Amplify Desmos Math CALIFORNIA

Grade 4

Volume 1: Units 1–4

Student Edition

About Amplify

Amplify is dedicated to collaborating with educators to create learning experiences that are rigorous and riveting for all students. Amplify creates K–12 core and supplemental curriculum, assessment, and intervention programs for today's students.

A pioneer in K–12 education since 2000, Amplify is leading the way in next-generation curriculum and assessment. All of our programs provide teachers with powerful tools that help them understand and respond to the needs of every student.

Amplify gratefully acknowledges the work of distinguished program advisors from English Learners Success Forum (ELSF), who have been integral in the development of Amplify Desmos Math. ELSF is a 501(c)(3) nonprofit organization whose mission is to expand educational equity for multilingual learners by increasing the supply of high-quality instructional materials that center their cultural and linguistic assets.

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Hello Curious Mind,

Welcome to Grade 4!

Your view of the world is starting to become more varied and complex, just like the numbers and operations you'll work with this year!

You'll get to explore fractions as you run with Ingrid, work with numbers up to 1 million as you swim with sea turtles, and solve problems involving making homes for hamsters. You'll also explore number patterns with Mel — a fourth grader just like you — and help Henry work with fractions as he takes care of a new plant. You'll explore multi-digit multiplication and division with Maile at her lei shop in Hawaii, and you'll use what you know about angles and properties of shapes to try to find Captain Bogwart's treasure.

And that's not all!

It's going to be an exciting year! Let's dig in!

Sincerely,

The Amplify Desmos Math California team

Unit 1 Factors and Multiples

Let's use what we know about multiplication and division to work with factors and multiples.

Unit Story: I Contain Multitudes In this story, Mel talks about who she is, through the context of her favorite number.

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zero_start_2020/Shutterstock.com

Unit 2 Fraction Equivalence and Comparison

Let's find fractions that are equivalent and compare all types of fractions.

Unit Story: One Step at a Time In this story, Ingrid overcomes challenges as she trains for a race.

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Craig Sterken/Shutterstock.com

Unit 3 Extending Operations to Fractions

Ground Picture/Shutterstock.com

Let's learn how adding and subtracting fractions is similar to adding and subtracting whole numbers. Let's learn how multiplying fractions is similar to multiplying whole numbers.

Unit Story: Finny In this story, Henry adopts a plant and learns patience as he tries, fails, and with some help, tries again to get it to grow.

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Unit 4 From Hundredths to Hundred Thousands

Let's learn how place value extends to numbers less than 1 and greater than 1,000.

Unit Story: Myles and the Leatherbacks In this story, Myles describes his experiences working with his mother at the local "Sea Turtle Patrol."

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Unit 5 Multiplicative Comparison and Measurement

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Let's discover how to compare numbers or amounts using multiplication. Let's use multiplication to rewrite measurements using different units.

Unit Story: Just for Fun In this story, Lucas explores a variety of activities at the local community center.

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Arh-sib/Shutterstock.com

Unit 6 Multiplying and Dividing Multi-Digit Numbers

Nikita M production/Shutterstock.com

Let's multiply and divide multi-digit whole numbers by breaking them down into smaller parts. Let's use these skills to solve problems with multiple steps.

Unit Story: Special Day, Special Lei In this story, Maile and her family work at Pat's Lei Shop, where they make, sell, and ship Hawaiian lei for special occasions.

Curioso.Photography/Shutterstock.com

Number1411/Shutterstock.com

Andrii Zastrozhnov/Shutterstock.com

Unit 7 Angles and Properties of Shapes

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Let's learn to draw and identify points, lines, rays, angles, and parallel and intersecting lines. Let's classify triangles and quadrilaterals based on their sides and angles, and explore symmetry.

Unit Story: Captain Bogwart's Treasure In this story, Kayla is on the hunt for Captain Bogwart's treasure. She will use a map and clues to help her get close!

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Unit 1

Factors and Multiples

Big Ideas in This Unit

CC2 Number and Shape Patterns | Factors and Area Models

CC4 Connected Problem Solving

Essential Questions

- What are factors and multiples of a number?
- What patterns can be seen in the factors and multiples of a number?
- How do area models and arrays illustrate the factors of whole number multiplication and division?

Explore: Quilt Patterns

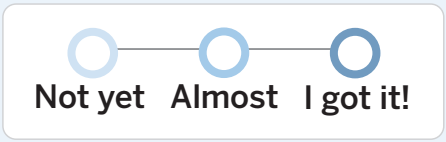
What patterns can you find in the border of Mel's quilt?

Unit Story: I Contain Multitudes

In this story, Mel talks about who she is, through the context of her favorite number.

Watch Your Knowledge Grow

This is the math you'll explore in this unit. Rate your understanding to see how your knowledge grows!



I can . . .	Before	After
Determine all factor pairs for a whole number.		
Recognize whether a whole number is a multiple of another number.		
Determine whether a whole number is a prime number or a composite number.		
Determine the rules of a pattern and continue it with numbers or shapes.		
Create a number or shape pattern that follows a rule.		
Determine the factors of a whole number with a rectangle area model.		

Sub-Unit

1

Patterns, Factors, and Multiples

Unit Story: I Contain Multitudes

Followtheflow/Shutterstock.com

What patterns do you see in the quilt Mel's aunt made?
What numbers do you see represented?

Name _____ Date _____

Number and Shape Patterns 4.OA.5, SMP.1, SMP.3, SMP.7

Explore: Quilt Patterns

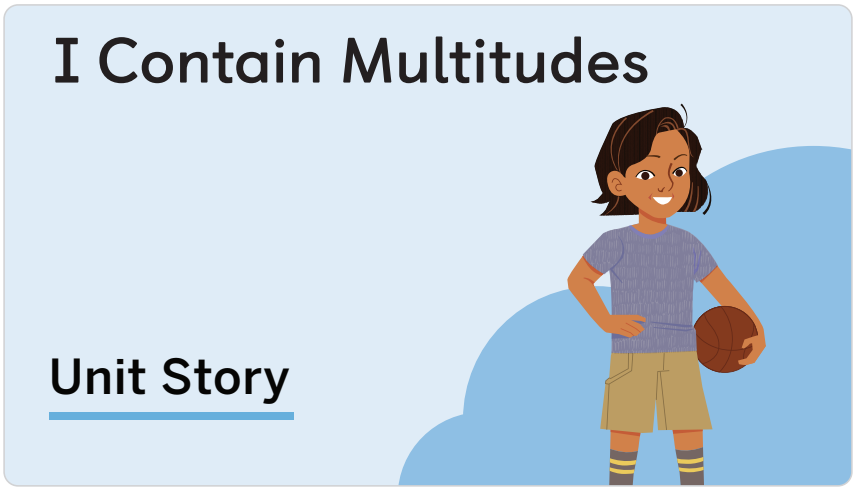
What patterns can you find in the border of Mel's quilt?

Warm-Up

eyes on teacher

I can be all of me in math class.
What experiences in Mel's story can you relate to?

Discuss What do you notice? What do you wonder?



Activity

Name _____ Date _____

Look for patterns in the border of Mel's quilt.

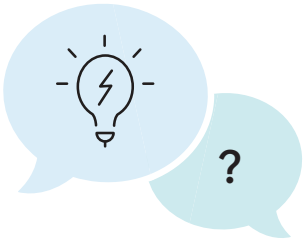
- What do you notice about the shapes?
- Describe all the patterns you see.
- How could you use numbers to describe some of the patterns?
- How could you use numbers to make predictions about the patterns?

Ways to be a mathematician

1 I can take my time to think about a challenging problem before trying to solve it.

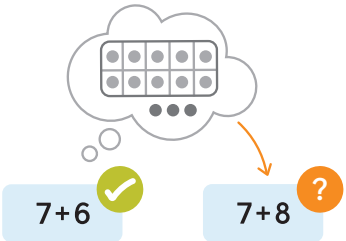
Not yet Almost I got it!

2 I can explain why my thinking makes sense and understand the thinking of others.



Not yet Almost I got it!

3 I can use math to help solve real life problems.



Not yet Almost I got it!

Name _____ Date _____

Number and Shape Patterns 4.OA.5, SMP.7

How Does It Grow?

Let's explore visual patterns that grow.

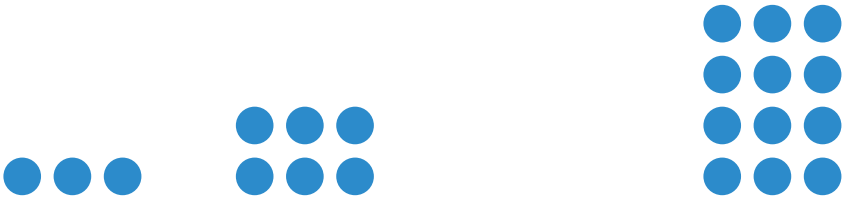
Warm-Up

eyes on teacher

I can be all of me in math class.
What makes you a good math partner?

Activity 1 Missing Steps

Here is a pattern that follows a rule. Step 3 of the pattern is missing.



1 Discuss

What do you notice about the pattern?

Name _____ Date _____

Missing Steps (continued)

2 Draw Step 3 of the pattern. Be prepared to explain your thinking.

Draw

3 Draw Step 5 of the pattern. Be prepared to explain your thinking.

Draw

4 Describe how the pattern grows.

_____

_____

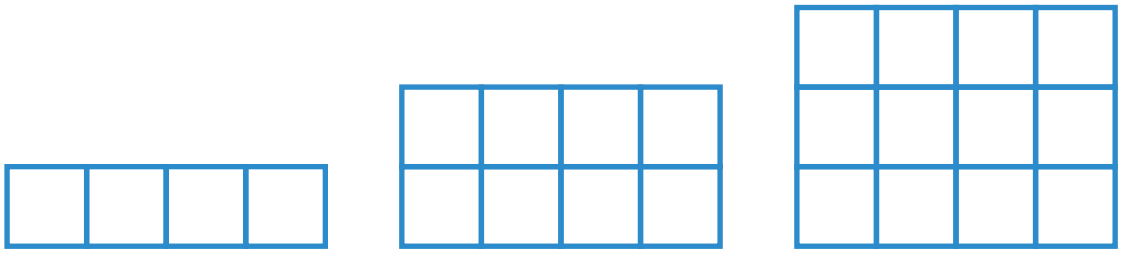
_____

Activity 2

Name _____ Date _____

Pattern Expressions

Here is a pattern that follows a rule.

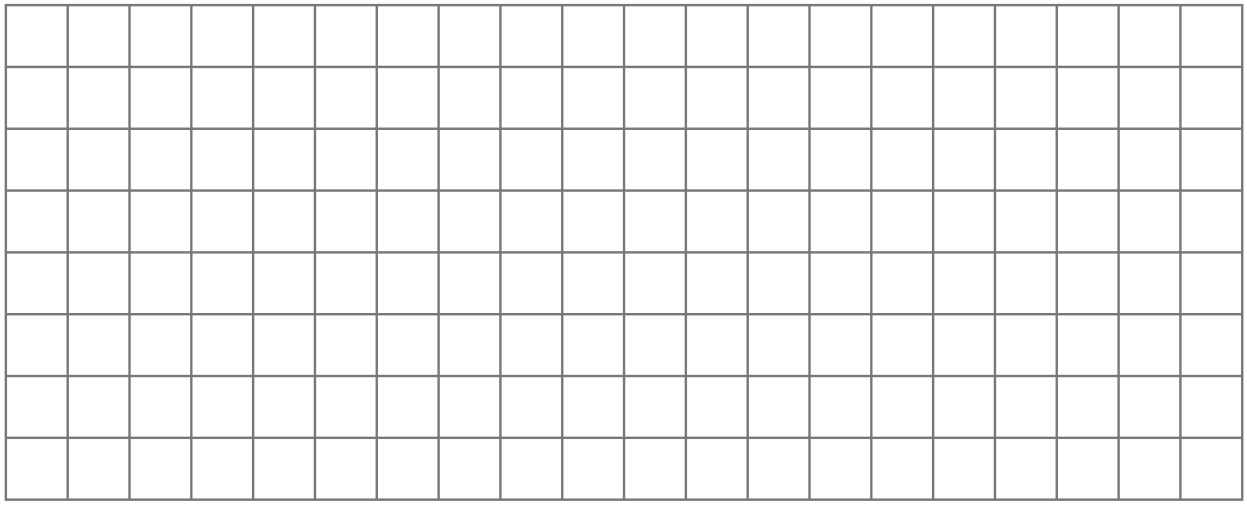


Step 1 Step 2 Step 3

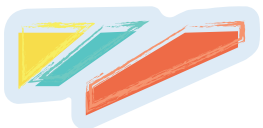
5 Discuss

What do you notice about the pattern?

6 Draw the next 3 steps of the pattern on the grid.



Step 4 Step 5 Step 6



Name _____ Date _____

Pattern Expressions (continued)

7 Determine the total number of squares in Steps 2–6 without counting. Write an expression to represent how you determined the number.

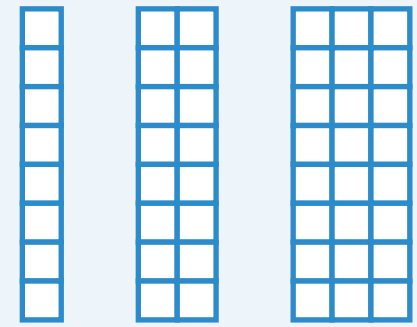
Step	Total number of squares	Expression
2		
3		
4		
5		
6		

8 **Discuss**

- What patterns do you notice?
- How could you determine the number of squares in Step 10 without drawing? Step 20?

Summary 1.02

Visual patterns that grow can be described using numerical patterns. The features of the visual and numerical patterns can be used to extend the patterns and make predictions.



8, 16, 24

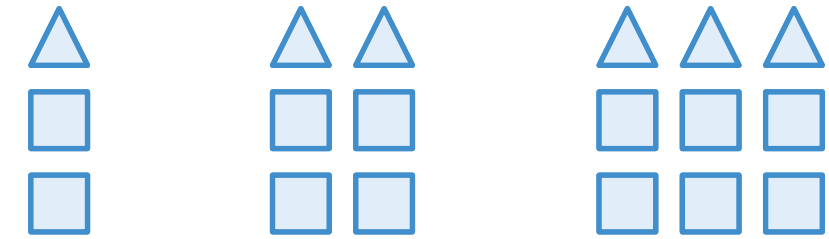
1 × 8, 2 × 8, 3 × 8

Step 5: 5 × 8 = 40

Step 10: 10 × 8 = 80

Practice 1.02

Diego followed a rule to build the pattern of squares and triangles shown. Use Diego's pattern for Problems 1 and 2.



1 What would the next 2 steps in Diego's pattern look like?

Draw

Step 4:

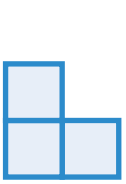
Step 5:

Name _____ Date _____

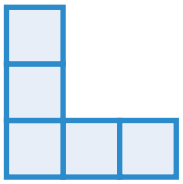
2 How many total shapes will be in Step 10?

(A) 18 (B) 27 (C) 30 (D) 33

Clare followed a rule to build the pattern of square blocks shown. Use Clare's pattern for Problems 3 and 4.



Step 1



Step 2

3 What would the next 2 steps in Clare's pattern look like?

Draw

Step 3:

Step 4:

4 Describe how the pattern grows.

_____

_____

5 A shape pattern is generated using a repeating pattern of Circle, Star, Square, Triangle. If the pattern begins at Square, select the next 3 shapes that would be shown.

(A) Circle, Star, Square

(B) Star, Square, Triangle

(C) Triangle, Circle, Star

(D) Square, Triangle, Circle

Name _____ Date _____

Spiral Review

For Problems 6–10, determine the value of the expression.

6 $10 \div 2$ _____

7 $14 \div 7$ _____

8 10×5 _____

9 9×1 _____

10 5×4 _____

11 Create a drawing or tape diagram to represent the situation. There are 35 apples. If the apples are packed into 5 bags with the same amount in each bag, how many apples are in each bag?

Draw

answer: _____

Unit 1
Lesson
3

Name _____ Date _____

Number and Shape Patterns | 4.OA.5, SMP.3, SMP.6, SMP.7

Numbers Rule!

Let's explore number patterns that follow a given rule.

Warm-Up

eyes on teacher

I can be all of me in math class. What makes you a mathematician?

Activity
1

Following the Rules

Use the given rule to generate the first 10 numbers in each pattern.

For Problems 1 and 2, the first number in the pattern is provided

1 Rule: Add 2

2 , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____

2 Rule: Add 2

3 , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____

Name _____ Date _____

Following the Rules (continued)

For Problems 3 and 4, choose a starting number that is *not* 2 or 3.

3 Rule: Add 2

_____ , _____ , _____ , _____ , _____ , _____ , _____ , _____ , _____ , _____

4 Rule: Add 2

_____ , _____ , _____ , _____ , _____ , _____ , _____ , _____ , _____ , _____

5 **Discuss**

- What do you notice about the patterns?
- How are the patterns similar? How are they different?

Activity 2

Name _____ Date _____

Double Plus One

6 For each number in the table, multiply it by 2 and add 1.

Number	Double the number plus 1
1	
2	
3	
4	
5	
10	
23	
57	
100	
309	

7 **Discuss**

What do you notice about the numbers you recorded in the table?

Name _____ Date _____

Double Plus One (continued)

Priya noticed that all the numbers she recorded in the table are odd.

8 Does an even number multiplied by 2 result in an even or odd number?

_____

9 Does an odd number multiplied by 2 result in an even or odd number?

_____

10 Does an even number plus 1 result in an even or odd number?

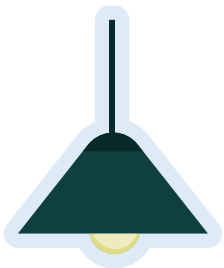
_____

11 Does an odd number plus 1 result in an even or odd number?

_____

12 **Discuss**

Explain why all the numbers you recorded in the table are odd.



Summary 1.03

The structure of numbers, such as what makes a number even or odd, can be used to make predictions about number patterns.

Rule: Add 2

7, 9, 11, 13, 15, 17, 19

Rule: Add 2

8, 10, 12, 14, 16, 18

Practice 1.03

1 For each number in the table, multiply it by 3 and subtract 2.

Number	Multiply by 3, subtract 2
2	
4	
5	
8	
9	

Name _____ Date _____

For Problems 2 and 3, use the given rule to generate the first 10 numbers in the pattern. The first number is provided.

2 Rule: Add 5

7 , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____

3 Rule: Subtract 3

30 , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____ , ____

4 Select the list of numbers that follows the rule: Multiply by 2.

(A) 10, 12, 14, 16, 18

(B) 10, 20, 30, 40, 50

(C) 10, 20, 40, 80, 160

(D) 10, 15, 20, 25, 30

Spiral Review

For Problems 5–9, determine the value of the expression.

5 $12 \div 2$ _____

6 $24 \div 6$ _____

7 8×5 _____

8 7×3 _____

9 $9 \div 1$ _____

Name _____ Date _____

10 Create a drawing or tape diagram to represent the situation. There are 32 students. If 4 students sit at each table, how many tables are needed?

Draw

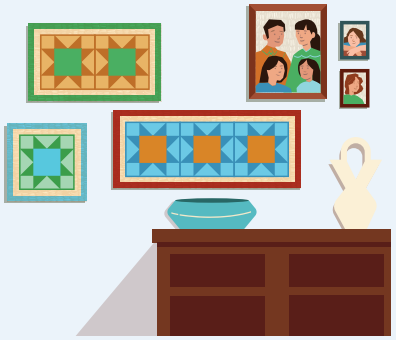
answer: _____

Name _____ Date _____

Factors and Area Models | Number and Shape Patterns | 4.OA.5, 4.OA.4, SMP.7, SMP.8

What Do They Have in Common?

Let's explore patterns in numbers between 1 and 100.



Warm-Up

eyes on teacher

I can be all of me in math class.
What were you most proud of during this lesson?

Activity 1 Charting Patterns

Here is a chart showing the numbers 1–100.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Name _____ Date _____

Charting Patterns (continued)

For Problems 1 and 2, record the numerical patterns in the chart.

1. Skip count by 2 and put a circle around each number in the pattern.

2. Skip count by 5 and put a square around each number in the pattern.

3. What do all of the numbers with circles have in common?

_____

_____

4. What do all of the numbers with squares have in common?

_____

_____

5. What do all of the numbers with both circles and squares have in common?

_____

_____

Activity 2

Name _____ Date _____

Exploring Multiples

You will be assigned 2 numbers. Write your numbers here: _____ _____

6 Identify *all* the **multiples** of your first number in the chart, using a color or symbol to mark the multiples.

7 Identify *all* the multiples of your second number in the chart, using a different color or symbol to mark the multiples.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Name _____ Date _____

Exploring Multiples (continued)

8 Discuss

You will meet with a group who identified the multiples of a different pair of numbers. Compare your charts showing the multiples of your assigned numbers.

- What do you notice when you compare the **common multiples** on each chart?
- Which pair of numbers — 3 and 6 or 3 and 7 — has more common multiples between 1 and 100? Why does this make sense?

Summary 1.04

Multiplication equations represent the relationship between factors and **multiples**. The product is a multiple of each of the factors. When 2 numbers have the same multiple, that multiple is a **common multiple**. For example, you can multiply 4 × 3 and 6 × 2 and get 12. 12 is a common multiple of 4 and 2.

$$3 \times 2 = 6$$

factor factor multiple

6 is a multiple of 3.

6 is a multiple of 2.

6 is a **common multiple** of 2 and 3.

$$6 \times 4 = 24$$

factor factor multiple

24 is a multiple of 6.

24 is a multiple of 4.

24 is a **common multiple** of 6 and 4.

common multiple A number that is a multiple of both of two given numbers.
multiple The result of multiplying a number by a whole number.

Practice 1.04

Use the chart for Problems 1–3.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Name _____ Date _____

1 Draw a circle around *all* the multiples of 9 in the chart.

2 Draw a square around *all* the multiples of 4 in the chart.

3 List *all* the multiples that 9 and 4 have in common. _____

Use the chart for Problems 4–8.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

4 Choose 2 numbers between 1 and 10.

_____ and _____

5 Draw a circle around *all* the multiples of your first number in the chart.

6 Draw a square around *all* the multiples of your second number in the chart.

Name _____ Date _____

7 Why do some of the numbers have more than 1 shape around them?

_____

_____

_____

8 Select the list of numbers that are *all* multiples of 15.

(A) 5, 10, 15, 20

(B) 15, 20, 25, 30

(C) 15, 30, 45, 60

(D) 30, 40, 50, 60

Spiral Review

For Problems 9–12, determine the value of the expression.

9 8×8 _____

10 $30 \div 10$ _____

11 $42 \div 6$ _____

12 10×6 _____

13 During the California gold rush, one gold miner found gold dust 8 days in a row. If gold miners usually found about $12 worth of gold dust per day, what was the total value of the gold dust that the miner found?

Write a multiplication equation to represent the problem. Use a ? for the unknown value. Then solve the equation.

equation: _____

value: _____

Name _____ Date _____

Factors and Area Models | Connected Problem Solving | 4.OA.4, 4.MD.3, SMP.7

Building Rectangles

Let's explore and notice patterns with multiples.

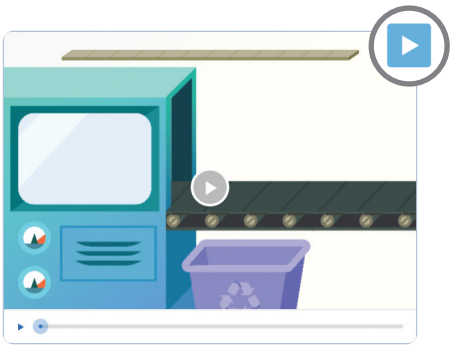
Warm-Up

1 eyes on teacher

I can be all of me in math class.
Mel's favorite number is 552.
What is your favorite number?
Why?

Activity 1 Rectangle Machines

2 Let's watch a video.



3 This machine makes rectangles with a side length of 8 units. Determine at least 3 other areas, in square units, that this machine could create.

_____

_____

_____

_____

_____

Name _____ Date _____

Rectangle Machines (continued)

4 This machine makes rectangles with a side length of 9 units. Determine at least 3 areas, in square units, that this machine could create.

_____

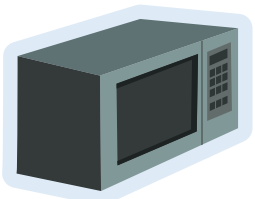
_____

_____

_____

_____

5 Let's look at different rectangles.



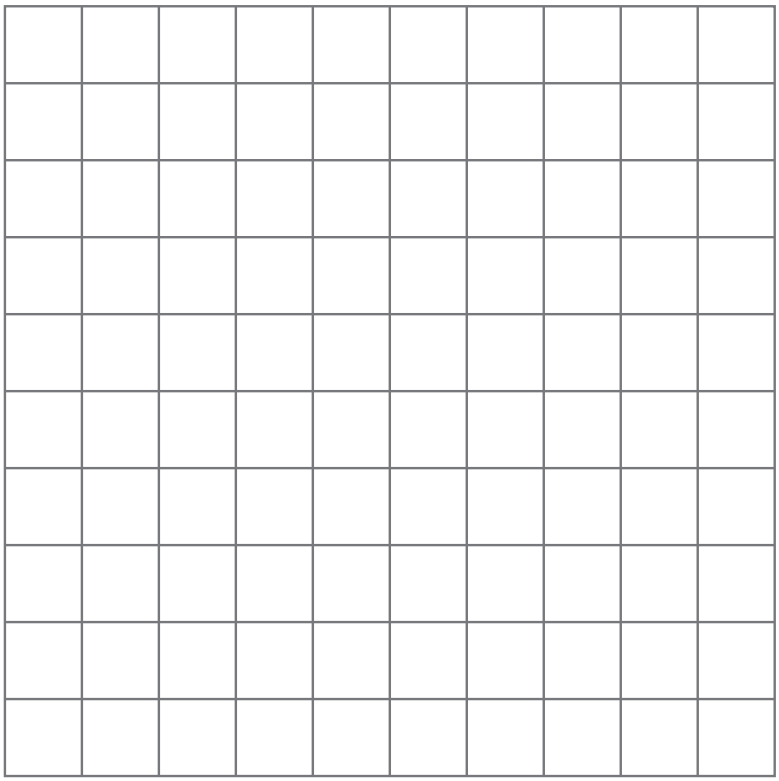
Activity 2

Name _____ Date _____

More Multiples

6 A machine makes rectangles with areas that are multiples of 4 units. Determine whether the given areas could be made by this machine. Use the grid if it is helpful.

