grid lines by counting the spaces for all four sides. Use your thumb signals to show how comfortable you are with finding the perimeter of rectangles on grid lines."