Area (square units)	Possible? (*yes* or *no*)
24	
30	
12	
15	



Name _____ Date _____

More Multiples (continued)

7 Design a Challenge

You will design a machine that can create multiples.

- Choose a number from the number cards.
- Use your number to fill in the first blank.
- Determine 3 multiples that this machine could create.

Trade books with a partner. Use the information in the first box to solve your partner's challenge. When you have completed the challenge, trade books with another partner.

My machine makes multiples of _____.

My machine can create the multiples _____, _____, _____.

My Challenge: What are 3 other multiples that my machine could create?

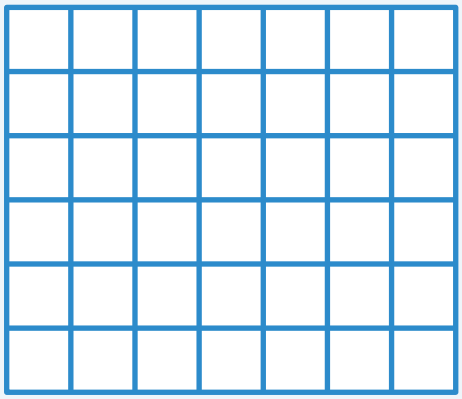
Partner 1:	**Partner 2:**	**Partner 3:**

8

Mel's machine makes multiples of 4. She says 58 is a multiple of 4. Do you agree? Explain your thinking.

Summary 1.05

Multiplication facts can be used to determine whether a number is a multiple of another number.



$6 \times 1 = 6$
$6 \times 2 = 12$
$6 \times 3 = 18$
$6 \times 4 = 24$
$6 \times 5 = 30$
$6 \times 6 = 36$
$6 \times 7 = 42$

42 is a multiple of **6**.

width How wide an object is from side to side (measured in same-sized units with no gaps or overlaps)

Practice 1.05

1 Han wants to build a rectangle with an area of 20 square units and a width of 4 units. Can Han create this rectangle? Explain your thinking.

Name _____ Date _____

A gardener wants to design different rectangular gardens, each with an area of 20 square units. For Problems 2 and 3, determine whether the gardener can design the garden with the given width. Circle *yes* or *no*.

Show or explain your thinking.

2 a garden with a width of 6 units

yes no

3 a garden with a width of 2 units

yes no

4 A rectangle has a width of 5 units and a length that is a whole number. Determine whether each value could be a possible area of the rectangle in square units. Select Yes or No for each value.

	Yes	No
1		
3		
5		
15		
24		
40		

Name _____ Date _____

Spiral Review

For Problems 5–8, determine the value of the expression.

5 $80 \div 8$ _____

6 10×3 _____

7 $36 \div 6$ _____

8 $64 \div 8$ _____

Use the story problem for Problems 9 and 10.

A pack of 36 markers has 3 rows. Each row has the same number of markers. How many markers are in each row?

9 Write a multiplication equation that represents the situation using a ? for the unknown value.

_____

10 Represent the situation with a drawing and solve the problem. Rewrite the equation with the number that makes it true.

Show or explain your thinking.

answer: _____

equation: _____

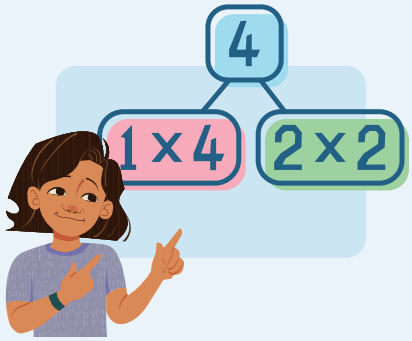
Unit 1
Lesson
6

Name _____ Date _____

Factors and Area Models | Connected Problem Solving | 4.OA.4, 4.MD.3, SMP.2, SMP.7

How Many Rectangles?

Let's look at factors that go together.



We are a math community. What does it look like and sound like to give respectful feedback to other members in our math community?

Warm-Up

eyes on teacher

Activity 1 Quilt Design

Hands-On

Mel's aunt has 24 fabric squares that she wants to use to make a rectangular quilt. You will be given 24 square tiles to represent the fabric squares.

1. Use the square tiles to determine *all* the different ways Mel's aunt could arrange the squares to make a rectangle.
   - Use the grid paper on the next page to draw each rectangle.
   - Label the side lengths of each rectangle.
2. Record the dimensions of each rectangle you drew as a multiplication expression.

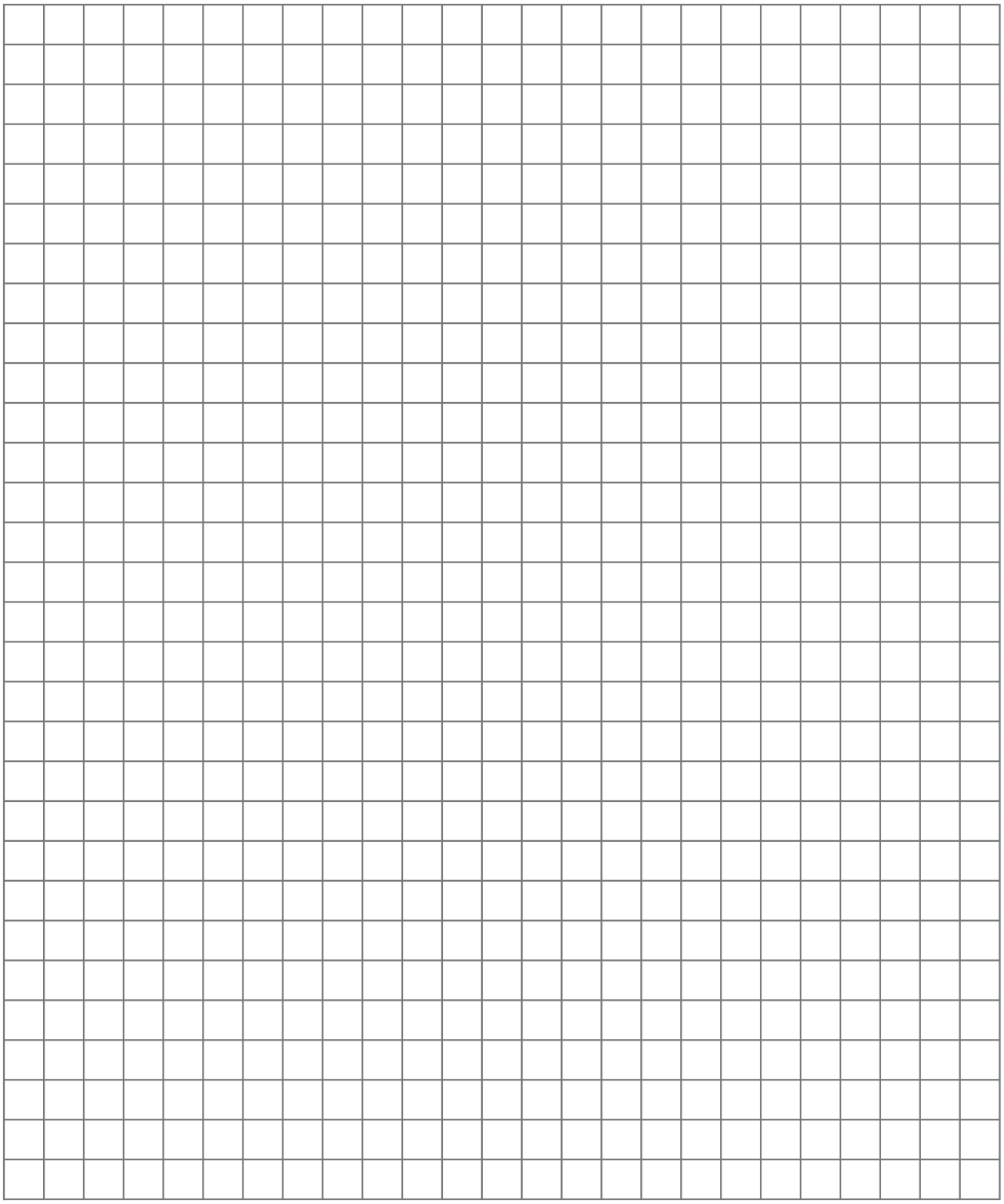
3. **Discuss**

   How do you know you have found all the possible rectangles that have an area of 24 square units?

Name _____ Date _____

Quilt Design (continued)

Each grid square has an area of 1 square unit.



Activity 2

Name _____ Date _____

Introducing the Center, Can You Build It? Stage 1

Pairs Let's build rectangles with a given area.

You'll need: Recording Sheet, Area Cards, folders, inch tiles or grid paper

Set Up Draw an Area Card. This is the target area for this round.

How to Play

1. Each player secretly builds a rectangle with the target area.
2. Record and compare the dimensions of your rectangles.
3. If both rectangles have the same dimensions, you earn 1 point. If both rectangles have different dimensions, you earn 2 points.
4. If possible, repeat Steps 1–3 for the same target area until one or both players cannot build another rectangle.

How to Win Keep playing, trying to earn at least 5 points.

CENTER
Recording Sheet

Name _____ Date _____

Can You Build It? (continued)

Target area	My dimensions	My partner's dimensions	Score

Summary 1.06

Factor pairs for a specific whole number are 2 factors that when multiplied together result in that number. The whole number is a multiple of each of its factors.

factor pairs of 36: 1 × 36, 2 × 18, 3 × 12, 4 × 9, 6 × 6

36 is a multiple of 1, 2, 3, 4, 6, 9, 12, 18, and 36.

Practice 1.06

1 Determine whether the side lengths given are possible for each area.

Side lengths	Area (square units)	Possible? (*yes* or *no*)
5 × 8	40	
4 × 9	37	
7 × 4	26	
8 × 4	32	

Name _____ Date _____

2 List *all* the possible side lengths for a rectangle with an area of 42.

3 What are *all* the possible side lengths for a rectangle with an area of 30?

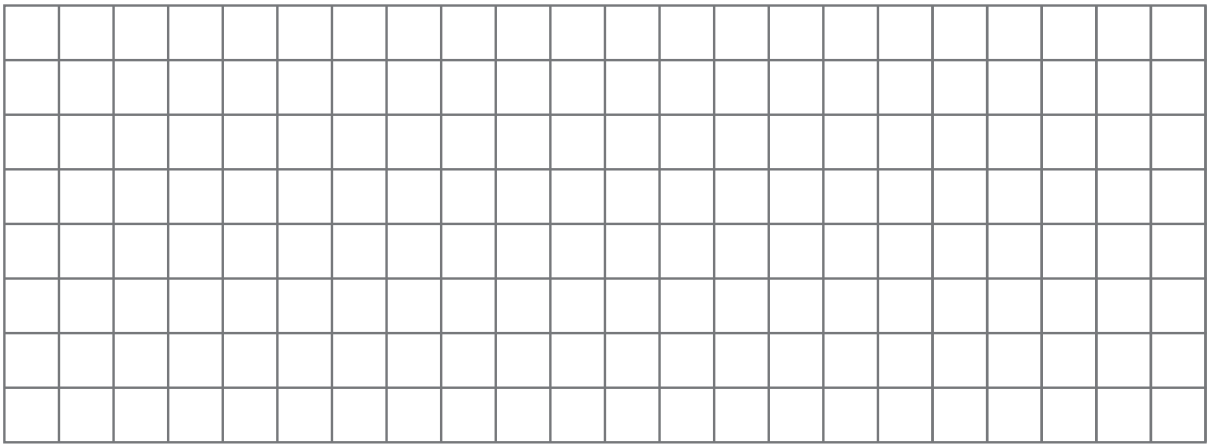
(A) 1, 3, 5, 6, 10, 30

(B) 1, 2, 3, 5, 6, 10, 15, 30

(C) 1, 2, 3, 5, 6, 10, 30

(D) 1, 3, 5, 6, 10

4 Use the grid to draw *all* the possible rectangles with an area of 16. Each grid square has an area of 1 square unit.



5 Record the dimensions of each rectangle you drew as a multiplication expression.

Name _____ Date _____

Spiral Review

For Problems 6–10, determine the value of the expression.

6 7×8 _____

7 $54 \div 6$ _____

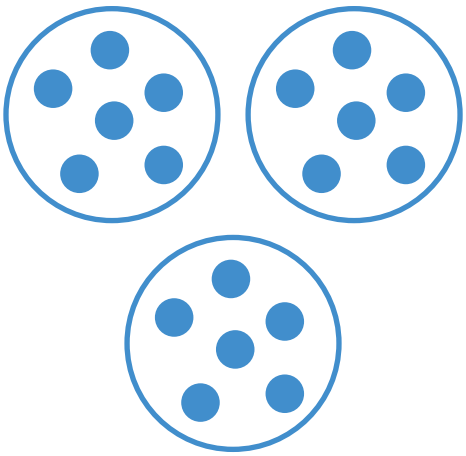
8 9×5 _____

9 $20 \div 4$ _____

10 9×10 _____

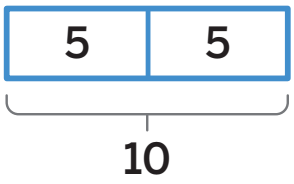
For Problems 11 and 12, write a division equation to match the diagram.

11



equation: _____

12



equation: _____

Unit 1
Lesson
7

Name _____ Date _____

Factors and Area Models 4.OA.4, SMP.3, SMP.6, SMP.7

How Many Factors?

Let's categorize numbers by how many factors they have.

We are a math community. Mel enjoys playing on a team. How did working with a partner help you today in math class?

Warm-Up

eyes on teacher

Activity 1

One or More Factor Pairs

Hands-On

1 Determine *all* the factor pairs for each number in the table. Write the factor pairs as multiplication expressions and then list *all* the individual factors.

Number	Factor pairs	Factors
4		
7		
17		
28		
33		
36		

Name _____ Date _____

One or More Factor Pairs (continued)

2 Discuss

- Which numbers in the table have the *fewest* number of factors?
- Which numbers in the table have the *greatest* number of factors?

Activity 2

Name _____ Date _____

Prime or Composite?

Hands-On

Mel kept track of different numbers she encountered in her life outside of school. She recorded information about the numbers in a table.

Number	Description
13	basketball games in a season
92	Grandpa Tom's age
54	shapes on the border of the Lakota star quilt
79	total points scored in 1 basketball season

Name _____ Date _____

Prime or Composite? (continued)

3 Which numbers in the table are **prime numbers**?

Show or explain your thinking.

answer: _____

4 Which numbers in the table are **composite numbers**?

Show or explain your thinking.

answer: _____

Summary 1.07

Whole numbers with exactly 2 factors are **prime numbers**. Whole numbers with more than 2 factors are **composite numbers**. The number 1 has only 1 factor, so it is neither prime nor composite.

Prime	Composite	Neither
19	**24**	**1**
1×19	1×24, 2×12, 3×8, 4×6	1×1
factors: 1, 19	factors: 1, 2, 3, 4, 6, 8, 12, 24	factor: 1

composite number A number that has more than 1 factor pair.
prime number A number that has only 1 factor pair.

Practice 1.07

1 Complete the table to determine whether each number is *prime* or *composite*.

	Factor pairs	Prime or composite?	How do you know?
37			
27			
47			
77			

Name _____ Date _____

2 Determine whether each number is prime or composite. Select Prime or Composite for each number.

	Prime	Composite
2		
15		
31		
42		
11		
100		

3 Cicadas are medium-sized insects. Some cicadas spend 13 or 17 years underground before they come above ground in large numbers. Determine whether each number, 13 and 17, is *prime* or *composite*. Explain your thinking.

4 There are 44 countries in Europe and 23 countries in North America. Complete the table to determine whether each number is *prime* or *composite*.

	Factor pairs	Prime or composite?
44		
23		

Name _____ Date _____

Spiral Review

For Problems 5–9, determine the value of the expression.

5 10 × 9 _____

6 6 ÷ 2 _____

7 21 ÷ 3 _____

8 9 × 6 _____

9 32 ÷ 8 _____

10 Diego has 36 apple slices that he and 3 friends equally share. How many apple slices does each person get? Write a division equation that represents the situation.

answer: _____

equation: _____

Name _____ Date _____

Factors and Area Models | Building Toward 4.NBT.5, SMP.7, SMP.8

Which Products Do You Know?

Let's practice multiplying numbers within 100.

Warm-Up

eyes on teacher

We are a math community. How can we build a supportive math community where everyone feels valued?

Activity 1 Card Sort: Multiplication

Hands-On

You will be given a set of cards with multiplication expressions.

1. Look at the multiplication expression on each card. Do you know the product? Sort the cards by placing each card into 1 of the categories in the table and record your responses.

Know it right away	Can figure it out	Do not know it yet

Name _____ Date _____

Card Sort: Multiplication (continued)

2 Choose 1 of the multiplication expressions from your *Know it right away* list or your *Can figure it out* list.

Write instructions for how to help someone determine the product of the expression.

Expression	Instructions

3 **Discuss**

Share your instructions with a partner. Then work together to determine the product of 1 expression from each of your *Do not know it yet* lists using 1 of your strategies or another strategy.

Activity 2

Name _____ Date _____

Introducing the Center, Cover Up

Stage 12

Pairs Let's multiply using factors of 1–5 and 10.

You'll need: Recording Sheet, Gameboard A or B, 2 base-ten units, two-color counters

Set Up

- Choose a Gameboard.
- Choose who will use red counters and who will use yellow counters.

How to Play

1. **Player A:**
   - Place each cube on a number in the gray row. Each cube can be on a different number, or both cubes can be on the same number. Multiply the numbers.
   - Cover the product of the two numbers with a counter.
   - Record the multiplication expression and product.
2. **Player B:**
   - Move one of the cubes. Multiply the numbers.
   - If the product is not already covered with a counter, cover it.
   - Record the multiplication expression and product.
3. Take turns moving one cube at a time. Record each multiplication expression and product, even if you were unable to cover the product.

How to Win The first player to cover 5 squares in a row wins.

CENTER
Recording Sheet

Name _____ Date _____

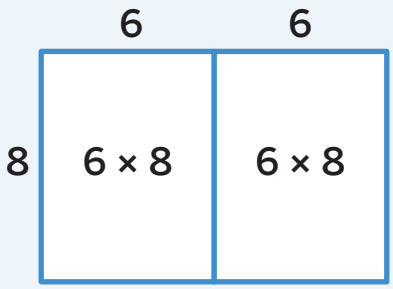
Cover Up (continued)

Multiplication expression	Product

Summary 1.08

You can use the Distributive Property of Multiplication to decompose 1 of the factors in a multiplication expression into addends, multiply each addend by the other factor, and then add the products.

Determine the product of 12 × 8.

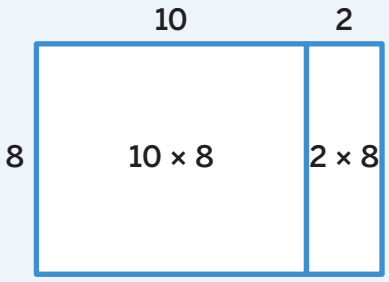


(6 + 6) × 8

6 × 8 = 48

6 × 8 = 48

48 + 48 = 96

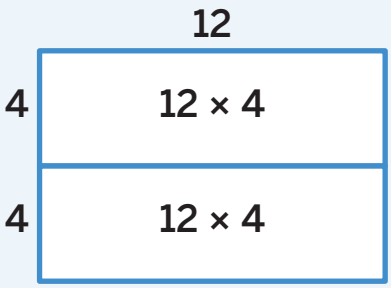


(10 + 2) × 8

10 × 8 = 80

2 × 8 = 16

80 + 16 = 96



12 × (4 + 4)

12 × 4 = 48

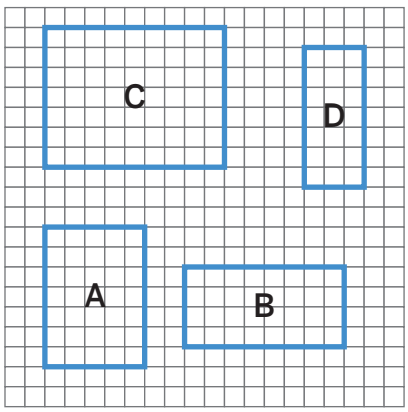
12 × 4 = 48

48 + 48 = 96

Practice 1.08

For Problems 1–4, determine the area of the rectangle in square units. Each grid square has an area of 1 square unit.

1. **area of A:** _____ square units
2. **area of B:** _____ square units
3. **area of C:** _____ square units
4. **area of D:** _____ square units



Name _____ Date _____

5 Write the product that matches each multiplication expression.

Product	Multiplication expression
56	_____ 9 × 9
30	_____ 8 × 7
42	_____ 5 × 4
20	_____ 9 × 8
81	_____ 3 × 10
72	_____ 7 × 6

6 New York City is well known for its subway system, which is used to help navigate the city. A one-way ticket on the subway costs $3. Clare purchased 8 one-way tickets. Write a multiplication expression and determine the product to determine how much Clare spent on subway rides.

expression: _____

product: _____

7 Diego purchased 5 cases of water. There are 12 bottles in each case. How many bottles of water did Diego purchase?

(A) 60 bottles of water

(B) 17 bottles of water

(C) 7 bottles of water

(D) 50 bottles of water

Name _____ Date _____

Spiral Review

For Problems 8–12, determine the value of the expression.

8 $70 \div 10$ _____

9 $10 \div 2$ _____

10 $9 \div 3$ _____

11 $25 \div 5$ _____

12 $14 \div 7$ _____

Use the story problem for Problems 13 and 14.

Jada's class has 24 students. There are 6 students in each row. How many rows are there?

13 Write a multiplication equation that could be used to solve the problem.

_____

14 Write a division equation that could be used to solve the problem.

_____

Sub-Unit

2

Using Factors and Multiples

Unit Story: I Contain Multitudes

zero_start_2020/Shutterstock.com

What do you like to do that involves using math in some way?

Name _____ Date _____

Factors and Area Models | Connected Problem Solving | 4.OA.4, SMP.1, SMP.2, SMP.3

Hamster Homes

Let's solve problems that involve factors and multiples.

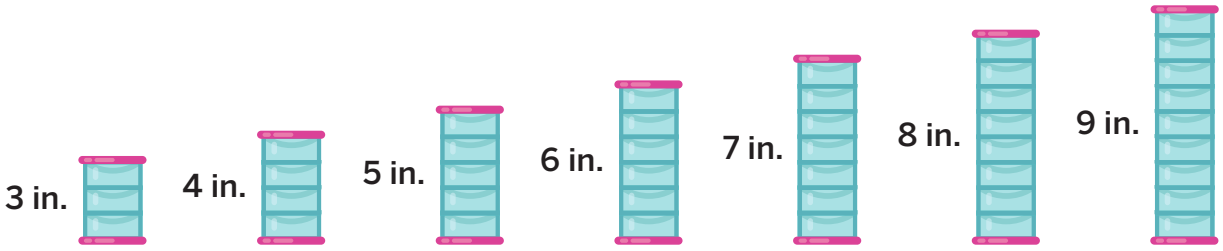
We are a math community.
Mel was a good role model in the story. How could you be a good role model for your math peers?

Warm-Up

1 eyes on teacher

Activity 1 Platform Heights

2 You are creating a hamster home! Choose a tube length.



tube length: _____

Name _____ Date _____

Platform Heights (continued)

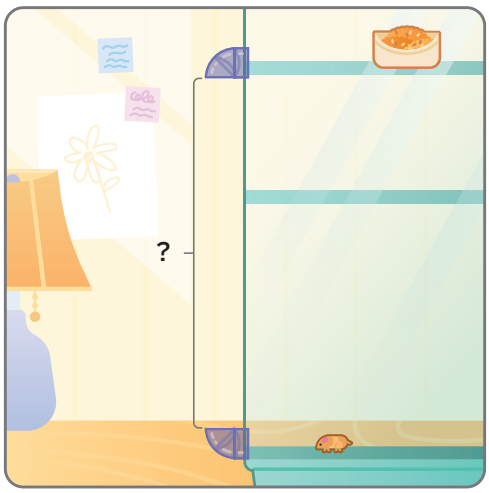
3 Using your tube length, determine *at least* 3 platform heights that you could make.

_____

_____

_____

_____



4 Using your tube length, select *all* the platform heights that you could make. Place a check mark next to each possible height in the table.

tube length: _____

Platform height	Possible?
28 in.	
36 in.	
45 in.	
56 in.	

5 Discuss

Mel and Kaylee have tubes, each with a length of 6 inches.

- Mel says she could use the tubes to connect to a platform with a height of 66 inches.
- Kaylee says she could use the tubes to connect to a platform with a height of 52 inches.

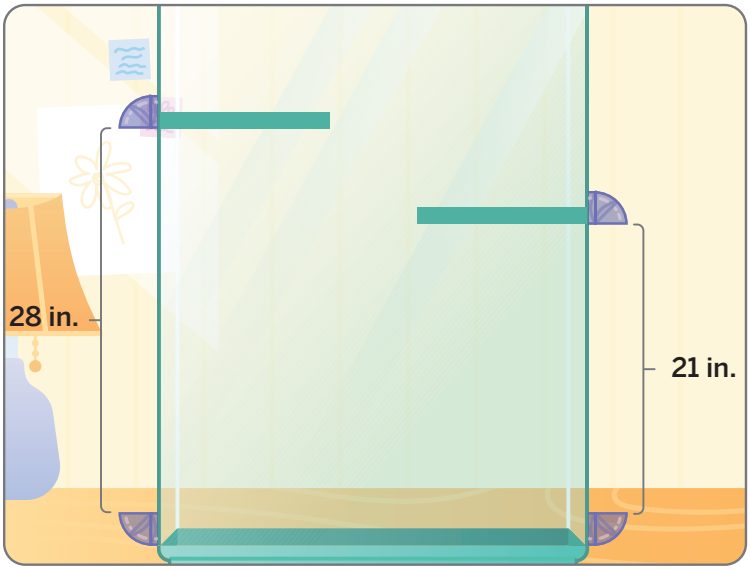
Do you agree with Mel, Kaylee, both, or neither? Why?

Activity 2

Name _____ Date _____

Making Tunnels

6 Han created a hamster home with platform heights of 28 inches and 21 inches.



7 Write the tube lengths and number of tubes that could connect to a platform with a height of 28 inches.

Tube length (in.)	Number of tubes

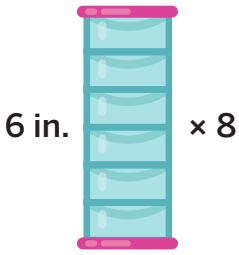
Name _____ Date _____

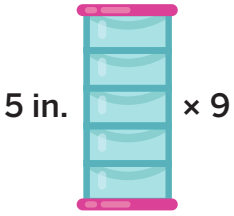
Making Tunnels (continued)

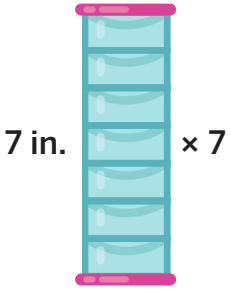
8 Write the tube lengths and number of tubes that could connect to a platform with a height of 21 inches.

Tube length (in.)	Number of tubes

9 Mel's hamster home has a platform with a height of 48 inches. Circle *all* the sets of tubes that Mel could use to connect to the platform. Explain your thinking.





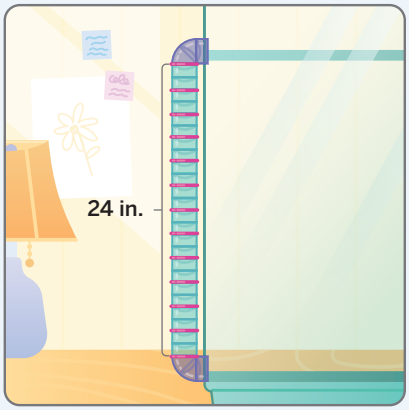


Summary 1.09

Factors and multiples can be used to solve real-world problems involving equal groups.

Mel determined that tube lengths of 2 inches, 3 inches, 4 inches, and 6 inches connected to a platform with a height of 24 inches.

Tube lengths of 8 inches or 12 inches could also connect to a platform with a height of 24 inches.



Practice 1.09

Use the information for Problems 1 and 2.

Blue pens are sold in packs of 5 and black pens are sold in packs of 6. Select which color pen a student should buy to have no extras.

Show or explain your thinking.

1. Jada wants to buy 48 of the same color pen for her class.

blue **black**

2. Han wants to buy 55 of the same color pen for his class.

blue **black**

Name _____ Date _____

Use the numbers 14 and 35 for Problems 3 and 4.

3 List *all* the factors of 14 and 35.

factors of 14: _____

factors of 35: _____

4 What are the common factors of 14 and 35?

_____

Use the information for Problems 5 and 6.

Eraser tops are sold in packs of 12 and pencils are sold in packs of 10. Clare's teacher needs 32 eraser tops and pencils for the class.

Show or explain your thinking.

5 How many packs of eraser tops does Clare's teacher need to buy?

answer: _____

6 How many packs of pencils does Clare's teacher need to buy?

answer: _____

Name _____ Date _____

7 Jada is building a bookshelf. She has 75 books and wants the same number of books on each shelf. How many shelves could Jada's bookshelf have? Select *all* that apply.

- ☐ **A.** 3
- ☐ **B.** 4
- ☐ **C.** 5
- ☐ **D.** 8
- ☐ **E.** 10
- ☐ **F.** 15

Spiral Review

For Problems 8–11, determine the value of the expression.

8 $100 \div 10$ _____

9 10×6 _____

10 $49 \div 7$ _____

11 $21 \div 3$ _____

12 Write a division equation for each pair of numbers in the table. Use a? for the unknown value. Then determine the solution to each equation.

	Division equation	Solution
26, 13		
8, 64		
20, 4		
15, 5		

Unit 1
Lesson
10

Name _____ Date _____

Factors and Area Models | 4.OA.4, SMP.3, SMP.6, SMP.7, SMP.8

Factor or Multiple?

Let's think about how factors and multiples are similar and different.

We are a math community. What does good listening look like and sound like in a math community?

Warm-Up

eyes on teacher

Activity 1 Factor and Multiple Statements

1 Use each number to fill in 1 of the blanks in each statement. Then use another number to make the statement true and complete both statements.

Number	Factor	Multiple
10	_____ is a factor of _____ because _____.	_____ is a multiple of _____ because _____.
7	_____ is a factor of _____ because _____.	_____ is a multiple of _____ because _____.

Name _____ Date _____

Factor and Multiple Statements (continued)

Number	Factor	Multiple
50	_____ is a factor of _____ because _____.	_____ is a multiple of _____ because _____.
16	_____ is a factor of _____ because _____.	_____ is a multiple of _____ because _____.

2 Discuss

Compare statements with your partner. What is similar about your statements? What is different?

Activity 2

Name _____ Date _____

Introducing the Center, Related Numbers

Stage 2

Pairs Let's determine the factors and multiples for a given number.

You'll need: 100 base-ten units, Gameboard, Recording Sheet,

Set Up Each player needs 50 cubes.

How to Play

1. **Player A:** Cover up an even number that is less than 50.
2. **Player B:** Cover up a factor or multiple of the number your partner covered.
3. Take turns covering numbers that are factors or multiples of the number your partner last covered. The round ends when there are no more factors or multiples of the number remaining.
4. The last player to cover a number in each round earns 1 point. Record your scores.

How to Win The player with more points after 10 rounds wins.

CENTER
Recording Sheet

Name _____ Date _____

Related Numbers (continued)

Round	Player A's score	Player B's score
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		

Summary 1.10

Depending on the relationship between given numbers, the same number can be a factor and a multiple.

20 is a multiple of 5: 5, 10, 15, 20

20 is a factor of the following numbers:
20, 40, 60, 80, . . .

Practice 1.10

1 List *all* the factors of 24.

2 List *all* the factors of 36.

3 List *all* the numbers that are factors of both 24 and 36.

4 List *all* the multiples of 6 that are less than or equal to 50.

Name _____ Date _____

5 List *all* the multiples of 9 that are less than or equal to 50.

_____

6 List *all* the numbers less than or equal to 50 that are multiples of both 6 and 9.

_____

7 Select *all* the numbers that are multiples of both 6 and 10.

- ☐ **A.** 10
- ☐ **B.** 12
- ☐ **C.** 30
- ☐ **D.** 36
- ☐ **E.** 52
- ☐ **F.** 60

8 Select *all* the numbers that are factors of both 15 and 45.

- ☐ **A.** 1
- ☐ **B.** 3
- ☐ **C.** 5
- ☐ **D.** 9
- ☐ **E.** 15
- ☐ **F.** 45

Name _____ Date _____

Spiral Review

For Problems 9–13, determine the value of the expression.

9 8×6 _____

10 5×7 _____

11 2×12 _____

12 $15 \div 5$ _____

13 $42 \div 6$ _____

For Problems 14 and 15, determine the fraction represented on the number line.

14

_____

15

_____

Unit 1
Lesson
11

Name _____ Date _____

Factor and Area Models | 4.OA.4, SMP.6, SMP.7, SMP.8

Mystery Numbers

Let's describe and identify numbers.

I am a doer of math.
How does staying organized with your work help you as you are solving more challenging math problems?

Warm-Up

eyes on teacher

Activity 1

Finding the Matches

Hands-On

You will be given a set of cards with numbers and clues. Match each number with the set of clues that describes it.

1 Record your matches in the table.

Number	Clue

2 **Discuss**

- What did you notice about the clues?
- Which clues were most helpful for identifying the numbers? What made those clues helpful?

Activity 2

Name _____ Date _____

What Number Am I?

For Problems 3 and 4, choose a number from the table as your mystery number. Use the sentence frames to write 4 clues for each mystery number.

24	49	52
31	90	67

3 **mystery number:** _____

clues:

_____

_____

_____

_____

4 **mystery number:** _____

clues:

_____

_____

_____

_____

5 **Discuss**

Take turns reading your clues to your partner and having your partner guess your mystery numbers.

- Which clues that you or your partner wrote applied to multiple numbers?
- Which clues that you or your partner wrote applied to only your mystery numbers?

Summary 1.11

Numbers can be described and identified using information about their factors, multiples, and whether they are prime or composite.

21

21 is a multiple of 7.
3 is a factor of 21.
21 is a composite number.

Practice 1.11

1 Match the numbers with the given clues.

15	40	32

3 is a factor of this number. _____

This number has 6 factors. _____

This number is a multiple of 10. _____

2 Identify the mystery number using the clues.

- Clue 1: This number is composite.
- Clue 2: 8 is a factor of this number.
- Clue 3: 128 is a multiple of this number.
- Clue 4: This number is a multiple of 4.

mystery number: _____

Name _____ Date _____

3 Determine whether each number is a *multiple of 3*, a *factor of 36*, or *neither*. Place a check mark in the correct column.

	Multiple of 3	Factor of 36	Neither
4			
6			
10			
12			
13			

4 Choose a mystery number between 20 and 50. Write 4 clues for your mystery number.

mystery number: _____

Clue 1: _____

Clue 2: _____

Clue 3: _____

Clue 4: _____

5 Consider the mystery number 31. Write 4 clues for the mystery number. 3 clues should be true and 1 clue should be false.

true: _____

true: _____

true: _____

false: _____

Name _____ Date _____

6 Determine whether each clue is true or false for the number 51. Select True or False for each clue.

	True	False
51 is prime.		
102 is a factor of 51.		
3 is a multiple of 51.		
51 is a multiple of 17.		

Spiral Review

For Problems 7–10, determine the value of the expression.

7 9×8 _____

8 $18 \div 2$ _____

9 6×3 _____

10 $45 \div 9$ _____

For Problems 11 and 12, plot and label the fraction on the number line.

11 $\frac{1}{4}$

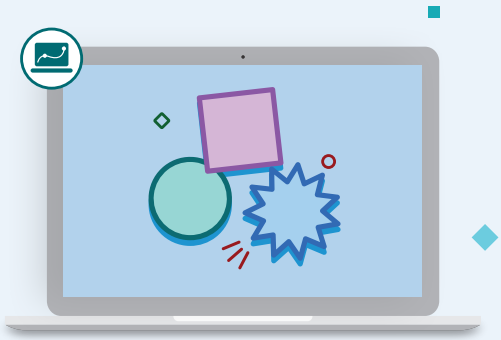
12 $\frac{3}{8}$

Name _____ Date _____

Factors and Area Models | 4.OA.4, SMP.6, SMP.7

A Number Game

Let's play a game with numbers.



Warm-Up

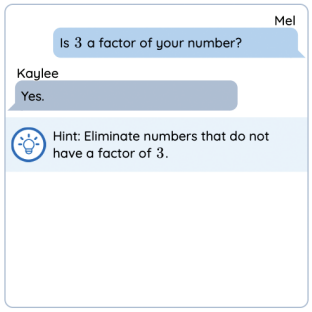
1 eyes on teacher

I can be all of me in math class.
What is something you are proud of from your work today?

Activity 1 Mel and Kaylee's Game

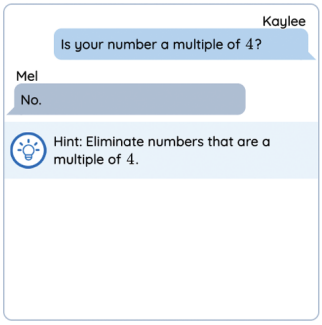
Mel and Kaylee are playing a game. Each screen represents a new round of the game. They ask questions to guess a mystery number and eliminate numbers that do not fit by using each other's answers.

2 Using Kaylee's answer, cross out the cards Mel should eliminate.



20	24	17
15	35	12

3 Using Mel's answer, cross out the cards Kaylee should eliminate.

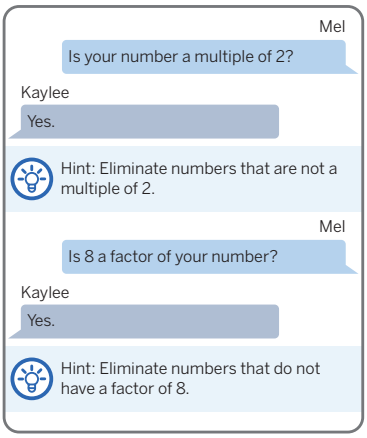


20	24	17
15	35	12

Name _____ Date _____

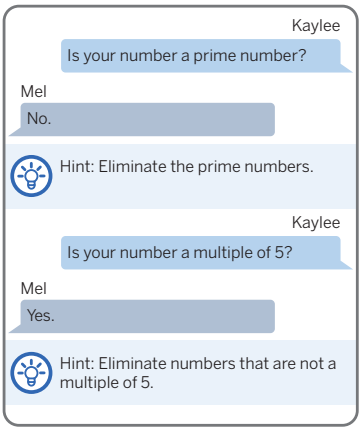
Mel and Kaylee's Game (continued)

4 Using Kaylee's answers, cross out the cards that Mel should eliminate.



20	24	17
15	35	12

5 Using Mel's answers, cross out the cards that Kaylee should eliminate.



20	24	17
15	35	12

5 Discuss

What could Kaylee ask next?

Activity 2

Name _____ Date _____

What's the Number?

To play the game, you and your partner will each choose a mystery number from the gameboard. Both of you will ask questions about each other's mystery numbers. Use the gameboard to eliminate numbers and identify the mystery numbers. Record your questions and your partner's answers as you take turns.

6 Round 1

Question	Answer
1.	
2.	
3.	
4.	

My partner's mystery number: _____

Which question would help you decide between the numbers 52 and 35? Select *all* that apply.

(A) Is 4 a factor?

(B) Is 5 a factor?

(C) Is 70 a multiple?

(D) Is the number composite?

Name _____ Date _____

What's the Number? (continued)

7 Round 2

Question	Answer
1.	
2.	
3.	
4.	

My partner's mystery number: _____

Write a question that could help you decide between the numbers 67 and 70.

_____

_____

8 Discuss

What did you notice about the questions that were asked during the game?

Summary 1.12

Factors, multiples, and prime and composite numbers can be used to describe whole numbers between 1 and 100 and how they are related to one another.

48 is a composite number.

Factor	1	2	3	4	6	8	12	16	24	48
Multiple	48	96								

Practice 1.12

For Problems 1 and 2, use the numbers 60 and 72.

1 List *all* the factors of 60 and 72.

factors of 60: _____

factors of 72: _____

2 What are the common factors of 60 and 72?

_____

3 List 5 multiples of 15.

_____

4 List *all* the factors of 18.

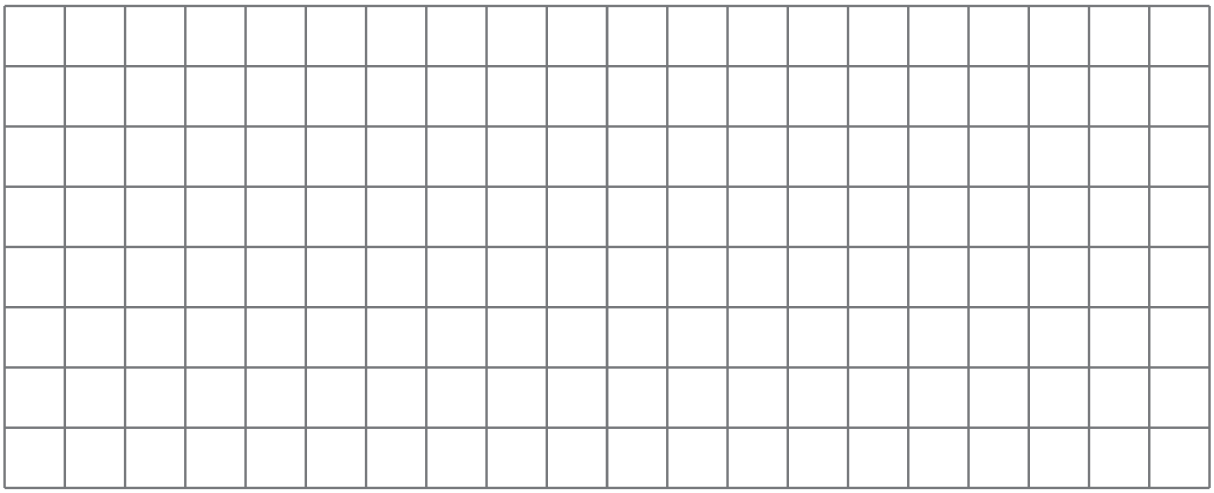
_____

Name _____ Date _____

5 Determine whether each number is a *factor of 12*, a *multiple of 12*, or *neither*. Place a check mark in the correct column.

Number	Factor of 12	Multiple of 12	Neither
3			
4			
5			
6			
8			
10			
12			
24			
74			

6 Use the grid to draw *all* the possible rectangles with an area of 20 square units. Each grid square has an area of 1 square unit.



Name _____ Date _____

7 Determine whether each statement is true or false. Select True or False for each statement.

	True	False
17 is a prime number.		
22 is a prime number.		
36 is a multiple of 18.		
48 is a factor of 24.		
The only factor pairs of 21 are 1 and 21.		

Spiral Review

For Problems 8–11, determine the value of the expression.

8 $60 \div 10$ _____

9 9×2 _____

10 12×12 _____

11 $77 \div 11$ _____

For Problems 12 and 13, plot and label the fraction $\frac{1}{2}$ on the number line.

12

13

Math at Work

Do you think 56,411 is a prime number? It's hard to know, even for computers!

Cryptographers apply prime numbers to develop codes to help businesses send messages or store information. Codes that use prime numbers help protect the information because the codes are very challenging to break.

El Nariz/Shutterstock.com. PopTika/Shutterstock.com.

Math in the World

Some types of cicadas come out to lay their eggs every 7, 13, or 17 years – all prime numbers! Some scientists think this is because there are fewer years where multiple types of cicadas come out at the same time. Why do you think that might matter?

Mary Terriberry/Shutterstock.com

Math Mindset

How are multiples of numbers related to patterns?

Unit 2

Fraction Equivalence and Comparison

Big Ideas in This Unit

CC3 Fraction Flexibility | Visual Fraction Models

Questions for Investigation

- How do you know whether 2 fractions are equivalent without drawing a model?
- How can you use visual fraction models to compare fractions made of different-sized parts?

Explore: Building Your Own Number Line

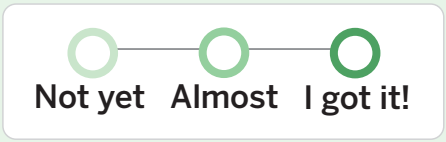
How can you use the fewest number of points to represent different types of fractions on a number line?

Unit Story: One Step at a Time

In this story, Ingrid overcomes challenges as she trains for a race.

Watch Your Knowledge Grow

This is the math you'll explore in this unit. Rate your understanding to see how your knowledge grows!



I can . . .	Before	After
Explain why 2 fractions are equivalent using fraction strips.		
Show that a fraction with a numerator greater than 1 can be made by adding up unit fractions.		
Recognize when 2 fractions with different numerators and denominators are equal to each other.		
Generate fractions with different numerators and denominators that are equal to each other.		
Generate visual fraction models to justify whether a fraction is greater than, equal to, or less than another fraction.		
Compare 2 fractions by saying one is less than or greater than another.		
Compare fractions with different numerators and different denominators.		

Sub-Unit

1

Size and Location of Fractions

Unit Story: One Step at a Time

romakoma/Shutterstock.com

Gavin suggests that Ingrid count street lamps as she runs. What are some other landmarks that are often equally spaced apart?

Name _____ Date _____

Visual Fraction Models | Building Toward 4.NF.1, 4.NF.2, SMP.1, SMP.6, SMP.7

Explore: Building Your Own Number Line

How can you use the fewest number of points to represent different types of fractions on a number line?

Warm-Up

eyes on teacher

I am a doer of math.
What motivates you to participate in mathematical activities or explorations?

Discuss What do you notice? What do you wonder?

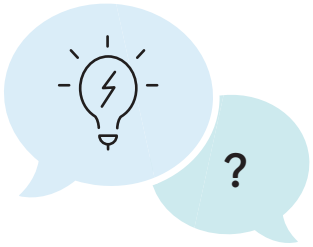
Activity

Name _____ Date _____

Work with your group to create your own number line. Plot the fewest number of points so that your number line includes each type of fraction listed.

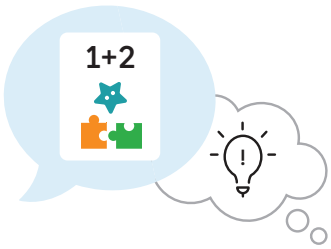
Ways to be a mathematician

1 I can explain why my thinking makes sense and ask questions to understand the thinking of others.



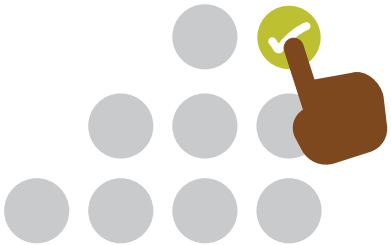
Not yet Almost I got it!

2 I can work carefully and try to be clear when I share my ideas.



Not yet Almost I got it!

3 I can see how ideas are connected and use patterns to help solve problems.



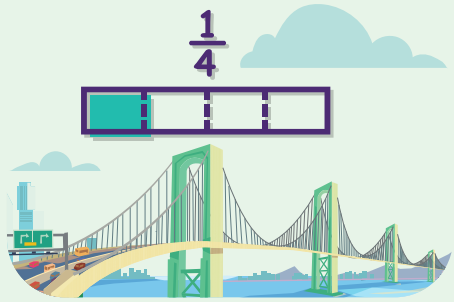
Not yet Almost I got it!

Name _____ Date _____

Visual Fraction Models | 4.NF.3, SMP.3, SMP.6, SMP.7, SMP.8

Fraction Strips

Let's use representations to look at relationships between unit fractions and non-unit fractions.



Warm-Up

eyes on teacher

I am a doer of math.
In what ways have you been creative in math class?

Activity 1 Creating Fraction Strips

Hands-On

You will be given a set of paper strips.

1. Each strip represents 1 whole. Represent *halves*, *fourths*, and *eighths* on the blank strips. Use 1 strip for each fraction and label each part with the fraction it represents.

Name _____ Date _____

Creating Fraction Strips (continued)

Use your fraction strips to complete Problems 2–4.

2 What do you notice about $\frac{1}{4}$ and $\frac{1}{2}$? How is $\frac{1}{4}$ related to $\frac{1}{2}$?

3 What do you notice about $\frac{1}{8}$ and $\frac{1}{4}$? How is $\frac{1}{8}$ related to $\frac{1}{4}$?

4 What do you notice about $\frac{1}{8}$ and $\frac{1}{2}$? How is $\frac{1}{8}$ related to $\frac{1}{2}$?

5 **Discuss**

What patterns do you notice in the relationships between the fractions?

Activity 2

Name _____ Date _____

Using Fraction-Strip Diagrams

Each fraction-strip diagram represents 1 whole that has been equipartitioned.

Fraction strip A

Fraction strip B

Write an expression using unit fractions that represents the sum of the whole fraction strip.

6 Fraction strip A: _____

7 Fraction strip B: _____

8 **Discuss**

What is the same about these expressions? What is different?

Name _____ Date _____

Using Fraction-Strip Diagrams (continued)

Shade the fraction-strip diagram to represent the fraction. Then write an expression for the shaded part of the fraction-strip diagram as a sum of unit fractions. Be prepared to explain your thinking.

Draw

9 $\frac{3}{6}$

answer: _____

10 $\frac{5}{12}$

answer: _____

11 $\frac{2}{3}$

answer: _____

Summary 2.02

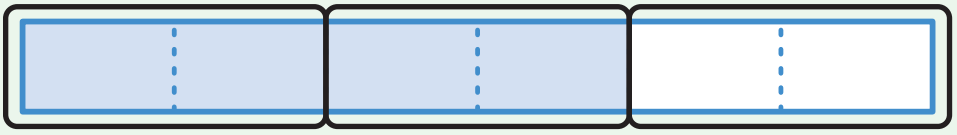
Fractions with related denominators can be represented on the same fraction strip by **equipartitioning** or combining given parts. Non-unit fractions can be represented with expressions as a sum of unit fractions.

Split each $\frac{1}{6}$ into 2 equal parts. Each part then represents $\frac{1}{12}$. Shade 4 parts to show $\frac{4}{12}$.

Expression:

$\frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12}$

Combine two $\frac{1}{6}$ to show $\frac{1}{3}$. Shade 2 parts to show $\frac{2}{3}$.



Expression:

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

equipartition To partition into equal parts

Practice 2.02

For Problems 1 and 2, write a unit fraction that represents the size of 1 part in each fraction strip.

1

_____

2

_____

Name _____ Date _____

3 Which fraction is represented by the shaded part on the diagram?

(A) $\frac{1}{4}$

(B) $\frac{1}{3}$

(C) $\frac{1}{6}$

(D) $\frac{1}{5}$

For Problems 4–6, shade the fraction-strip diagram to represent the fraction. Then write an expression for the shaded part of the fraction-strip diagram as a sum of unit fractions.

Draw

4 $\frac{4}{10}$

answer: _____

5 $\frac{3}{8}$

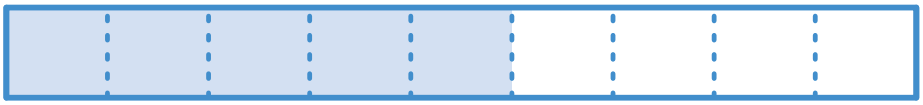
answer: _____

6 $\frac{7}{8}$

answer: _____

Name _____ Date _____

7 Which expression represents the shaded part of the fraction strip?



A $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9}$

B $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$

C $\frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7}$

D $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$

Spiral Review

For Problems 8–12, determine the value of the expression.

8 4×3 _____

9 $24 \div 3$ _____

10 $42 \div 7$ _____

11 3×3 _____

12 20×5 _____

13 There are 5 badminton teams in the gym. Each team has 8 players. How many badminton players are there altogether?

Show your thinking.

answer: _____

Name _____ Date _____

Visual Fraction Models | Building Toward 4.NF.1, SMP.7

Chop It

Let's locate fractions on number lines.

I am a doer of math.
Ingrid faced challenges during her training. How can you overcome obstacles in your math work today?

Warm-Up

1 eyes on teacher

Activity 1 Locating Fractions

2 Locate and label $\frac{1}{4}$ on the number line. Use the fraction strip if it is helpful.

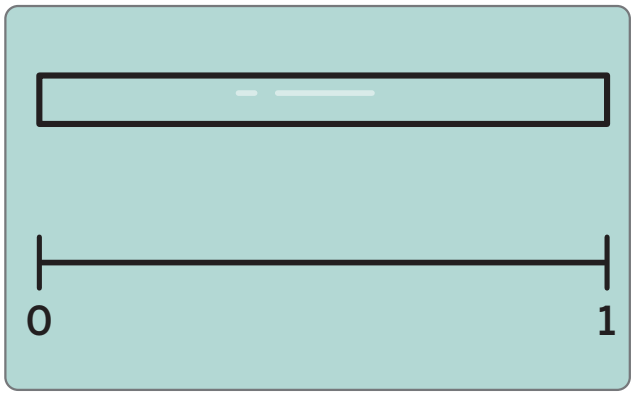
3 **Discuss**

Describe your strategy for locating $\frac{1}{4}$ on the number line.

Name _____ Date _____

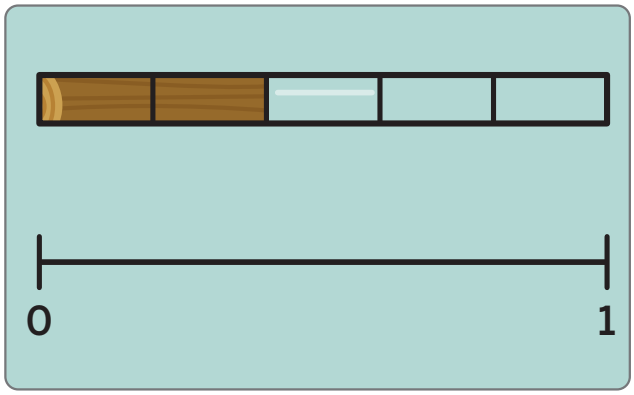
Locating Fractions (continued)

4 Locate and label $\frac{2}{3}$ on the number line. Use the fraction strip if it is helpful.



5 **Discuss**

- What fraction is represented on the fraction strip?
- How can you represent that fraction on the number line?



Activity 2

Name _____ Date _____

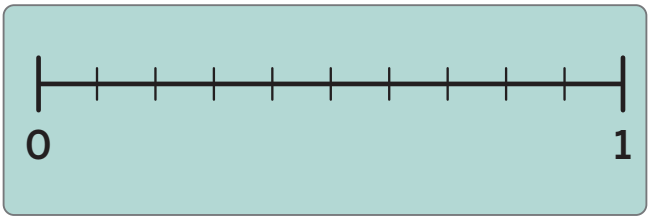
Locating More Fractions

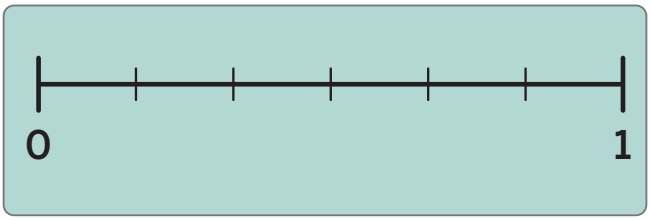
6 Locate and label $\frac{3}{5}$ on the number line. Use the fraction strip if it is helpful.

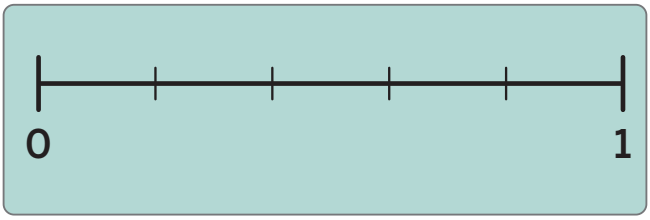
7 Locate and label the following fractions on a number line.

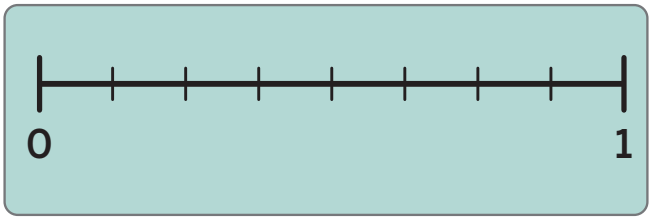
$\frac{1}{5}$ $\frac{7}{8}$ $\frac{5}{10}$

Choose the number line you think is appropriate to use for each fraction.





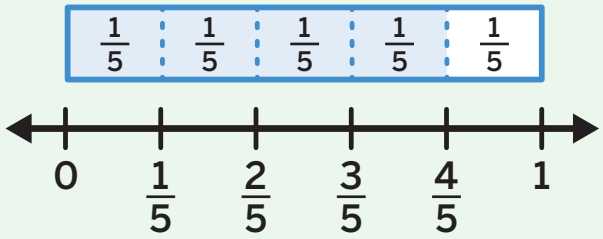




Summary 2.03

Number lines can be used to represent fractions by equipartitioning the whole into the number of parts represented by the denominator and locating the fraction at the tick mark that represents the distance from 0 to the fraction.

Locate $\frac{4}{5}$ on the number line.



Practice 2.03

For Problems 1 and 2, locate and label the fraction on the number line.

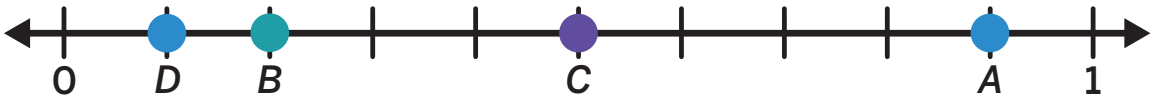
1 $\frac{6}{10}$

2 $\frac{7}{12}$

3 Locate and label $\frac{6}{8}$ on the number line.

Name _____ Date _____

For Problems 4–7, write a fraction to represent the point shown on the number line.



4 **point *A*:** _____

5 **point *B*:** _____

6 **point *C*:** _____

7 **point *D*:** _____

8 Which point on the number line is located at $\frac{3}{8}$?

(A) point *A*

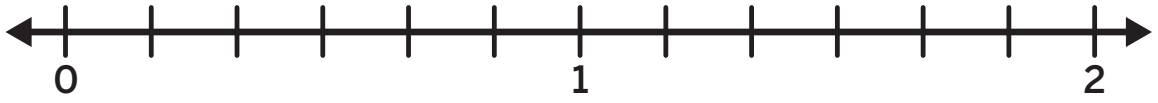
(B) point *B*

(C) point *C*

(D) point *D*

Name _____ Date _____

9 It is estimated that 24% of beaches are eroding at a rate of $\frac{3}{6}$ meters per year. Locate and label $\frac{3}{6}$ on the number line.



Spiral Review

For Problems 10–14, determine the value of the expression.

10 8×4 _____

11 7×8 _____

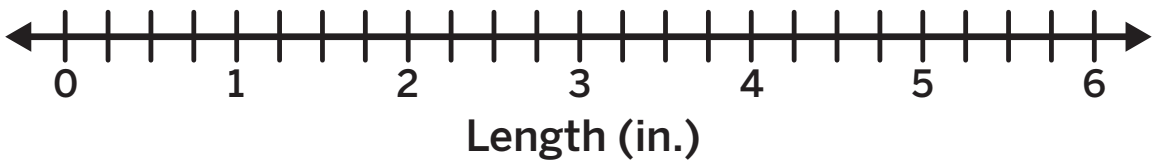
12 $27 \div 9$ _____

13 $48 \div 6$ _____

14 $60 \div 5$ _____

15 Here are the lengths, in inches, of several pieces of ribbon in Clare's collection. Represent the data on the line plot.

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



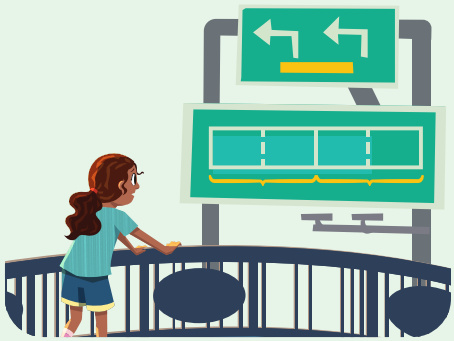
Unit 2
Lesson
4

Name _____ Date _____

Visual Fraction Models 4.NF.3, SMP.3, SMP.6, SMP.7

All Kinds of Fractions

Let's represent fractions greater than 1 and fractions with different denominators.



I am a doer of math.
How can you be flexible if you face challenges today in math class?

Warm-Up

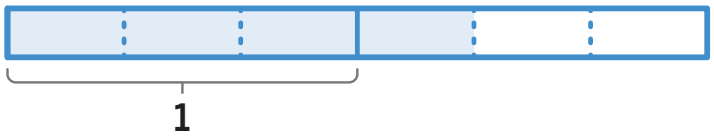
eyes on teacher

Activity
1

Diagrams for Other Fractions

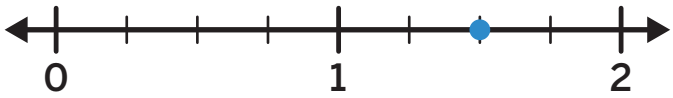
Write a fraction and an expression to represent the shaded part of the fraction strip or the point on the number line.

1



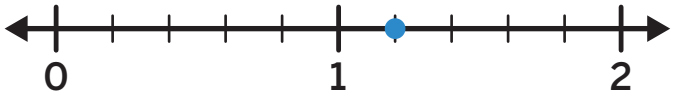
fraction: _____ expression: _____

2



fraction: _____ expression: _____

3



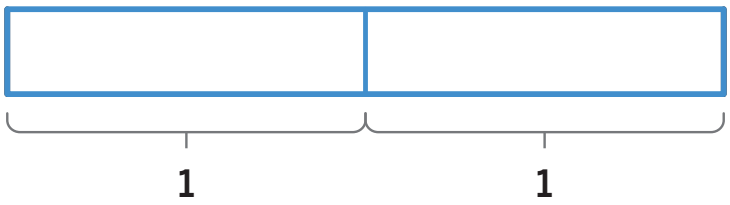
fraction: _____ expression: _____

Name _____ Date _____

Diagrams for Other Fractions (continued)

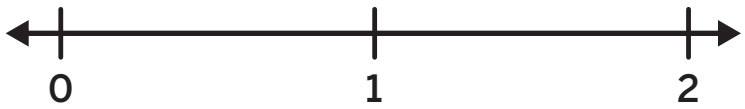
For Problems 4 and 5, partition the fraction-strip diagram or number line to represent and locate the fraction. Then write an expression to represent the fraction.

4 $\frac{3}{2}$



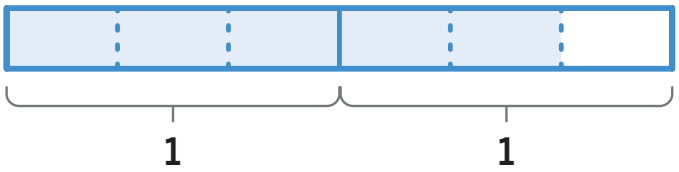
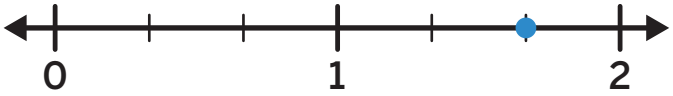
expression: _____

5 $\frac{8}{6}$



expression: _____

6 Diego, Jada, and Han each represented the fraction $\frac{5}{3}$.

Diego	
Jada	
Han	$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$

Discuss

- How does each representation show $\frac{5}{3}$?
- Where do you see the unit fraction $\frac{1}{3}$ in each representation?
- Where do you see the numerator of 5 in each representation?

Activity 2

Name _____ Date _____

Fractions on a Number Line

7 Label *all* the tick marks on each number line.

Name _____ Date _____

Fractions on a Number Line (continued)

8 Discuss

Locate $\frac{1}{6}$ on one of the number lines and mark it with a point.

- Explain to your partner why you chose the number line you did.
- Is there another number line that also would have worked? How do you know?

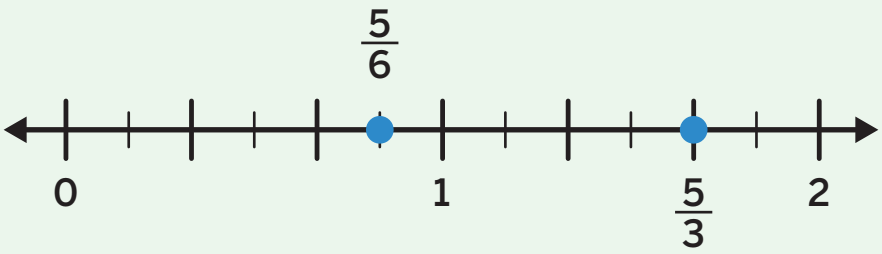
9

Locate and label the following fractions on the number lines. You may use a different number line for each fraction or the same number line for more than one of the fractions.

- $\frac{4}{10}$
- $\frac{3}{8}$
- $\frac{4}{6}$
- $\frac{1}{2}$

Summary 2.04

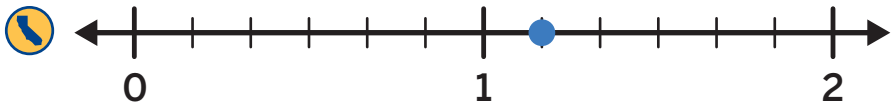
Number lines can be used to represent fractions that are less than 1 and fractions that are greater than 1. Fractions with different denominators can be represented on the same number line.



Practice 2.04

For Problems 1 and 2, select the expression that represents the point on the number line.

1



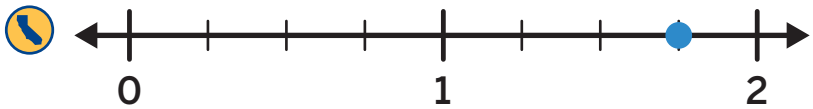
A $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$

B $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}$

C $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}$

D $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}$

2



A $\frac{1}{7}+\frac{1}{7}+\frac{1}{7}+\frac{1}{7}$

B $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$

C $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$

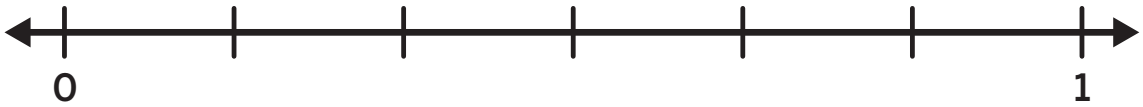
D $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$

Name _____ Date _____

For Problems 3–5, locate and label the fractions on the number line and mark them with a point.

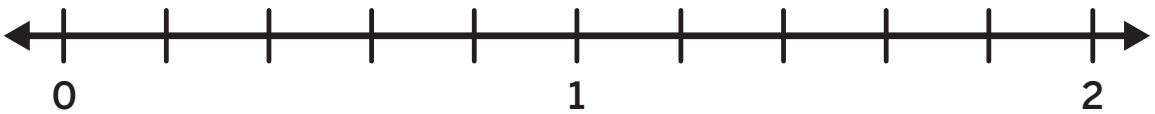
3 $\frac{3}{5}, \frac{5}{5}, \frac{1}{10}, \frac{7}{10}$

4 $\frac{2}{12}, \frac{9}{12}, \frac{5}{6}, \frac{3}{6}$



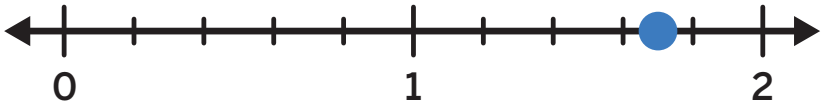
5 $\frac{2}{8}, \frac{7}{8}, \frac{2}{4}, \frac{3}{4}$

6 Diego found 2 arrowheads while hiking. The lengths of the arrowheads are $\frac{13}{10}$ inches and $\frac{7}{5}$ inches. Mark each length on the number line. Explain your thinking.



Name _____ Date _____

7 What fraction is represented by the point on the number line?



_____

Spiral Review

For Problems 8–13, determine the value of the expression.

8 18 ÷ 6 _____

9 80 ÷ 8 _____

10 12 × 6 _____

11 4 × 4 _____

12 100 ÷ 5 _____

13 7 × 9 _____

There are 72 soccer players practicing on a field. Each team has 12 players. How many soccer teams are practicing? Use the story problem for Problems 14 and 15.

14 Write a multiplication equation with a ? for the unknown that represents the story problem.

_____

15 Solve the problem.

_____

Notes:

Sub-Unit

2

Equivalent Fractions

Unit Story: One Step at a Time

Traveller70/Shutterstock.com

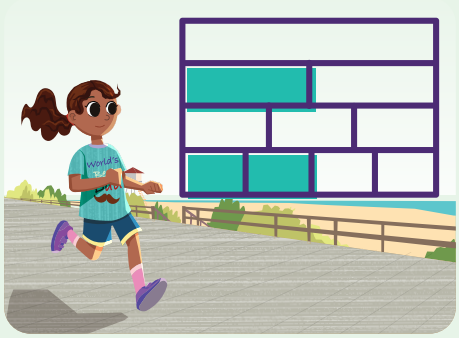
Ingrid found different landmarks to count at each training location. What might be the pros and cons of counting objects that are closer together or farther apart?

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.1, SMP.1, SMP.6, SMP.7

How Far Did Ingrid Run?

Let's find some fractions that are the same size.



I am a doer of math.
With practice, Ingrid got better at running. How can practice help you get better at math?

Warm-Up

eyes on teacher

Activity 1

Same Size, Different Numbers

Use the diagram showing several fraction strips for Problems 1–6.

1											
$\frac{1}{2}$						$\frac{1}{2}$					
$\frac{1}{3}$				$\frac{1}{3}$				$\frac{1}{3}$			
$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$		
$\frac{1}{5}$		$\frac{1}{5}$			$\frac{1}{5}$			$\frac{1}{5}$			$\frac{1}{5}$
$\frac{1}{6}$			$\frac{1}{6}$			$\frac{1}{6}$			$\frac{1}{6}$		
$\frac{1}{8}$				$\frac{1}{8}$				$\frac{1}{8}$			
$\frac{1}{10}$					$\frac{1}{10}$					$\frac{1}{10}$	
$\frac{1}{12}$						$\frac{1}{12}$					

Name _____ Date _____

Same Size, Different Numbers (continued)

1 Write a fraction that is equivalent to $\frac{1}{6}$. _____

2 Write a fraction that is equivalent to $\frac{2}{10}$. _____

3 Write a fraction that is equivalent to $\frac{3}{3}$.

_____

For Problems 4 and 5, choose fractions that are different from the ones given in Problems 1–3.

4 Choose a *unit fraction* that is represented on the diagram. _____

List *all* the equivalent fractions you can find using the diagram.
If there are no equivalent fractions possible, write *none*.

_____

5 Choose a *non-unit fraction* that is represented on the diagram. _____

List *all* the equivalent fractions you can find using the diagram.
If there are no equivalent fractions possible, write *none*.

_____

6 **Discuss**

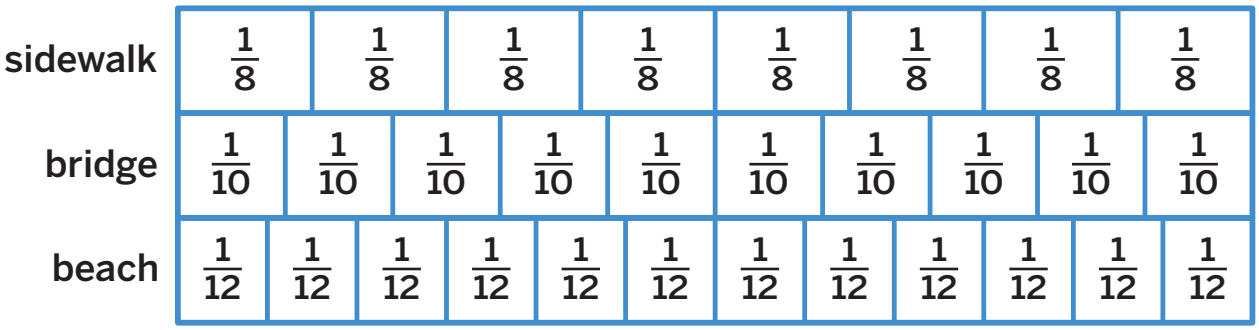
How do you know that 2 fractions are equivalent when they are represented on a diagram like this?

Activity 2

Name _____ Date _____

How Far to Run?

Ingrid used markers to keep track of the distances of her runs at different locations. The fraction strips represent the markers she used. Each fraction strip represents 1 mile.



7 If Ingrid ran $\frac{2}{8}$ of a mile along the sidewalk, how many *twelfths* of a mile would she need to run at the beach in order to run the same distance?

_____

8 Ingrid wants to run the same distance at all 3 locations, but she is not ready to run a full mile. Determine what distance she could run at all 3 locations that would be equal in length.

Location	Distance
sidewalk	
bridge	
beach	

Name _____ Date _____

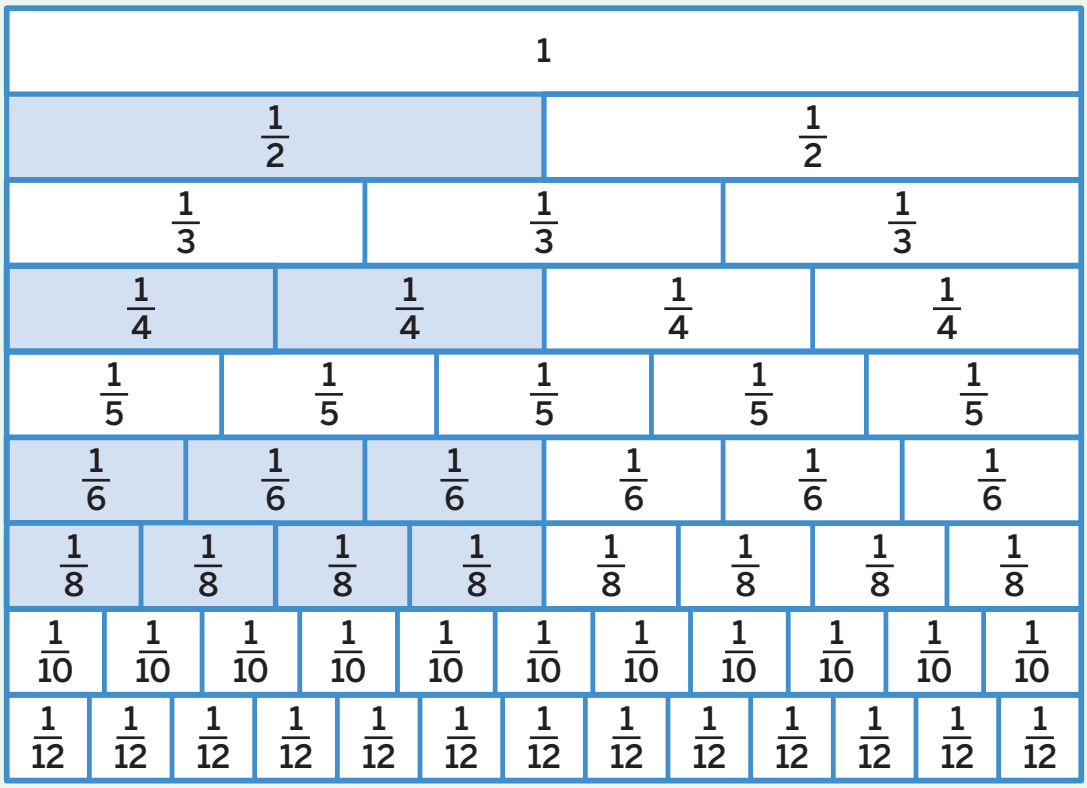
How Far to Run? (continued)

9 Discuss

One week, Ingrid ran $\frac{6}{8}$ of a mile on the sidewalk, $\frac{8}{10}$ of a mile on the bridge, and $\frac{9}{12}$ of a mile at the beach. Did she run the same distance at any of the locations that week? How do you know?

Summary 2.05

Fraction-strip diagrams can be used to identify equivalent fractions that have the same value.



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

Practice 2.05

1 Use the fraction strips in the Summary to name 3 different pairs of equivalent fractions. Explain how you know the fractions are equivalent.

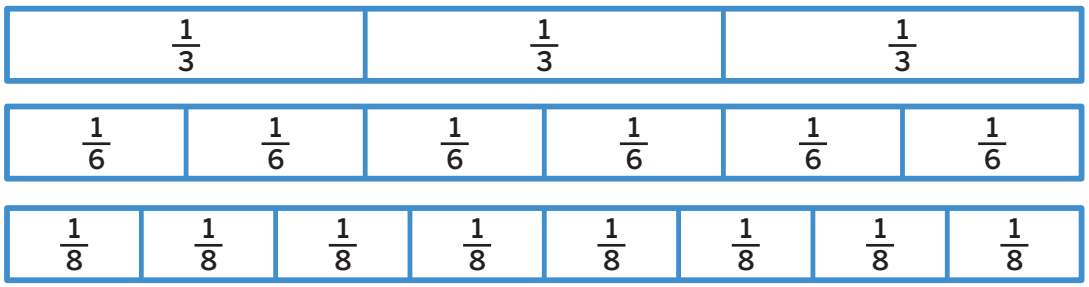
Name _____ Date _____

2 Ingrid ran $\frac{5}{8}$ of a mile on the sidewalk one day, and she ran $\frac{7}{10}$ of a mile on the bridge the next day. Did she run the same distance at each location?

Show or explain your thinking.

answer: _____

3 Here is a diagram showing 3 fraction strips.



Determine whether each statement is *true* or *false*. Place a check mark in the correct column.

	True	False
$\frac{2}{3}$ is equivalent to $\frac{5}{8}$.		
$\frac{3}{6}$ is equivalent to $\frac{4}{8}$.		
$\frac{8}{8}$ is equivalent to $\frac{6}{6}$.		
$\frac{3}{6}$ is equivalent to $\frac{3}{3}$.		

Name _____ Date _____

4 Determine which pairs are equivalent fractions. Select *all* that apply.

- ☐ **A.** $\frac{2}{5}$ and $\frac{6}{10}$
- ☐ **B.** $\frac{4}{5}$ and $\frac{9}{10}$
- ☐ **C.** $\frac{8}{10}$ and $\frac{4}{5}$
- ☐ **D.** $\frac{6}{10}$ and $\frac{3}{5}$
- ☐ **E.** $\frac{4}{10}$ and $\frac{1}{5}$
- ☐ **F.** $\frac{5}{5}$ and $\frac{10}{10}$

Spiral Review

For Problems 5–8, determine the value of the expression.

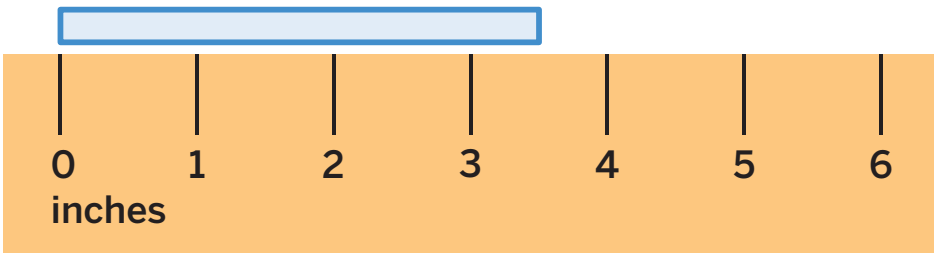
5 $40 \div 10$ _____

6 6×10 _____

7 $54 \div 6$ _____

8 11×8 _____

9 Partition the ruler into halves of an inch. What is the length of the rectangle?



_____

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.1, SMP.3, SMP.7, SMP.8

Can You Find Two?

Let's explore different representations we can use for equivalent fractions.

We are a math community.
How can we build a supportive math community where everyone feels valued?

Warm-Up

eyes on teacher

Activity 1 Two or More Fractions

Each fraction-strip diagram represents 1 whole.
Write *2 or more* equivalent fractions for the shaded part of each diagram.

Show your thinking.

1

answer: _____

2

answer: _____

Name _____ Date _____

Two or More Fractions (continued)

Write *2 or more* equivalent fractions that the point on each number line represents.

Show your thinking.

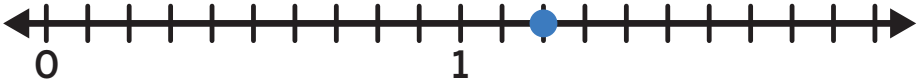
3

answer: _____

4

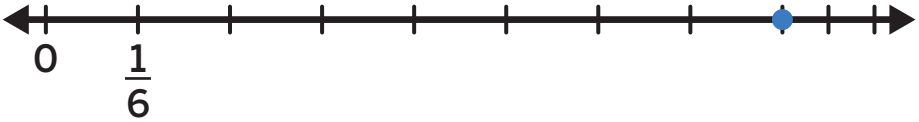
answer: _____

5



answer: _____

6



answer: _____

Activity 2

Name _____ Date _____

Using Visual Fraction Models

You and your partner will be assigned different fractions for Problems 7 and 8. For each of your assigned fractions, determine *2 more* equivalent fractions.

Use fraction-strip diagrams or number lines to show how the 3 fractions are equivalent. Include any notes, labels, or descriptions that might help others understand your thinking.

7 assigned fraction: _____

Show your thinking.

answer: _____

Name _____ Date _____

Using Visual Fraction Models (continued)

8 assigned fraction: _____

Show your thinking.

answer: _____

9 Discuss

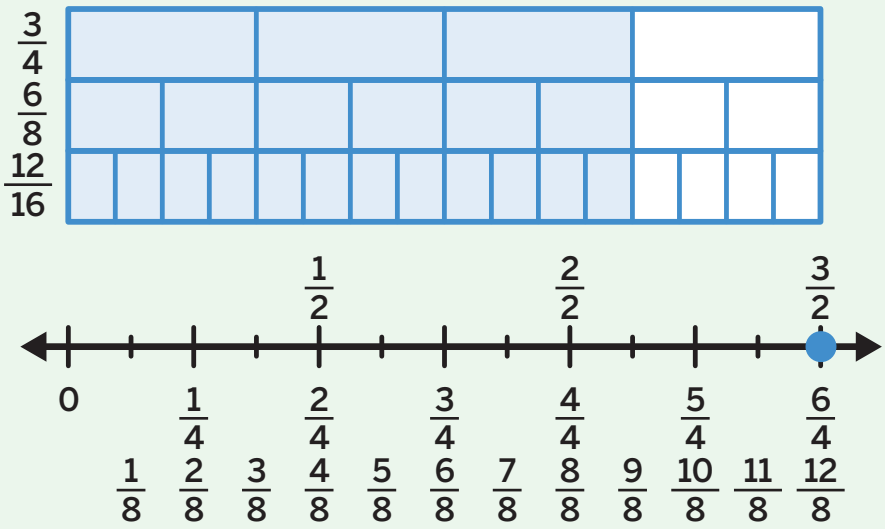
Share your visual fraction models with your partner.

- How do the models show that the fractions are equivalent?
- What is clear? What is confusing?

Use feedback from your partner to adjust your visual models.

Summary 2.06

Fraction-strip diagrams and number lines can be used to show that 2 or more fractions are equivalent.



Practice 2.06

1 Determine 2 fractions that are equivalent to $\frac{5}{3}$. Use a fraction-strip diagram or number line to show how the 3 fractions are equivalent.

Show your thinking.

answer: _____

Name _____ Date _____

2 Write 2 equivalent fractions that the point on the number line represents.

Show your thinking.

answer: _____

3 Use fraction-strip diagrams or number lines to show 2 fractions that are equivalent to $\frac{2}{4}$.

Show your thinking.

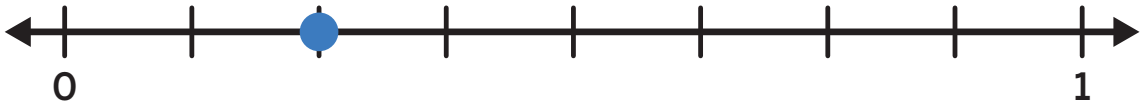
answer: _____

4 The fraction-strip diagram represents 1 whole. Select *all* the fractions that the shaded part of the diagram represents.

☐ **A.** $\frac{3}{4}$ ☐ **B.** $\frac{6}{10}$ ☐ **C.** $\frac{3}{8}$ ☐ **D.** $\frac{6}{8}$

Name _____ Date _____

5 Select *all* the fractions that are represented by the point on the number line.



☐ **A.** $\frac{1}{4}$ ☐ **B.** $\frac{2}{6}$ ☐ **C.** $\frac{2}{8}$ ☐ **D.** $\frac{3}{8}$

Spiral Review

For Problems 6–9, determine the value of the expression.

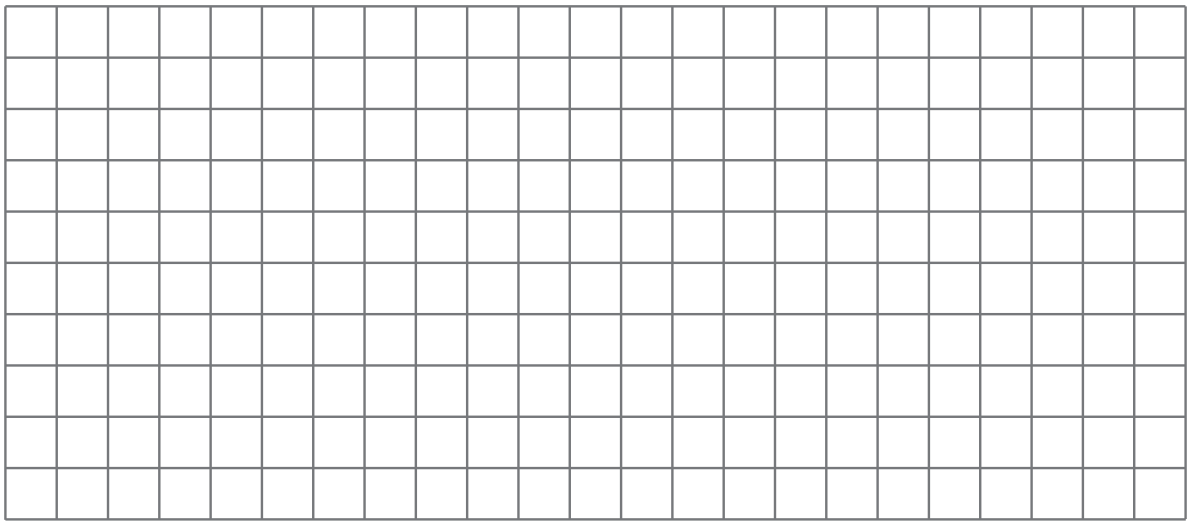
6 4×5 _____

7 7×4 _____

8 $16 \div 2$ _____

9 $36 \div 6$ _____

10 A garden bed has an area of 18 square feet. Draw *all* the possible lengths and widths of the garden bed. Label both side lengths of each garden bed.

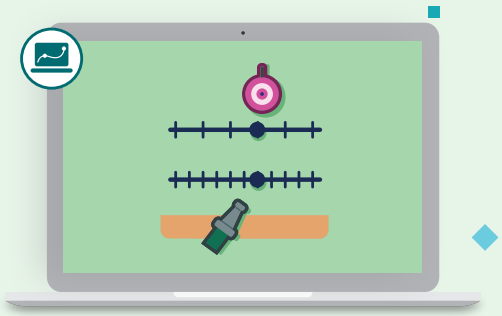


Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.1, SMP.3, SMP.8

At the Same Point

Let's explore how number lines can help us determine equivalent fractions.



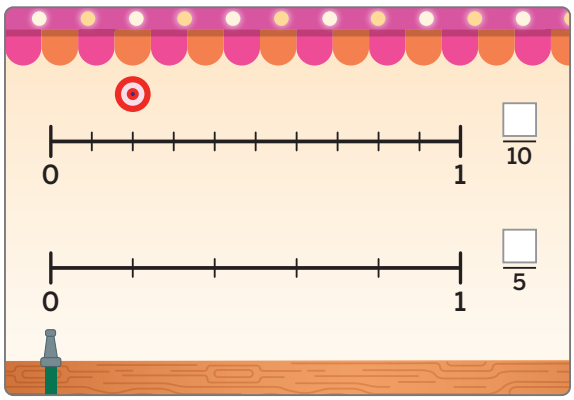
Warm-Up

1 eyes on teacher

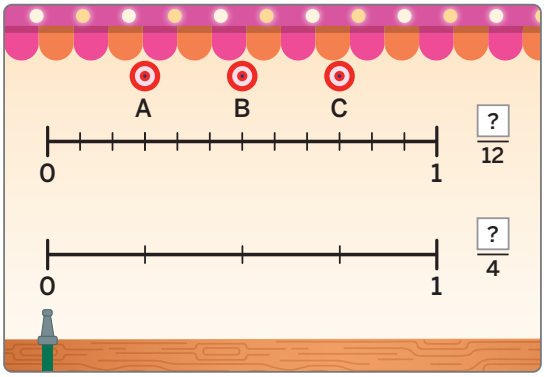
We are a math community.
How can you work together today to solve math problems?

Activity 1 Hit the Target

2 Determine a pair of equivalent fractions that will allow you to hit the target.



3 Determine a pair of equivalent fractions that will allow you to hit each target.

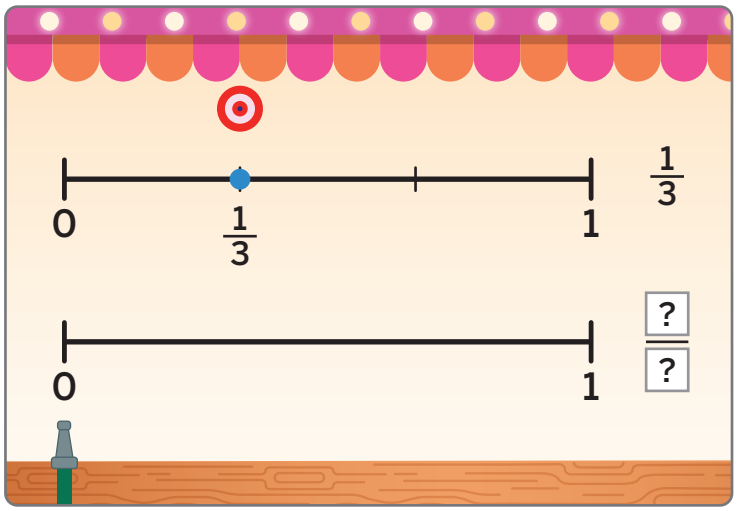


Target	Equivalent fractions
A	
B	
C	

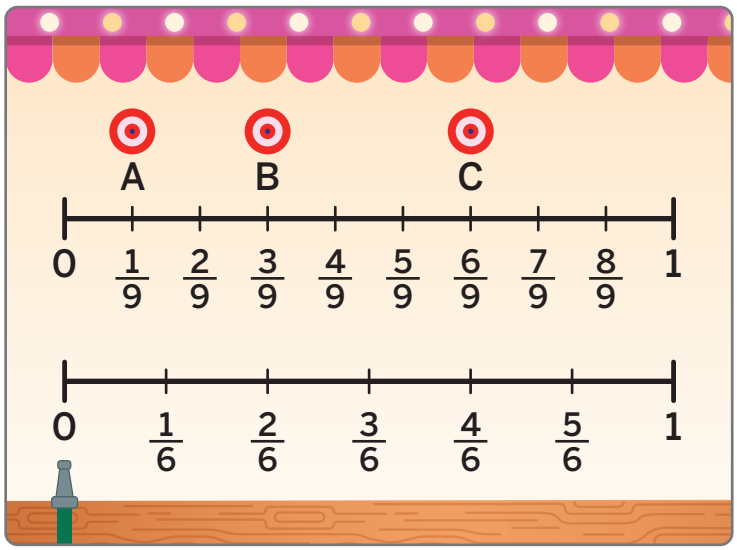
Name _____ Date _____

Hit the Target (continued)

4 Determine more than 1 fraction that is equivalent to $\frac{1}{3}$.



5 Make a prediction: Which targets will you be able to hit? Place a check mark next to those targets. Be prepared to explain your thinking.



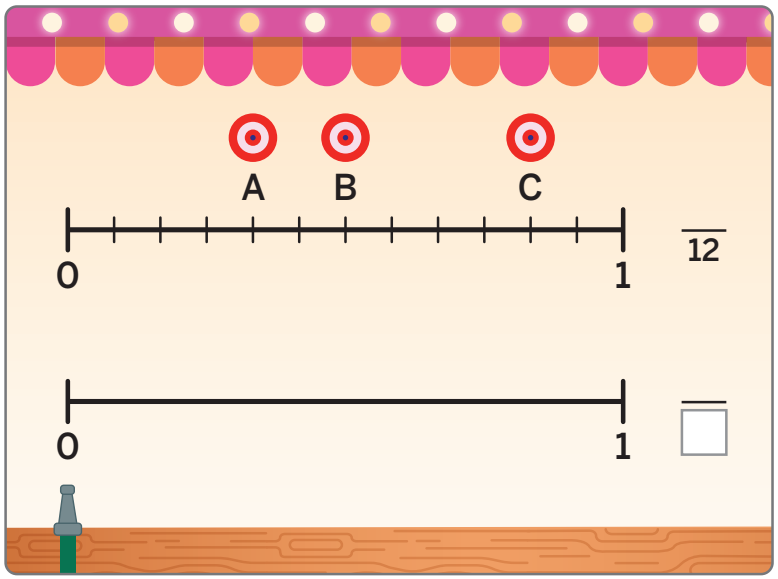
Target	Possible?
A	
B	
C	

Activity 2

Name _____ Date _____

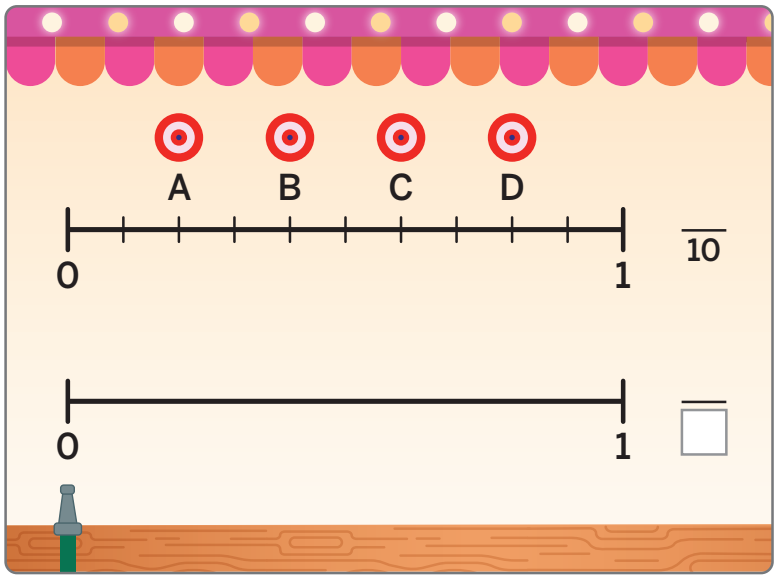
How Many Can You Hit?

6 Hit all 3 targets while keeping the same denominator for the bottom fraction.



Target	Equivalent fractions
A	
B	
C	

7 Hit all 4 targets while keeping the same denominator for the bottom fraction.

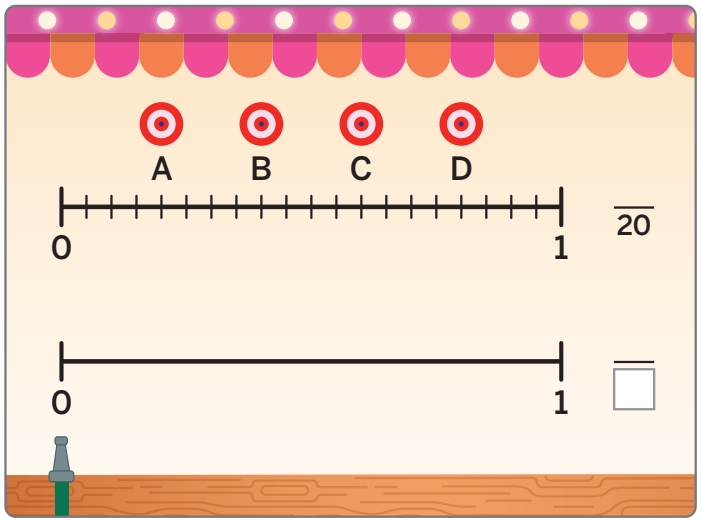


Target	Equivalent fractions
A	
B	
C	
D	

Name _____ Date _____

How Many Can You Hit? (continued)

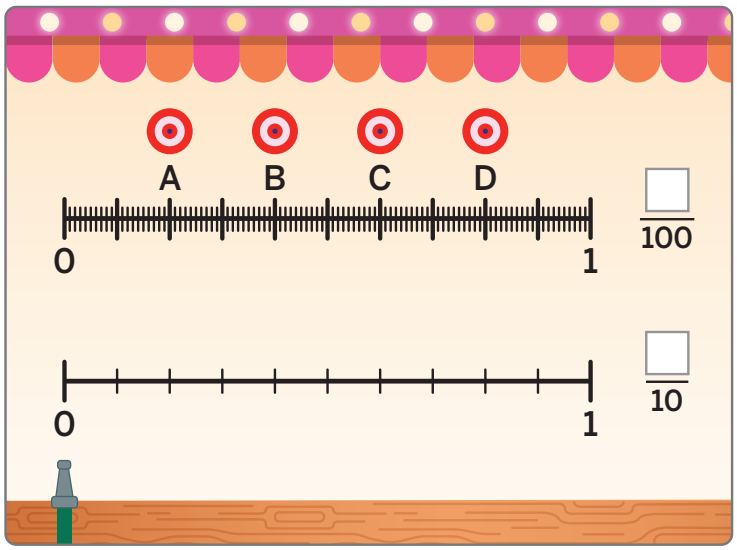
8 Hit all 4 targets while keeping the same denominator for the bottom fraction.



Target	Equivalent fractions
A	
B	
C	
D	

9 **Discuss**

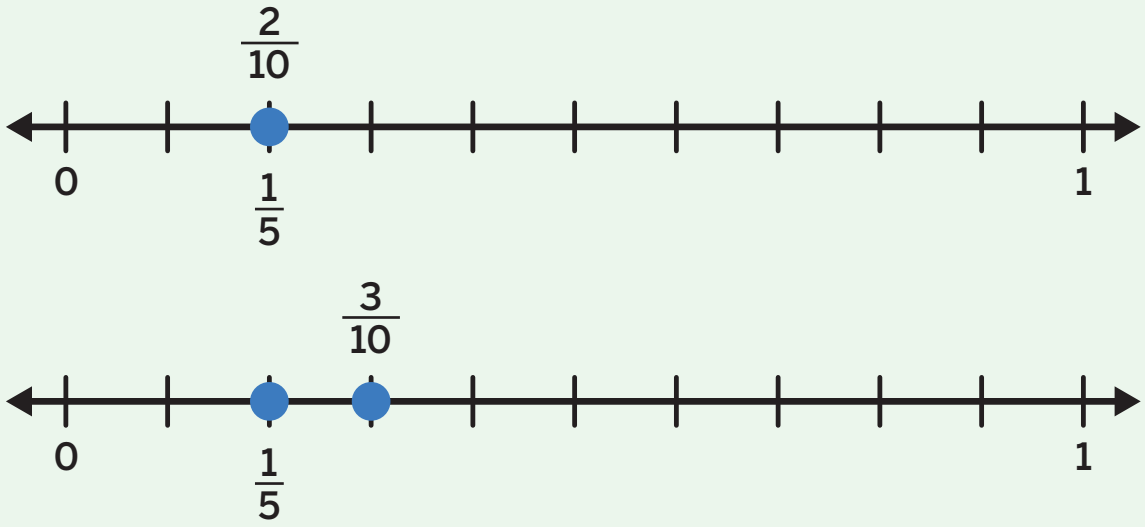
How can you use these number lines to help you determine pairs of equivalent fractions?



10 Let's watch a video about equivalent fractions.

Summary 2.07

Any 2 fractions located at the same point on a number line are equivalent. When 2 fractions are not located at the same point on a number line, they are not equivalent.



Practice 2.07

1 Represent $\frac{4}{10}$ on the number line. Then determine a fraction that is equivalent to $\frac{4}{10}$.

Show your thinking.

answer: _____

Name _____ Date _____

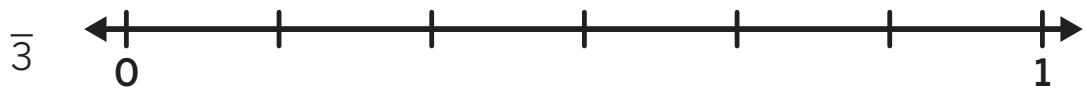
2 Determine a fraction that is equivalent to $\frac{6}{8}$.

Show your thinking.

answer: _____

For Problems 3–5, write the numerator to complete the fraction that is equivalent to $\frac{2}{6}$. If there is not a numerator that works, write *not possible*.

3



4

5

Name _____ Date _____

6 Determine whether each equation is true or false. Select True or False for each equation.

	True	False
$\frac{4}{5} = \frac{4}{10}$		
$\frac{4}{5} = \frac{5}{8}$		
$\frac{4}{5} = \frac{8}{10}$		
$\frac{4}{5} = \frac{90}{100}$		

Spiral Review

For Problems 7–10, determine the value of the expression.

7 2×12 _____

8 5×8 _____

9 $32 \div 8$ _____

10 $49 \div 7$ _____

11 Solve the problem. Then write a division equation that represents the problem.

Han's family picked 35 pounds of apples. They put 7 pounds in each bag. How many bags of apples did Han's family pick?

answer: _____

equation: _____

Unit 2
Lesson
8

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.1, SMP.3, SMP.6, SMP.7, SMP.8

How Do You Know? (Part 1)

Let's show all the ways we know 2 fractions are equivalent.

We are a math community.
How is being part of a math community helpful for mathematicians?

Warm-Up

eyes on teacher

Activity 1 How Do You Know?

1 You will be given a card with 2 equivalent fractions.

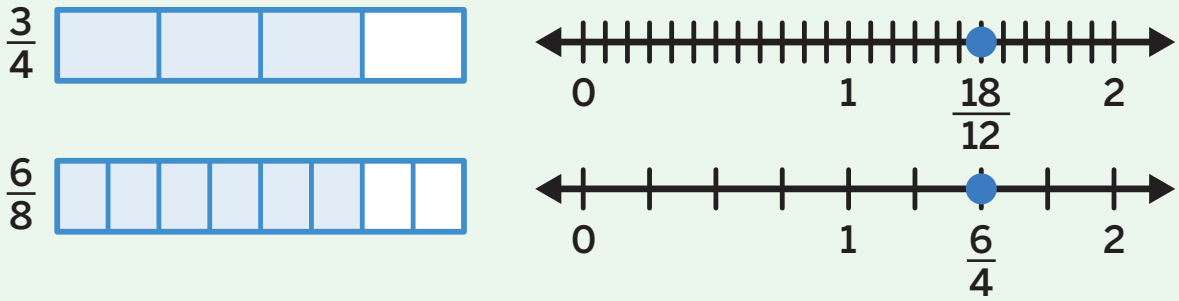
Create a poster that shows how you could justify that the 2 fractions are equivalent in as many ways as possible.

Your poster should include:

- fraction-strip diagrams and/or number lines
- words
- equations

Summary 2.08

Multiplication and division can be used to generate equivalent fractions.



$$\frac{3 \times 2}{4 \times 2} = \frac{6}{8}$$

$$\frac{18 \div 3}{12 \div 3} = \frac{6}{4}$$

Practice 2.08

1 Determine whether the fractions $\frac{10}{3}$ and $\frac{40}{12}$ are equivalent using a visual model, words, or equations. Write *yes* or *no*.

Show or explain your thinking.

answer: _____

Name _____ Date _____

2 Determine another fraction that is equivalent to $\frac{10}{3}$ and $\frac{40}{12}$.

Show or explain your thinking.

answer: _____

3 Determine whether each statement is *true* or *false*. Place a check mark in the correct column.

	True	False
$\frac{7}{3}$ is equivalent to $\frac{15}{9}$.		
$\frac{18}{32}$ is equivalent to $\frac{6}{8}$.		
$\frac{5}{35}$ is equivalent to $\frac{1}{7}$.		
$\frac{4}{7}$ is equivalent to $\frac{8}{14}$.		

4 Select *all* the fractions that are equivalent to $\frac{2}{8}$.

- ☐ **A.** $\frac{1}{4}$
- ☐ **B.** $\frac{4}{16}$
- ☐ **C.** $\frac{6}{16}$
- ☐ **D.** $\frac{10}{40}$
- ☐ **E.** $\frac{14}{60}$
- ☐ **F.** $\frac{20}{50}$

5 Select *all* the equations that show equivalent fractions.

- ☐ **A.** $\frac{1}{2} = \frac{2}{10}$
- ☐ **B.** $\frac{7}{9} = \frac{21}{27}$
- ☐ **C.** $\frac{4}{5} = \frac{12}{25}$
- ☐ **D.** $\frac{4}{6} = \frac{20}{18}$
- ☐ **E.** $\frac{9}{9} = \frac{36}{36}$
- ☐ **F.** $\frac{8}{12} = \frac{32}{48}$

Name _____ Date _____

6 Determine whether the fractions $\frac{6}{9}$ and $\frac{30}{45}$ are *equivalent* or *not equivalent*.

Show or explain your thinking.

answer: _____

Spiral Review

For Problems 7–10, determine the value of the expression.

7 4×4 _____

8 10×10 _____

9 $36 \div 6$ _____

10 $64 \div 8$ _____

11 Determine whether each number is *prime* or *composite*. Place a check mark in the correct column.

	Prime	Composite
3		
8		
16		
22		
23		
50		

Name _____ Date _____

Visual Fraction Models 4.NF.1, SMP.8

How Do You Know? (Part 2)

Let's use factors and multiples to help us determine equivalent fractions.

I am a doer of math.
How does having time to think support you as a mathematician?

Warm-Up

eyes on teacher

Activity 1

Using Multiples for Equivalent Fractions

You will be shown some work from Lesson 8 to help you complete Problems 1 and 2.

1 Discuss

- How do the visual fraction models change when you go from a fraction with a *lesser* denominator to an equivalent fraction with a *greater* denominator?
- What stays the same?

Name _____ Date _____

Using Multiples for Equivalent Fractions (continued)

2 How does the equation relate to how the visual models changed?

3 Use multiples to write 4 different equations that show other fractions that are equivalent to $\frac{1}{8}$.

Show your thinking.

Activity 2

Name _____ Date _____

Using Factors for Equivalent Fractions

You will be shown some work from Lesson 8 to help you complete Problems 4 and 5.

4 Discuss

- How do the visual fraction models change when you go from a fraction with a *greater* denominator to an equivalent fraction with a *lesser* denominator?
- What stays the same?

5 How does the equation relate to how the visual models changed?

Name _____ Date _____

Using Factors for Equivalent Fractions (continued)

6 Use factors to write as many different equations as you can that show other fractions that are equivalent to $\frac{18}{12}$.

Show your thinking.

Summary 2.09

Multiples or factors can be used to generate equivalent fractions.

Multiples

$$\frac{1 \times 2}{8 \times 2} = \frac{2}{16}$$

$$\frac{1 \times 3}{8 \times 3} = \frac{3}{24}$$

$$\frac{1 \times 4}{8 \times 4} = \frac{4}{32}$$

Factors

$$\frac{18 \div 2}{12 \div 2} = \frac{9}{6}$$

$$\frac{18 \div 3}{12 \div 3} = \frac{6}{4}$$

$$\frac{18 \div 6}{12 \div 6} = \frac{3}{2}$$

Practice 2.09

1 Determine 2 fractions that are equivalent to $\frac{10}{6}$.

Show or explain your thinking.

answer: _____

Name _____ Date _____

2 Use *factors* to determine 2 fractions that are equivalent to $\frac{24}{16}$.

Show or explain your thinking.

answer: _____

3 In the 1700s, 16 U.S. states joined the Union. Determine a fraction that is equivalent to $\frac{16}{50}$.

Show or explain your thinking.

answer: _____

4 Statewide averages of monthly precipitation in Florida have a low average of $\frac{2}{8}$ inches. Use *multiples* to determine 2 fractions that are equivalent to $\frac{2}{8}$.

Show or explain your thinking.

answer: _____

Name _____ Date _____

5 Determine whether each equation is true or false. Select True or False for each equation.

	True	False
$\frac{16}{6} = \frac{8}{3}$		
$\frac{7}{8} = \frac{21}{16}$		
$\frac{3}{5} = \frac{9}{15}$		
$\frac{8}{3} = \frac{40}{18}$		
$\frac{2}{3} = \frac{10}{15}$		
$\frac{14}{4} = \frac{2}{7}$		

Spiral Review

For Problems 6–10, determine the value of the expression.

6 $18 \div 9$ _____

7 $35 \div 5$ _____

8 $50 \div 10$ _____

9 $28 \div 7$ _____

10 $32 \div 4$ _____

For Problems 11 and 12, write a division equation to match the story problem.

11 42 teammates were split into 7 teams. How many teammates were on each team?

_____

12 24 strawberries were divided into bags. Each bag held 6 strawberries. How many bags of strawberries were there?

_____

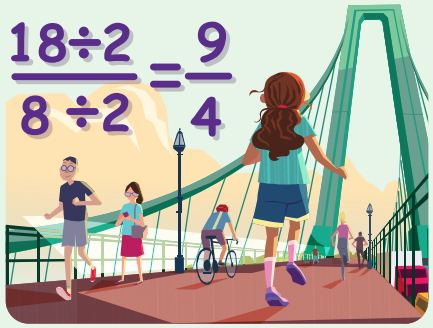
Unit 2
Lesson
10

Name _____ Date _____

Visual Fraction Models 4.NF.1, SMP.3, SMP.7

Equivalent Distances

Let's determine and identify equivalent fractions.



I am a doer of math.
How does exploring new strategies help you learn and grow as a mathematician?

Warm-Up

eyes on teacher

Activity
1

Equivalent Distances

Problems 1–4 show some distances Ingrid has run before. She wants to run those same distances again but at other locations.

Use factors and multiples to identify 2 other distances that are equivalent to the given distance.

Show your thinking.

1 $\frac{18}{8}$ miles

answer: _____

Name _____ Date _____

Equivalent Distances (continued)

Show your thinking.

2 $\frac{30}{12}$ miles

answer: _____

3 $\frac{7}{6}$ miles

answer: _____

4 $\frac{5}{4}$ miles

answer: _____

Activity 2

Name _____ Date _____

Introducing the Center, Fraction Match

Stage 4

Pairs Let's match equivalent fractions.

You'll need: Fraction Match Cards, Recording Sheet

Set Up Arrange the cards facedown in an array.

How to Play

1. On each turn, flip over 2 cards. Two cards match if they represent equivalent fractions.
2. If the cards match, collect them and take another turn. If the cards do not match, flip them over facedown, and your turn is over. If you collect 2 matches in a row, your turn is over.
3. Record the numbers for each match.
4. Take turns.

How to Win After all the matches have been found, the player who collected more cards wins.

CENTER
Recording Sheet

Name _____ Date _____

Fraction Match (continued)

Fraction	Fraction

Summary 2.10

Multiples can always be used to determine equivalent fractions. Factors can only be used to determine equivalent fractions when the numerator and the denominator have a factor in common.

	Multiples	Factors
$\frac{8}{6}$	$\frac{8 \times 2}{6 \times 2} = \frac{16}{12}$	$\frac{8 \div 2}{6 \div 2} = \frac{4}{3}$
$\frac{5}{4}$	$\frac{5 \times 2}{4 \times 2} = \frac{10}{8}$	

Practice 2.10

For Problems 1–4, identify 2 fractions that are equivalent to the given fraction.

1. $\frac{16}{8}$ _____

2. $\frac{40}{10}$ _____

3. $\frac{8}{6}$ _____

4. $\frac{90}{100}$ _____

Name _____ Date _____

5 The water frozen in glaciers makes up $\frac{85}{100}$ of the world's freshwater supply. Use factors or multiples to determine a fraction that is equivalent to $\frac{85}{100}$.

Show your thinking.

answer: _____

6 In a recent election, $\frac{6}{8}$ of voters voted yes for a new traffic light at an intersection near a school. Use factors or multiples to determine 2 fractions that are equivalent to $\frac{6}{8}$.

Show or explain your thinking.

answer: _____

7 Determine the fractions that are equivalent to $\frac{9}{12}$. Select *all* that apply.

- ☐ **A.** $\frac{3}{4}$
- ☐ **B.** $\frac{4}{6}$
- ☐ **C.** $\frac{12}{15}$
- ☐ **D.** $\frac{18}{24}$

Name _____ Date _____

8 Determine the fractions that are equivalent to $\frac{40}{100}$. Select *all* that apply.

- ☐ **A.** $\frac{2}{5}$
- ☐ **B.** $\frac{4}{10}$
- ☐ **C.** $\frac{20}{50}$
- ☐ **D.** $\frac{80}{160}$

Spiral Review

For Problems 9–13, determine the value of the expression.

9 $70 \div 7$ _____

10 $65 \div 5$ _____

11 12×3 _____

12 8×6 _____

13 $30 \div 10$ _____

14 List the first 10 multiples of 5 and 7.

multiples of 5: _____

multiples of 7: _____

15 Which of the multiples are *common multiples* of 5 and 7?

_____

Sub-Unit

3

Fraction Comparison

Unit Story: One Step at a Time

Craig Sterken/Shutterstock.com

How could you use numbers to describe how the spacing of the arches on the bridge compares to the spacing of the street lamps or the lifeguard stations?

Unit 2
Lesson
11

Name _____ Date _____

Visual Fraction Models 4.NF.2, SMP.3, SMP.8

Which Is Greater?

Let's compare fractions with the same denominator or the same numerator.

$\frac{2 \times 6}{2 \times 10} = \frac{12}{20}$

$\frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

Warm-Up

eyes on teacher

I can be all of me in math class.
How could you use your background experiences to help you solve math problems today?

Activity
1

Comparing Fractions

Hands-On **You will be given a diagram showing a set of fraction strips. Use the fraction strips if it is helpful.**

Circle the *greater* fraction in each pair of fractions.

1. $\frac{3}{8}$ or $\frac{5}{8}$
2. $\frac{3}{12}$ or $\frac{5}{12}$
3. $\frac{3}{12}$ or $\frac{3}{4}$
4. $\frac{9}{3}$ or $\frac{9}{5}$
5. Priya says, "10 is greater than 6, so $\frac{4}{10}$ is greater than $\frac{4}{6}$."

   Do you agree with the statement? Why or why not?

   Show or explain your thinking.

Name _____ Date _____

Comparing Fractions (continued)

6 Consider the following statement about comparing $\frac{5}{12}$ and $\frac{7}{12}$.

"7 is greater than 5, so $\frac{7}{12}$ is greater than $\frac{5}{12}$."

Do you agree with the statement? Why or why not?

Show or explain your thinking.

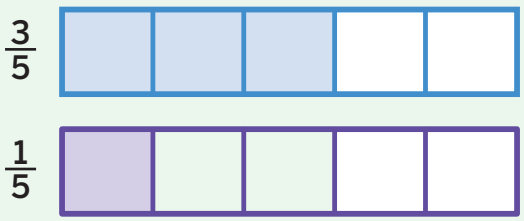
7 **Discuss**

- How could you compare fractions with the same denominator? Explain your thinking.
- How could you compare fractions with the same numerator? Explain your thinking.

Summary 2.11

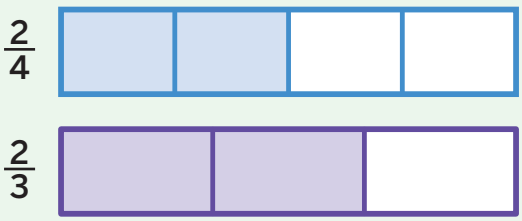
Fractions with the same numerator can be compared by considering the size of each of the parts. Fractions with the same denominator can be compared by considering the number of same-sized parts. The comparisons are true because the fractions refer to the same whole.

Same denominators



$\frac{3}{5} > \frac{1}{5}$

Same numerators



$\frac{2}{4} < \frac{2}{3}$

Practice 2.11

1 Which fraction is *greater*: $\frac{1}{8}$ or $\frac{1}{10}$?

Show or explain your thinking.

answer: _____

Name _____ Date _____

2 Which fraction is *greater*: $\frac{4}{10}$ or $\frac{7}{10}$?

Show or explain your thinking.

answer: _____

For Problems 3–10, circle the *greater* fraction in each pair of fractions.

3 $\frac{1}{5}$ or $\frac{1}{12}$

4 $\frac{5}{9}$ or $\frac{3}{9}$

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

6 $\frac{5}{6}$ or $\frac{5}{8}$

7 $\frac{15}{8}$ or $\frac{15}{12}$

8 $\frac{1}{2}$ or $\frac{2}{2}$

9 $\frac{1}{6}$ or $\frac{1}{5}$

10 $\frac{12}{10}$ or $\frac{10}{12}$

Name _____ Date _____

For Problems 11 and 12, complete the comparison statement.

11 $\frac{\quad}{8} < \frac{6}{8}$

12 $\frac{\quad}{10} > \frac{9}{5}$

Spiral Review

For Problems 13–16, determine the value of the expression.

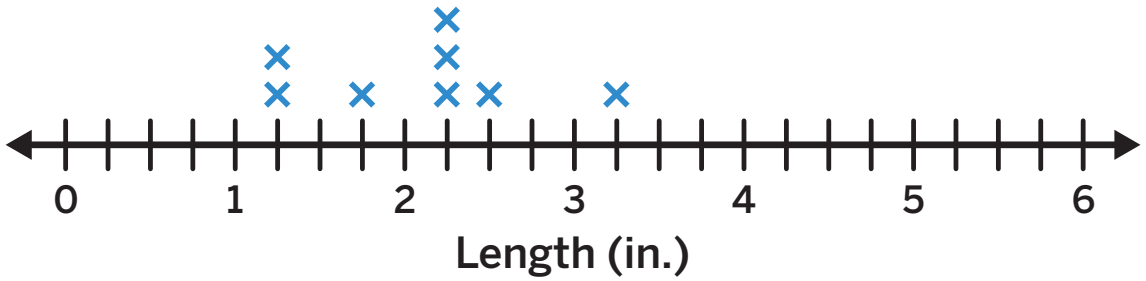
13 4×5 _____

14 2×7 _____

15 4×12 _____

16 5×10 _____

The line plot shows the lengths of some grasshoppers in inches. Use the line plot for Problems 17 and 18.



17 How many grasshoppers measured $2\frac{1}{4}$ inches? _____

18 How many grasshoppers measured *longer* than 2 inches? _____

Unit 2
Lesson
12

Name _____ Date _____

Visual Fraction Models 4.NF.2, 4.NF.1, SMP.1, SMP.3, SMP.6

Pairs to Compare

Let's compare fractions with related denominators.

I am a doer of math.
Think of a time when it took you a while to solve a math problem, but you solved it. How did that feel?

Warm-Up

eyes on teacher

Activity 1 Pairs to Compare

Identify the *greater* fraction in each pair of fractions.

Show or explain your thinking.

1. $\frac{5}{12}$ or $\frac{3}{4}$

answer: _____

2. $\frac{7}{6}$ or $\frac{11}{12}$

answer: _____

Name _____ Date _____

Pairs to Compare (continued)

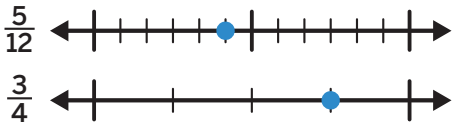
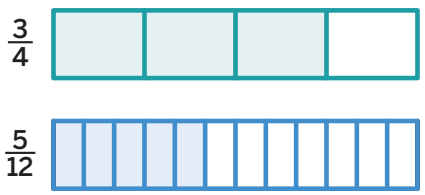
Show or explain your thinking.

3 $\frac{26}{10}$ or $\frac{11}{5}$

answer: _____

4 Discuss

Here are some ways that students determined the greater fraction in Problem 1.

Gavin's way	Ingrid's way	Shawn's way
I know $\frac{5}{12}$ is less than $\frac{1}{2}$, and $\frac{3}{4}$ is more than $\frac{1}{2}$, so $\frac{3}{4}$ is greater.		

Who do you agree with and why?

5 Discuss

Compare the strategies you used for Problems 1–4. What was similar? What was different?

Activity 2

Name _____ Date _____

New Pairs to Compare

Determine whether each comparison statement is *true* or *false*.

Show or explain your thinking.

6 $\frac{10}{3} < \frac{44}{12}$

answer: _____

7 $\frac{1}{4} > \frac{25}{100}$

answer: _____

Name _____ Date _____

New Pairs to Compare (continued)

Compare each pair of fractions. Complete each comparison using <, >, or =.

Show or explain your thinking.

8 $\frac{6}{12}$ _____ $\frac{4}{6}$

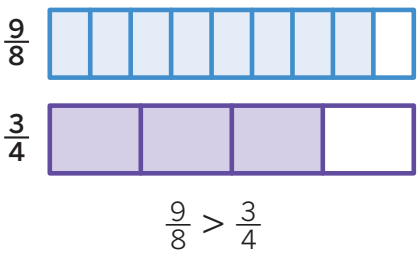
9 $\frac{4}{3}$ _____ $\frac{7}{6}$

10 **Discuss**

What strategies did you use to compare the fractions? Will those strategies work for every pair of fractions?

Summary 2.12

Students can use a variety of strategies to compare fraction size, like benchmark fractions, common denominators, number lines, and visual models.

Benchmark strategy	Common denominator	Tape diagram
I know $\frac{9}{8}$ is greater than 1, and $\frac{3}{4}$ is less than 1, so $\frac{9}{8}$ is larger.	$\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$ $\frac{9}{8} > \frac{6}{8}$	 $\frac{9}{8} > \frac{3}{4}$

common denominator The same denominator in two or more fractions.

Practice 2.12

1 Determine whether each statement is true or false. Select True or False for each equation.

	True	False
$\frac{15}{21}$ is greater than $\frac{4}{7}$.		
$\frac{7}{8}$ is greater than $\frac{8}{7}$.		
$\frac{50}{100}$ is greater than $\frac{3}{4}$.		
$\frac{2}{4}$ is greater than $\frac{3}{12}$.		

Name _____ Date _____

For Problems 2–4, complete the comparison statement using <, >, or =.

Show or explain your thinking.

2 $\frac{1}{5}$ _____ $\frac{22}{100}$

3 $\frac{10}{4}$ _____ $\frac{45}{20}$

4 $\frac{9}{6}$ _____ $\frac{14}{12}$

For Problems 5–7, circle the *greater* fraction in each pair of fractions.

Show or explain your thinking.

5 $\frac{25}{20}$ or $\frac{6}{5}$

6 $\frac{3}{4}$ or $\frac{10}{12}$

7 $\frac{2}{3}$ or $\frac{7}{9}$

Name _____ Date _____

8 In June 2022, it rained $\frac{2}{10}$ inches in Phoenix. In August 2022, it rained $\frac{1}{2}$ inches in Phoenix. Which month received more rainfall?

Show or explain your thinking.

answer: _____

Spiral Review

For Problems 9–12, determine the value of the expression.

9 $88 \div 8$ _____

10 3×8 _____

11 $36 \div 12$ _____

12 9×6 _____

The word *contiguous* means sharing a common border, and the word *continental* means belonging to 1 continent. There are 48 states in the contiguous United States and 49 states in the continental United States. Use the information for Problems 13 and 14.

13 How many factor pairs does 48 have? List *all* the factor pairs.

_____

_____

14 Is 49 *prime* or *composite*? Explain your thinking.

_____

_____

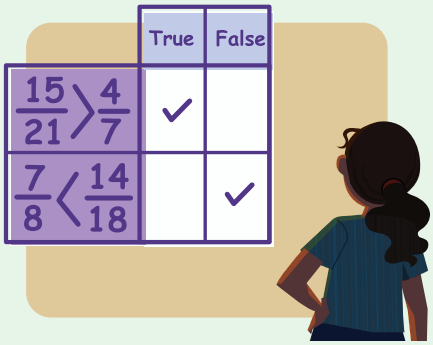
Unit 2
Lesson
13

Name _____ Date _____

Visual Fraction Model | 4.NF.2, 4.NF.1, SMP.1, SMP.2, SMP.3, SMP.7

Comparing Distances

Let's compare fractions with denominators that are not related to each other.



I am a doer of math.
How might it help others when someone shares a mathematical idea, even if they are not sure it will work?

Warm-Up

eyes on teacher

Activity 1

Comparing Our Distances

Ingrid, Gavin, Clare, Han, and Jada each wrote down the distances they walked or ran in kilometers on 2 different days.

For each student, determine which of their 2 distances is *greater*.

Show or explain your thinking.

1. Ingrid: $\frac{4}{3}$ or $\frac{13}{12}$

answer: _____

2. Gavin: $\frac{2}{3}$ or $\frac{4}{5}$

answer: _____

Name _____ Date _____

Comparing Our Distances (continued)

Show or explain your thinking.

3 Clare: $\frac{5}{12}$ or $\frac{3}{8}$

answer: _____

4 Han: $\frac{11}{10}$ or $\frac{6}{5}$

answer: _____

5 Jada: $\frac{13}{5}$ or $\frac{11}{6}$

answer: _____

6 **Discuss**

- Did you use the same strategy for each problem?
- How did you choose which strategy to use?

Activity 2

Name _____ Date _____

Finding Something in Common

Partner A:

- For each pair of fractions, determine a common *denominator* that allows you to compare the 2 fractions.
- Write an equivalent fraction for each of the given fractions with that common denominator.
- Complete the comparison statement using <, >, or =.

Partner B:

- For each pair of fractions, determine a common *numerator* that allows you to compare the 2 fractions.
- Write an equivalent fraction for each of the given fractions with that common numerator.
- Complete the comparison statement using <, >, or =.

Show or explain your thinking.

7 $\frac{5}{6}$ _____ $\frac{3}{4}$

equivalent fractions: $\frac{5}{6} = \square$ $\frac{3}{4} = \square$

8 $\frac{2}{3}$ _____ $\frac{5}{8}$

equivalent fractions: $\frac{2}{3} = \square$ $\frac{5}{8} = \square$

Name _____ Date _____

Finding Something in Common (continued)

Switch roles and follow the directions on the previous page.

Show or explain your thinking.

9 $\frac{2}{6}$ _____ $\frac{4}{10}$

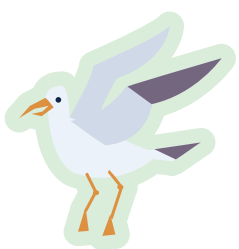
equivalent fractions: $\frac{2}{6} = \square$ $\frac{4}{10} = \square$

10 $\frac{4}{3}$ _____ $\frac{7}{5}$

equivalent fractions: $\frac{4}{3} = \square$ $\frac{7}{5} = \square$

11 Discuss

- Compare your answers for Problems 7–10. What is similar? What is different?
- How did you choose what number to use for your common numerator or common denominator? What other numbers could have worked?



Summary 2.13

Fractions can be compared by using common denominators or **common numerators**.

Compare $\frac{2}{5}$ and $\frac{5}{12}$.

$$\frac{2 \times 5}{5 \times 5} = \frac{10}{25}$$
$$\frac{5 \times 2}{12 \times 2} = \frac{10}{24}$$
$$\frac{10}{25} < \frac{10}{24}$$
$$\frac{2}{5} < \frac{5}{12}$$

$$\frac{2 \times 12}{5 \times 12} = \frac{24}{60}$$
$$\frac{5 \times 5}{12 \times 5} = \frac{25}{60}$$
$$\frac{24}{60} < \frac{25}{60}$$
$$\frac{2}{5} < \frac{5}{12}$$

common numerator The same numerator in two or more fractions.

Practice 2.13

For Problems 1 and 2, determine whether the comparison statement is *true* or *false*.

Show or explain your thinking.

1. $\frac{5}{8} = \frac{8}{12}$

answer: _____

2. $\frac{8}{6} < \frac{13}{10}$

answer: _____

Name _____ Date _____

For Problems 3–5, circle the *greater* fraction in the pair of fractions.

Show or explain your thinking.

3 $\frac{5}{12}$ or $\frac{1}{2}$

4 $\frac{3}{8}$ or $\frac{4}{12}$

5 $\frac{8}{3}$ or $\frac{12}{5}$

6 Determine whether each comparison statement is true or false. Select True or False for each equation.

	True	False
$\frac{5}{6} > \frac{6}{10}$		
$\frac{1}{2} < \frac{2}{3}$		
$\frac{4}{5} > \frac{8}{8}$		
$\frac{9}{2} > \frac{14}{15}$		
$\frac{12}{9} > \frac{4}{3}$		
$\frac{5}{2} > \frac{5}{4}$		

Name _____ Date _____

7 A recipe for zucchini bread has 3 ingredients that are each measured by a fraction of a cup.

- $\frac{3}{4}$ cups coconut oil
- $\frac{2}{3}$ cups chopped walnuts
- $\frac{4}{5}$ cups grated zucchini

Which ingredient has the greatest amount?

Show or explain your thinking.

answer: _____

Spiral Review

For Problems 8–11, determine the value of the expression.

8 4×5 _____

9 9×4 _____

10 $35 \div 7$ _____

11 $60 \div 12$ _____

12 There are 60 books on the bookshelf. There are 12 books on each shelf. How many shelves are there? Write a multiplication equation and a division equation that represent the story problem.

multiplication equation: _____

division equation: _____

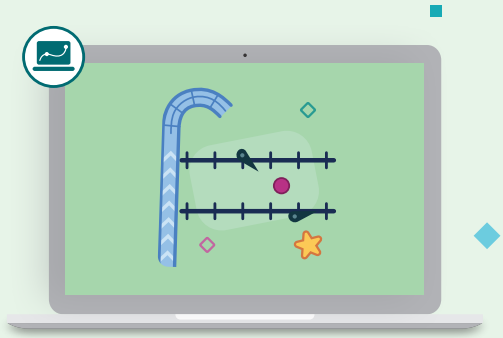
Unit 2
Lesson
14

Name _____ Date _____

Visual Fraction Models 4.NF.2, 4.NF.1, SMP.7, SMP.8

Getting in Order

Let's put some fractions in order.



We are a math community. How can you use the perspectives of others to help you as you work together on math problems today?

Warm-Up

1 eyes on teacher

Activity 1

Put Them in Order

Order the fractions from least to greatest.

Show or explain your thinking.

2

$\frac{3}{12}$ $\frac{2}{4}$ $\frac{1}{8}$

_____ _____ _____

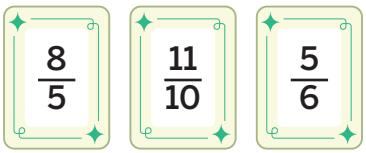
Least ⟶ Greatest

Name _____ Date _____

Put Them in Order (continued)

Show or explain your thinking.

3

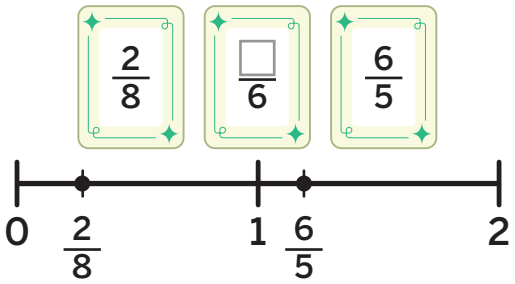


_____ _____ _____

Least ⟶ Greatest

4 Determine a numerator that orders the fractions from least to greatest. Use the number line to show your thinking, if it helps.

Least ⟶ Greatest



5 Discuss

- How did you determine which numerators would work in the middle card?
- What strategies did you use to choose the numerators?

Activity 2

Name _____ Date _____

Which Is the Greatest?

Hands-On

You and your partner will be given a set of cards with fractions. Flip over the cards one at a time and place the cards in order from least to greatest.

6

_____ _____ _____ _____

Least ⟶ Greatest

7

_____ _____ _____ _____

Least ⟶ Greatest

Name _____ Date _____

Which Is the Greatest? (continued)

8

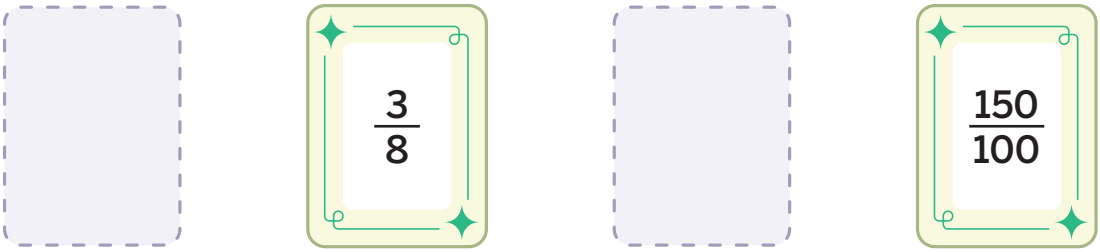
_____ _____ _____ _____

Least ⟶ Greatest

9 **Discuss**

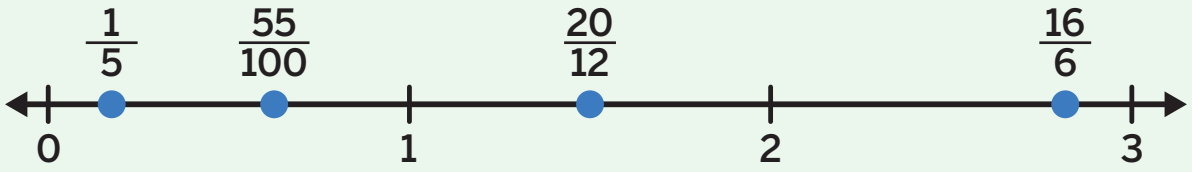
Priya placed the first 2 fractions in this order. What are 2 fraction cards that would work in the empty spots?

Least ⟶ Greatest



Summary 2.14

When putting fractions in order, it is helpful to use a strategy to compare the fractions to determine whether one fraction is greater than another.



Practice 2.14

1 Fill in the blank to make the comparison statement true.

$\frac{6}{8} < \frac{\ }{4} < \frac{3}{2}$

2 Circle the set of fractions that is ordered from *least* to *greatest*.

$\frac{2}{12}, \frac{3}{8}, \frac{5}{9}$

$\frac{1}{4}, \frac{3}{2}, \frac{6}{5}$

Name _____ Date _____

For Problems 3–5, order the fractions from *least* to *greatest*.

Show or explain your thinking.

3 $\frac{1}{3}, \frac{5}{12}, \frac{2}{10}$

_____ _____ _____

Least **Greatest**

4 $\frac{8}{15}, \frac{3}{5}, \frac{4}{10}$

_____ _____ _____

Least **Greatest**

5 $\frac{3}{4}, \frac{7}{12}, \frac{4}{8}$

_____ _____ _____

Least **Greatest**

Name _____ Date _____

6 Determine whether each statement is true or false. Select True or False for each equation.

	True	False
$\frac{7}{4}$ is greater than $\frac{10}{8}$.		
$\frac{6}{14}$ is greater than $\frac{10}{12}$.		
$\frac{3}{4}$ is less than $\frac{5}{5}$.		
$\frac{3}{10}$ is less than $\frac{2}{5}$.		

Spiral Review

For Problems 7–12, determine the value of the expression.

7 7×8 _____

8 10×9 _____

9 6×3 _____

10 $28 \div 7$ _____

11 $25 \div 5$ _____

12 $36 \div 9$ _____

13 Is 10 a prime or composite number? _____

14 List *all* the factor pairs of the number 10. _____

15 List the first 5 multiples of the number 10. _____

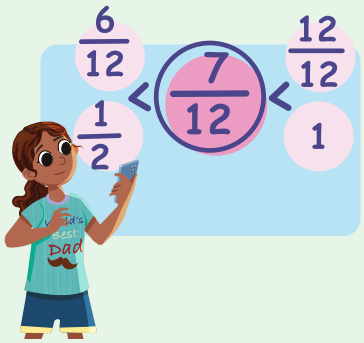
Unit 2
Lesson
15

Name _____ Date _____

Visual Fraction Models | 4.NF.2, 4.NF.1, SMP.1, SMP.3, SMP.6, SMP.7

All in Order

Let's use what we have learned to put a set of fractions in order.



Warm-Up eyes on teacher

We are a math community.
How could being part of a math community help you solve complex problems?

Activity
1

Ordering Distances

The students in the after-school running club had a party at the end of the school year to celebrate their accomplishments. Ms. Meng posted distances the students walked and ran throughout the year to highlight the progress they made.

Hands-On

1 Your group will be given a set of cards showing some of the distances walked or ran in kilometers. List the fractions on your cards in order from *least* to *greatest*.

_____, _____, _____, _____

least **greatest**

Name _____ Date _____

Ordering Distances (continued)

2 Join another group and combine your fraction cards. Create a number line to show all the distances on your combined cards in order from *least* to *greatest*.

Show your thinking.

3 You will work with the class to combine all your fraction cards and create a number line showing all the distances in order from *least* to *greatest*.

Summary 2.15

Making equivalent fractions, using benchmark numbers, and creating a number line can be useful strategies for comparing and ordering sets of fractions.

Order from least to greatest: $\frac{1}{4}, \frac{14}{12}, \frac{7}{12}, \frac{2}{3}$

$\frac{14}{12}$ is greater than 1.

$\frac{1}{4}$ is less than $\frac{1}{2}$.

$\frac{7}{12}$ and $\frac{2}{3}$ are more than $\frac{1}{2}$ but less than 1.

$\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$, so $\frac{7}{12} < \frac{2}{3}$.

least to greatest: $\frac{1}{4}, \frac{7}{12}, \frac{2}{3}, \frac{14}{12}$

Practice 2.15

1 Determine which fraction is *greatest.*

$\frac{13}{12}$ $\frac{3}{6}$ $\frac{6}{5}$ $\frac{95}{100}$

Show or explain your thinking.

answer: _____

Name _____ Date _____

For Problems 2–4, order the set of fractions from *least* to *greatest*.

Show or explain your thinking.

2 $\frac{3}{8}, \frac{20}{100}, \frac{2}{12}$

_____, _____, _____

least **greatest**

3 $\frac{7}{5}, \frac{6}{8}, \frac{4}{10}, \frac{6}{6}$

_____, _____, _____, _____

least **greatest**

4 $\frac{15}{10}, \frac{5}{3}, \frac{5}{8}, \frac{80}{100}, \frac{13}{12}$

_____, _____, _____, _____, _____

least **greatest**

Name _____ Date _____

5 Which fraction is greatest?

(A) $\frac{7}{10}$ (B) $\frac{7}{12}$

(C) $\frac{3}{5}$ (D) $\frac{65}{100}$

6 Which fraction is greatest?

(A) $\frac{8}{6}$ (B) $\frac{7}{4}$

(C) $\frac{8}{10}$ (D) $\frac{9}{10}$

Spiral Review

For Problems 7–10, determine the value of the expression.

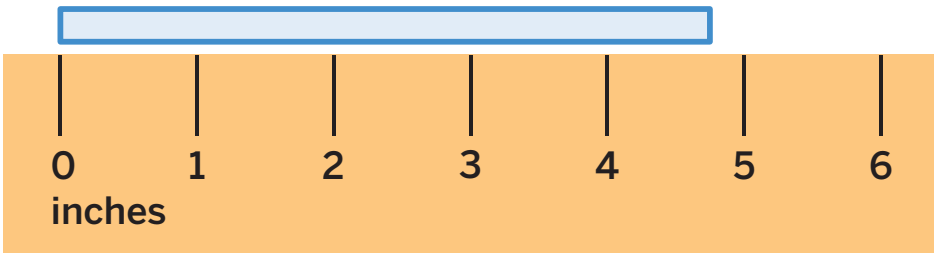
7 4×4 _____

8 8×6 _____

9 $70 \div 7$ _____

10 $21 \div 3$ _____

11 Partition the ruler into quarters of an inch. What is the length of the rectangle?



_____

Notes:

Math at Work

On your mark, get set, GO! Do you participate in fun runs or walks around your city? If so, next time, look at how your city is laid out, such as how tall the buildings are or where the streets are placed. Have you ever wondered who designed these?

City planners help design cities, including where to locate buildings, parks, and schools. They even plan where to place lampposts and street signs! They might use equivalent fractions when equally spacing apart lampposts.

aslysun/Shutterstock.com. Sergii Figurnyi/Shutterstock.com.

Math at Home

Locate an object in your home that has a fractional length. Measure its length with a ruler. Ask someone at home to work with you to write an equivalent fraction. What units did you choose?

length: _____

equivalent fraction: _____

Math Mindset

A friend says $\frac{5}{10} > \frac{5}{8}$ because $10 > 8$. What would you tell them?

Unit 3

Extending Operations to Fractions

Big Ideas in This Unit

CC1 Measuring and Plotting

CC2 Factors and Area Models

Number and Shape Patterns

CC3 Circles, Fractions, and Decimals

Fraction Flexibility

Visual Fraction Models

Questions for Investigation

- How is adding and subtracting fractions like adding and subtracting whole numbers?
- How is multiplying with fractions like multiplying whole numbers?
- How can visual models represent the addition, subtraction, and multiplication of fractions?

Explore: Making a Whole

How many different ways can you make a whole veggie pizza?

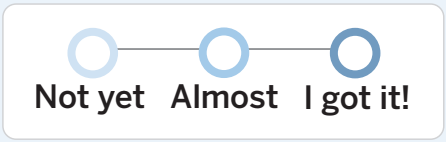
Unit Story: Finny

In this story, Henry adopts a plant and learns patience as he tries, fails, and with some help, tries again to get it to grow.

Ground Picture/Shutterstock.com

Watch Your Knowledge Grow

This is the math you'll explore in this unit. Rate your understanding to see how your knowledge grows!



I can . . .	Before	After
Solve addition and subtraction problems involving fractions with the same denominator.		
Solve addition and subtraction problems involving fractions, whole numbers, and mixed numbers.		
Decompose fractions and mixed numbers in multiple ways.		
Multiply a whole number and any fraction.		
Write multiplication expressions in different ways.		
Solve real-world problems involving the multiplication of whole numbers and fractions.		
Write equivalent fractions with denominators of 10 and 100.		
Add fractions with denominators of 10 and 100.		
Determine missing values in addition equations involving tenths and hundredths.		
Use line plots to solve problems involving different operations with fractions.		

Sub-Unit

1

Addition and Subtraction of Fractions

Unit Story: Finny

Natalie Board/Shutterstock.com

Henry expected Finny to grow really quickly. When is a time it took you longer than you expected to learn something in math class?

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | Building Toward 4.NF.3.a, 4.NF.3.b, SMP.1, SMP.2, SMP.7

Explore:
Making a Whole

How many different ways can you make a whole veggie pizza?

Warm-Up

eyes on teacher

We are a math community.
What does it look like and sound like to be engaged in math?

Discuss What do you notice? What do you wonder?

Finny

Unit Story

Activity

Name _____ Date _____

Work with your partner to show different ways you can make a whole veggie pizza. You can use any of the following pieces:

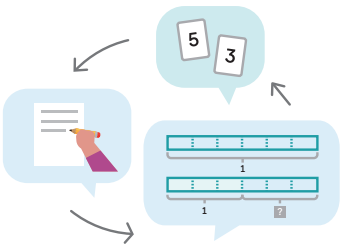
- cheese $\left(\frac{1}{2}\right)$
- mushroom $\left(\frac{1}{4}\right)$
- onion $\left(\frac{1}{8}\right)$
- pepper $\left(\frac{1}{3}\right)$
- tomato $\left(\frac{1}{6}\right)$

Ways to be a mathematician

1 I can take my time to think about a challenging problem before trying to solve it.

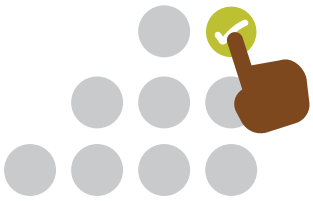
Not yet Almost I got it!

2 I can use numbers, words, and diagrams to make sense of math ideas and situations.



Not yet Almost I got it!

3 I can see how ideas are connected and use patterns to help solve problems.



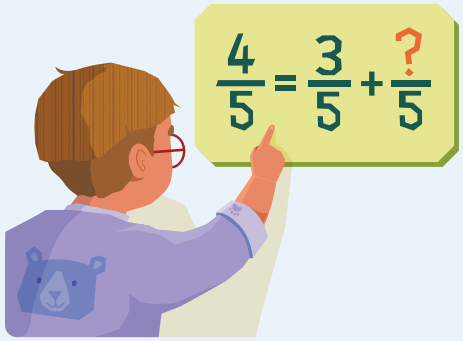
Not yet Almost I got it!

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.3.a, 4.NF.3.d, SMP.1, SMP.7

Pizza Problems

Let's solve problems involving fractions.



I am a doer of math.
How does using your imagination help you with a math problem that you do not know how to solve?

Warm-Up

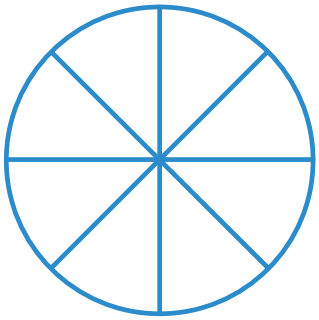
eyes on teacher

Activity 1 Sharing Veggie Pizza

Henry, Petra, Han, and Diego each have veggie pizzas of the same size.

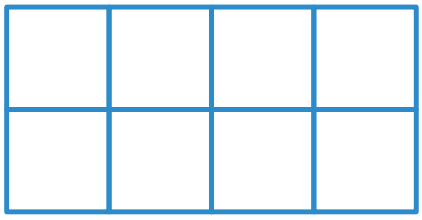
Show your thinking.

1. Henry has $\frac{5}{8}$ of a large pizza. Diego has $\frac{2}{8}$ of a large pizza. How much of a large pizza do they have altogether?



answer: _____

2. Petra had $\frac{5}{8}$ of her pizza left. She ate $\frac{2}{8}$ of the remaining pizza for lunch. What fraction of the pizza did Petra have left after lunch?



answer: _____

Name _____ Date _____

Sharing Veggie Pizza (continued)

Show your thinking.

3 Han had $\frac{7}{8}$ of his pizza left. He gave $\frac{3}{8}$ of his pizza to his sister. What fraction of the pizza does Han have left now?

answer: _____

4 Diego ordered a veggie pizza. He asked for $\frac{2}{8}$ of his pizza to have olives and the rest to have mushrooms. What fraction of Diego's pizza had mushrooms?

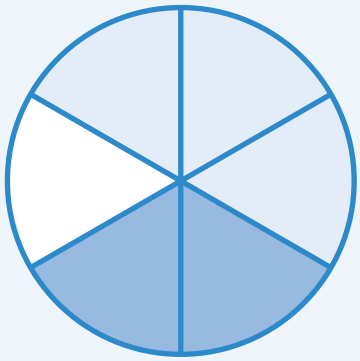
answer: _____

5 Discuss

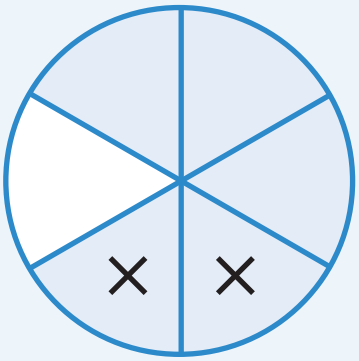
- Join with another pair. Compare how you represented and solved each problem.
- How did you know whether you were joining or separating parts in each problem?
- What equations could you use to represent each problem?

Summary 3.02

The joining or separating of fractions with the same denominator can be represented using addition or subtraction.



$\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$



$\frac{5}{6} - \frac{2}{6} = \frac{3}{6}$

Practice 3.02

For Problems 1–3, create a visual model to represent the story problem. Then write an equation that matches your model and record your answer.

Show your thinking.

1 Han had $\frac{5}{6}$ of a loaf of bread. He used $\frac{3}{6}$ of the loaf to make a sandwich. How much of the loaf of bread is left?

model:

equation: _____ **answer:** _____

Name _____ Date _____

Show your thinking.

2 Diego takes a walk in his neighborhood. He leaves home and walks south for $\frac{4}{10}$ miles and takes a break. Then he continues walking south for another $\frac{3}{10}$ miles. How far is Diego from home?

model:

equation: _____ **answer:** _____

3 Henry's new plant measured $\frac{8}{12}$ feet tall. After 3 weeks, he measures that his plant grew $\frac{2}{12}$ feet. How tall is Henry's plant now?

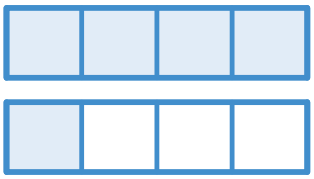
model:

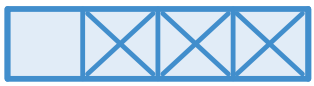
equation: _____ **answer:** _____

Name _____ Date _____

4 Priya has 4 quarters. She gives her sister $\frac{1}{4}$ of her quarters. Which model represents the fraction of Priya's quarters she has left?

(A) 

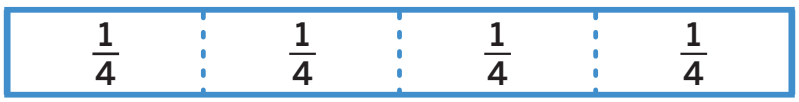
(B) 

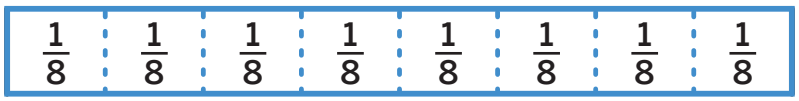
(C) 

(D) 

Spiral Review

5 Use the fraction strips to determine which pairs are equivalent fractions. Select *all* that apply.





(A) $\frac{6}{8}$ and $\frac{3}{4}$ (B) $\frac{2}{4}$ and $\frac{3}{8}$ (C) $\frac{1}{4}$ and $\frac{1}{8}$

(D) $\frac{8}{8}$ and $\frac{4}{4}$ (E) $\frac{5}{8}$ and $\frac{3}{4}$ (F) $\frac{2}{4}$ and $\frac{4}{8}$

For Problems 6–9, determine the value of the expression.

6 6×8 _____

7 7×9 _____

8 5×12 _____

9 $28 \div 4$ _____

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.3.b, 4.NF.3, SMP.1, SMP.7

Math Pizzeria

Let's decompose different fractions.

We are a math community.
What words or phrases are helpful to hear when you are working on a challenging problem in math class?

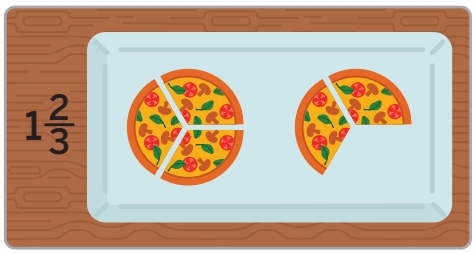
Warm-Up

1 eyes on teacher

Activity 1 Any Way You Slice It

2 Let's watch a video.

3 Complete the equations to show different ways to decompose $1\frac{2}{3}$ into a sum of fractions. Each blank line should have a fraction.



$1\frac{2}{3}$ = _____ + _____ + _____ + _____ + _____

$1\frac{2}{3}$ = _____ + _____ + _____

$1\frac{2}{3}$ = _____ + _____

Name _____ Date _____

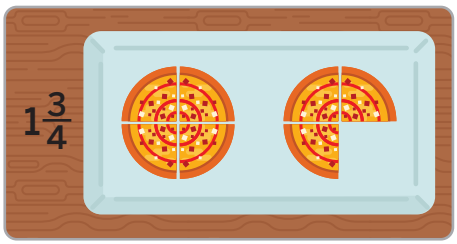
Any Way You Slice It (continued)

4 Complete the equations to show different ways to decompose $\frac{8}{5}$ into a sum of fractions. Each blank line should have a fraction.

$\frac{8}{5} =$ _____ + _____ + _____ + _____

$\frac{8}{5} =$ _____ + _____ + _____

5 Complete the equations to show different ways to decompose $1\frac{3}{4}$ into a sum of fractions. Each blank line should have a fraction.



$1\frac{3}{4} =$ _____ + _____ + _____ + _____ + _____ + _____

$1\frac{3}{4} =$ _____ + _____

6 Discuss

Here are some equations students wrote to make a sum of $\frac{7}{4}$.

Jada wrote $\frac{7}{4} = \frac{4}{4} + \frac{3}{4}$.

Diego wrote $\frac{7}{4} = 1 + \frac{3}{4}$.

Han wrote $\frac{7}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$.

Who do you agree with and why?

Activity 2

Name _____ Date _____

Pizza! Pizza! Pizza!

7 Decompose $\frac{6}{4}$ in as many ways as you can using different combinations of fourths. Write an addition expression for each decomposition.

8 Decompose $1\frac{5}{8}$ in as many ways as you can using different combinations of eighths. Write an addition expression for each decomposition.

Name _____ Date _____

Pizza! Pizza! Pizza! (continued)

9 Decompose $\frac{7}{6}$ in as many ways as you can using different combinations of sixths. Write an addition expression for each decomposition.

10 **Design a Challenge**

You will make some pizzas.

- Choose a number between 3 and 8 for your denominator. This is the number of slices in 1 whole pizza.
- Choose a number for your numerator that creates a fraction greater than 1 but less than 3. This is the total number of slices.

Trade books with a partner. Use the information in the first box to solve your partner's challenge. Then trade books with another partner.

numerator: _____ **denominator:** _____ **fraction:** _____

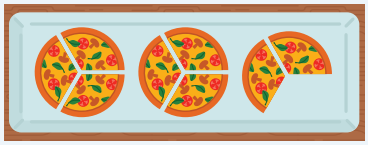
my equation: _____

My Challenge: Write an addition equation that makes a sum of _____.

Partner 1:	**Partner 2:**	**Partner 3:**

Summary 3.03

All **mixed numbers** and some non-unit fractions can be decomposed in multiple ways.



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

mixed number A number expressed as a whole number and a fraction less than 1.

Practice 3.03

1 Write $\frac{7}{6}$ as a sum of fractions in 5 different ways.

$\frac{7}{6} =$ _____

$\frac{7}{6} =$ _____

$\frac{7}{6} =$ _____

$\frac{7}{6} =$ _____

$\frac{7}{6} =$ _____

Name _____ Date _____

2 Determine whether each equation is true or false. Select True or False for each equation.

	True	False
$\frac{3}{10} + \frac{1}{10} + \frac{2}{10} = \frac{5}{10}$		
$\frac{1}{6} + \frac{2}{6} + \frac{1}{6} = \frac{6}{6}$		
$\frac{2}{8} + \frac{2}{8} + \frac{2}{8} = \frac{6}{8}$		
$\frac{1}{12} + \frac{4}{12} + \frac{1}{12} + \frac{2}{12} = \frac{8}{12}$		

3 Diego and Han are each building a tower of blocks. There are 2 sizes of blocks — $\frac{5}{6}$ feet tall and $\frac{3}{6}$ feet tall. Both of their towers are $3\frac{2}{6}$ feet tall, but they used the blocks differently. What are the possible ways that Diego and Han built their towers?

Show your thinking.

Diego's tower

Han's tower

Name _____ Date _____

Spiral Review

4 Use multiples to determine 2 fractions that are equivalent to $\frac{3}{5}$.

Show or explain your thinking.

For Problems 5–8, determine the value of the expression.

5 11×5 _____

6 7×12 _____

7 $40 \div 4$ _____

8 $24 \div 2$ _____

Unit 3
Lesson
4

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.3.d, 4.NF.3.a, 4.MD.2, SMP.2, SMP.4, SMP.7

Water, Ribbons, and Plants

Let's solve real-world problems involving fractions.

Warm-Up

eyes on teacher

I can be all of me in math class.
What are some words or phrases that describe you in math class?

Activity
1

Water and Ribbon for Finny

Create a visual model to represent each story problem. Then write an equation that matches your model and record your answer.

1 Last week, Henry gave Finny the following amounts of water:

- Monday: $\frac{3}{10}$ cups
- Wednesday: $\frac{6}{10}$ cups
- Sunday: $\frac{7}{10}$ cups

How much water did Henry give Finny last week?

Show your thinking.

model:

equation: _____

answer: _____

Name _____ Date _____

Water and Ribbon for Finny (continued)

2 Henry had 2 feet of ribbon. He used $\frac{5}{6}$ feet of ribbon to decorate a new pot for Finny. How much ribbon did Henry have left to decorate other items?

Show your thinking.

model:

equation: _____

answer: _____

3 **Discuss**

- How are your models and equations similar? How are they different?
- How does *each* equation connect to the model?

Activity 2

Name _____ Date _____

Henry's New Plants

Create a visual model to represent each story problem. Then write an equation that matches your model and record your answer.

4 Henry bought a new plant. He gave it $\frac{3}{8}$ cups of water on Monday and $\frac{6}{8}$ cups of water on Friday. How much more water did Henry give his plant on Friday than on Monday?

Show your thinking.

model:

equation: _____

answer: _____

Name _____ Date _____

Henry's New Plants (continued)

5 Henry bought $\frac{11}{4}$ grams of bean and pumpkin seeds. If he bought $\frac{5}{4}$ grams of bean seeds, then how many grams of pumpkin seeds did he buy?

Show your thinking.

model:

equation: _____

answer: _____

6 Discuss

How do you determine whether you should use addition or subtraction to solve a problem?

Summary 3.04

The relationship between addition and subtraction can help you solve real-world problems.

A caterpillar was $\frac{5}{6}$ inches long. After 1 week, the caterpillar is now $\frac{13}{6}$ inches long. How many inches did the caterpillar grow?

$$\frac{5}{6} + \_\_\_\_ = \frac{13}{6} \qquad \frac{13}{6} - \frac{5}{6} = \_\_\_\_$$

Practice 3.04

For Problems 1 and 2, create a visual model to represent the story problem. Then write an equation that matches your model and record your answer.

1 Han and his family adopted a puppy from the local shelter. The puppy currently weighs $8\frac{1}{2}$ kilograms. If the puppy weighed 6 kilograms when they first brought it home from the shelter, how much weight has it gained?

Show your thinking.

model:

equation: _____ **answer:** _____

Name _____ Date _____

2 On Monday, Han's puppy ate $\frac{6}{8}$ pounds of dog food. On Tuesday, the puppy ate $\frac{9}{8}$ pounds of dog food. How much more dog food did the puppy eat on Tuesday than on Monday?

Show your thinking.

model:

equation: _____ **answer:** _____

3 Priya is making fruit punch. She pours $\frac{6}{8}$ cups of lemonade and $\frac{5}{8}$ cups of cranberry juice into a glass. How many cups are in Priya's glass of fruit punch? Represent the story problem with a model, an addition equation, and a subtraction equation. Then write the answer.

Show your thinking.

model:

addition equation: _____

subtraction equation: _____

answer: _____

Name _____ Date _____

4 Select the equation that represents the problem.

Diego bought $\frac{10}{6}$ grams of cucumber and lemon seeds. If he bought $\frac{7}{6}$ grams of cucumber seeds, then how many grams of lemon seeds did he buy?

(A) $\frac{10}{6} + \frac{7}{6} = \frac{17}{6}$

(B) $\frac{10}{6} - \frac{7}{6} = \frac{3}{6}$

(C) $\frac{7}{6} - \frac{10}{6} = \frac{3}{6}$

(D) $\frac{7}{6} + \frac{10}{6} = \frac{3}{6}$

Spiral Review

5 Write a fraction that is equivalent to $\frac{2}{5}$. Use the number line to show your thinking.

_____

For Problems 6–11, determine the value of the expression.

6 $35 \div 7$ _____

7 3×10 _____

8 $64 \div 8$ _____

9 7×3 _____

10 $110 \div 11$ _____

11 2×12 _____

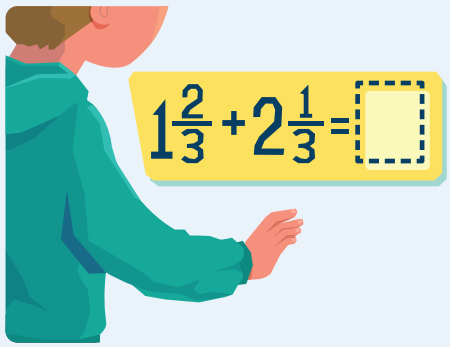
Unit 3
Lesson
5

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.3.a, 4.NF.3.c, SMP.3, SMP.6, SMP.7, SMP.8

On the Number Line

Let's use estimation and number lines to represent sums and differences of fractions.



Warm-Up

eyes on teacher

I can be all of me in math class. What makes you a mathematician?

Activity
1

Card Sort: Estimate the Sum or Difference

Hands-On

You and your partner will be given cards to sort into groups.

1 Estimate the value of the expression on each card to determine whether the value is *less than 1*, *between 1 and 2*, or *greater than 2*. Write each expression in the appropriate column.

Less than 1	Between 1 and 2	Greater than 2

Name _____ Date _____

Card Sort: Estimate the Sum or Difference (continued)

You may use this space for other work. Use the number line if it is helpful.

2 Discuss

- Which expressions were the most challenging to sort? Why?
- What estimation strategies did you use to determine whether the sum or difference was less than 1, between 1 and 2, or greater than 2?

Activity 2

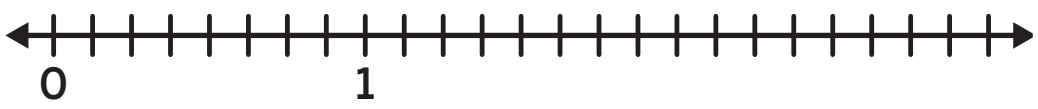
Name _____ Date _____

What Is the Sum or Difference?

Represent each expression on the number line and then determine the value.

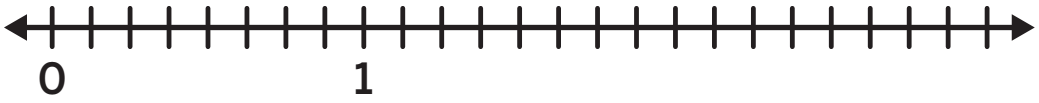
Show your thinking.

3 $\frac{5}{8} + \frac{2}{8}$



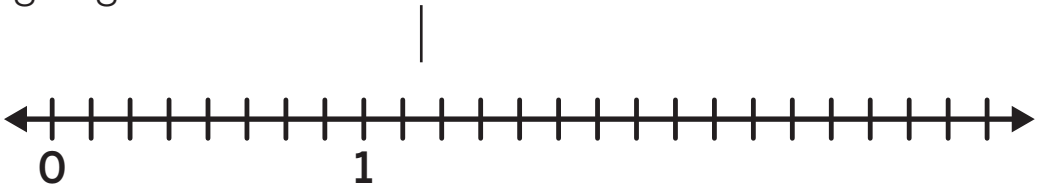
answer: _____

4 $1\frac{3}{8} - \frac{2}{8}$



answer: _____

5 $\frac{1}{8} + \frac{9}{8}$



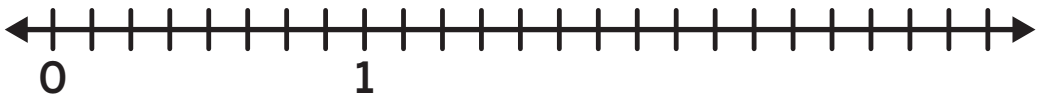
answer: _____

Name _____ Date _____

What Is the Sum or Difference? (continued)

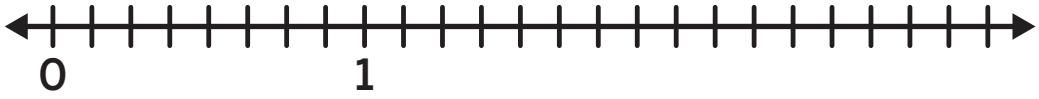
Show your thinking.

6 $\frac{13}{8} - \frac{6}{8}$



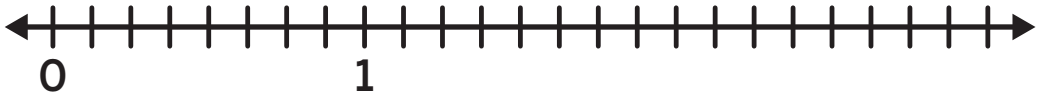
answer: _____

7 $\frac{11}{8} + 1\frac{1}{8}$



answer: _____

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



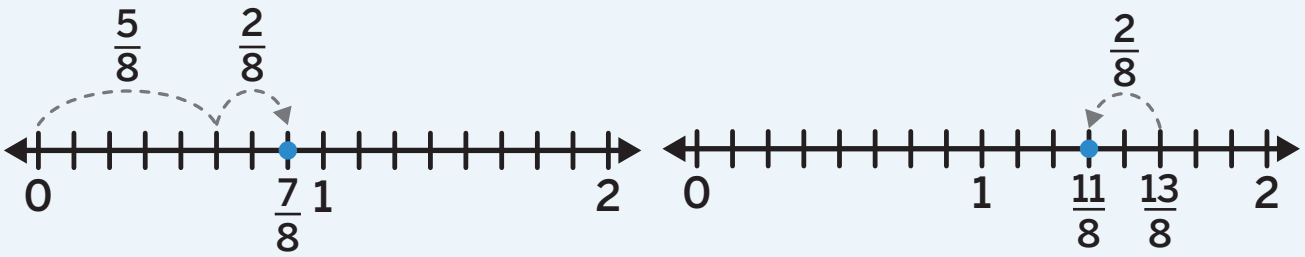
answer: _____

9 Discuss

How are your number line representations the same?
How are they different?

Summary 3.05

Number lines can be used to represent the addition and subtraction of fractions and determine the values of expressions. Just as with whole numbers, you can add fractions in any order. The order of subtracting fractions is important.

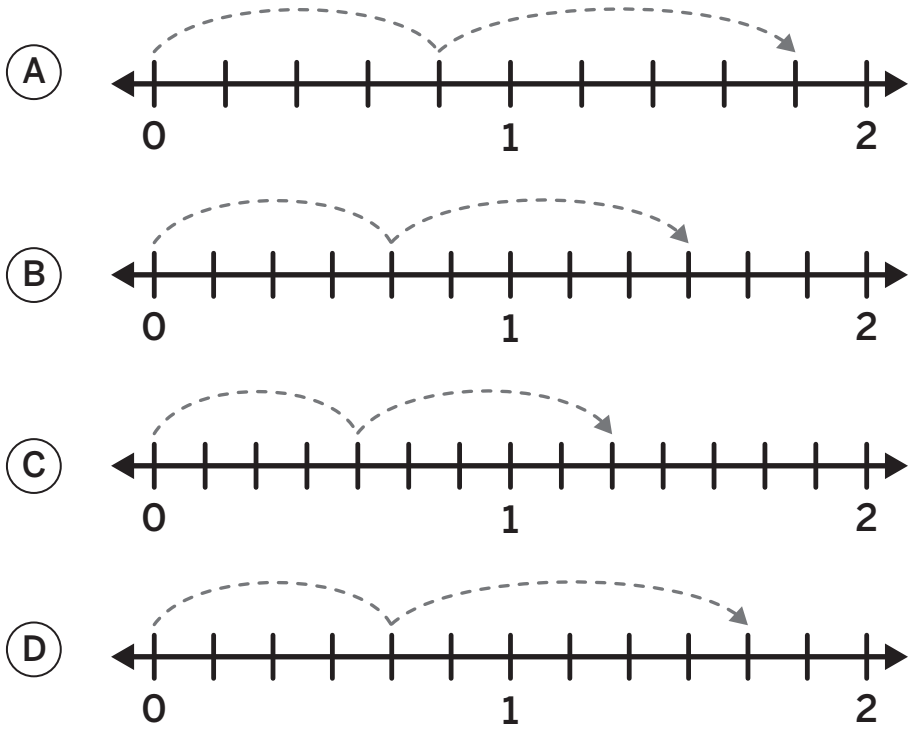


$$\frac{5}{8} + \frac{2}{8} = \frac{7}{8}$$

$$\frac{13}{8} - \frac{2}{8} = \frac{11}{8}$$

Practice 3.05

1 Which number line represents the expression $\frac{4}{6} + \frac{5}{6}$?

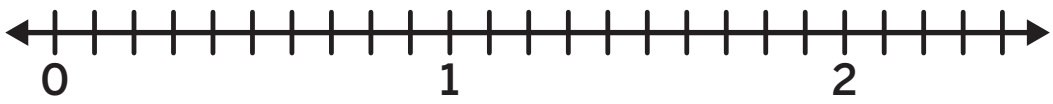


Name _____ Date _____

For Problems 2–4, represent the expression on the number line and then determine the value.

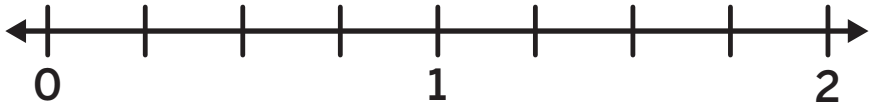
Show your thinking.

2 $\frac{18}{10} - \frac{13}{10}$



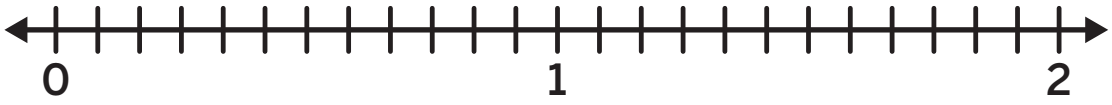
answer: _____

3 $\frac{3}{4} + \frac{3}{4}$



answer: _____

4 $\frac{2}{12} + 1\frac{3}{12}$



answer: _____

Name _____ Date _____

5 Use the number line to help you estimate the sum of the expression $\frac{5}{12} + \frac{9}{12}$.

(A) less than 1 (B) between 1 and 2 (C) greater than 2

Spiral Review

6 Select *all* the fractions that the point on the number line represents.

(A) $\frac{5}{4}$ (B) $\frac{3}{4}$ (C) $\frac{6}{8}$ (D) $\frac{7}{8}$

For Problems 7–12, determine the value of the expression.

7 5×5 _____

8 $49 \div 7$ _____

9 9×6 _____

10 $16 \div 2$ _____

11 12×3 _____

12 $88 \div 8$ _____

Name _____ Date _____

Fraction Flexibility 4.NF.3.d, 4.NF.3.c, 4.MD.2, SMP.1, SMP.3, SMP.6

All Kinds of Numbers

Let's add and subtract fractions, whole numbers, and mixed numbers.

Warm-Up

eyes on teacher

I can be all of me in math class.
How do your actions show that you are a mathematician?

Activity 1 What's Left?

Henry has different watering cans that he uses to water his plants.

Show or explain your thinking.

1 Henry has a watering can that contains 5 cups of water. How much water will be left in the watering can if Henry pours $\frac{5}{4}$ cups into Finny's pot?

answer: _____

Name _____ Date _____

What's Left? (continued)

Show or explain your thinking.

2 Henry has $2\frac{2}{4}$ cups of water in the watering can. He adds $1\frac{3}{4}$ cups of water to the watering can. How much water is in the watering can now?

answer: _____

3 Henry used $2\frac{1}{4}$ cups of water to water his plants. He started with 6 cups of water. How much water is left in the watering can now?

answer: _____

4 **Discuss**

With a partner, compare your strategies for solving Problem 3.

Summary 3.06

To add or subtract a fraction and a mixed number or a whole number, it can be helpful to decompose the whole numbers.

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

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

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

$$2\frac{3}{4} + 1\frac{3}{4}$$

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

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

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

Practice 3.06

For Problems 1 and 2, evaluate the expression.

Show or explain your thinking.

1 $2 - \frac{3}{4}$

answer: _____

2 $3\frac{2}{6} + 1\frac{3}{6}$

answer: _____

Name _____ Date _____

For Problems 3–5, solve the story problem.

Show your thinking.

3 Typically, female mosquitofish grow to be $2\frac{4}{5}$ inches long, while male mosquitofish grow to be $1\frac{3}{5}$ inches long. Typically, how much longer are female mosquitofish than male mosquitofish?

answer: _____

4 Jada helped her mom make sparkling fruit punch for the neighborhood block party. They started with fruit juice in the container and added $1\frac{7}{8}$ gallons of sparkling water to make 5 gallons of punch. How much fruit juice was in the container when they started?

answer: _____

5 Diego is putting bowls of popcorn out for a snack while he has friends over. Diego adds $2\frac{4}{5}$ cups of popcorn to a bowl that already has $1\frac{2}{5}$ cups of popcorn in it. Now how much popcorn is in the bowl?

answer: _____

Name _____ Date _____

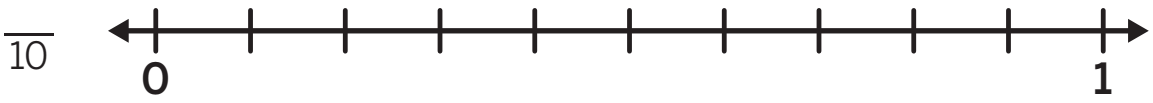
6 Select *all* the ways that 3 could be decomposed in order to subtract $\frac{3}{4}$.

(A) $2\frac{5}{4}$ (B) $2\frac{4}{4}$ (C) $1\frac{8}{4}$ (D) $\frac{16}{4}$ (E) $\frac{12}{4}$

Spiral Review

7 Write the numerator to complete the fraction so that it is equivalent to $\frac{4}{5}$.

Show your thinking.



For Problems 8–11, determine the value of the expression.

8 8×12 _____

9 6×7 _____

10 11×4 _____

11 $54 \div 9$ _____

Name _____ Date _____

Fraction Flexibility 4.NF.3.d, 4.NF.3.c, 4.MD.2, SMP.2, SMP.7, SMP.8

Bookshelf Fractions

Let's explore when decomposing helps to add and subtract fractions.

Warm-Up

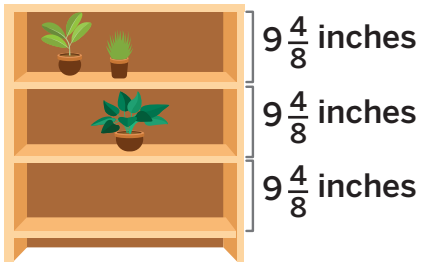
eyes on teacher

I am a doer of math.
How does having time to think support you as a mathematician?

Activity 1

Plants on a Bookshelf

Henry and Petra want to line up their plants together on a bookshelf. Each shelf is $9\frac{4}{8}$ inches tall.



Show your thinking.

1 Henry's plant Finny, including the pot, is $\frac{7}{8}$ inches shorter than the shelf. How tall is Finny?

answer: _____

Name _____ Date _____

Plants on a Bookshelf (continued)

Show your thinking.

2 Petra has a plant that is $5\frac{1}{8}$ inches tall with a pot that is $3\frac{3}{8}$ inches tall. How tall is Petra's plant and pot altogether?

answer: _____

3 Petra has another plant that is $5\frac{6}{8}$ inches tall, including the pot. How much space will there be on the bookshelf between Petra's plant in the pot and the top of the $9\frac{4}{8}$-inch tall shelf?

answer: _____

Activity 2

Name _____ Date _____

Card Sort: To Decompose or Not to Decompose

Hands-On

Your group will be given a set of cards with addition and subtraction expressions.

4 Analyze the expression on each card and think about whether it would be necessary or helpful to decompose at least 1 number to evaluate the expression. Sort the cards and record the letter of each card in the correct column of the table. Be prepared to explain your thinking.

Not necessary and not helpful	Necessary or helpful

Name _____ Date _____

Card Sort: To Decompose or Not to Decompose (continued)

Choose 2 expression cards and determine their values.

- **Choose 1 expression card from each group.**
- **1 expression should show subtraction, and 1 should show addition.**

Show your thinking.

5 Evaluate the expression for which it was *not* necessary or helpful to decompose any number. Write the letter of the card.

card: _____

answer: _____

6 Evaluate the expression for which it was necessary or helpful to decompose 1 or more numbers. Write the letter of the card.

card: _____

answer: _____

Summary 3.07

Problems involving addition or subtraction of fractions, whole numbers, and mixed numbers can be solved in different ways.

$$\frac{13}{5} + \underline{\quad} = 4\frac{1}{5}$$

$$\frac{13}{5} + \frac{8}{5} = \frac{21}{5}$$

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

$$2\frac{3}{5} + \frac{2}{5} = 3$$

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

Practice 3.07

For Problems 1 and 2, evaluate the expression. It may be necessary to decompose at least one of the numbers.

Show your thinking.

1 $3\frac{6}{8} + 1\frac{5}{8}$

answer: _____

2 $5 - 3\frac{7}{10}$

answer: _____

Name _____ Date _____

For Problems 3–6, solve the story problem. It may be necessary to decompose at least one of the numbers.

Show your thinking.

3 Jada and Shawn went walking on the track. Jada walked $3\frac{1}{4}$ miles. Shawn walked $1\frac{3}{4}$ miles less than Jada. How far did Shawn walk?

answer: _____

4 Clare is making necklaces and wants the length of the chain and clasp to be a total of $18\frac{1}{4}$ inches long. She is using a clasp that is $2\frac{3}{4}$ inches long. How long does the chain need to be?

answer: _____

Name _____ Date _____

Show your thinking.

5 Shawn is making hot chocolate for a party by adding $14\frac{7}{10}$ cups of milk to $3\frac{2}{10}$ cups of hot chocolate mix. How many cups were added together to make the hot chocolate?

answer: _____

6 Priya purchased $2\frac{5}{8}$ pounds of apples and $3\frac{7}{8}$ pounds of oranges at the farmers market. What was the total weight of the fruit Priya purchased?

(A) $1\frac{2}{8}$ (B) $5\frac{1}{8}$ (C) $6\frac{4}{8}$ (D) $7\frac{2}{8}$

Spiral Review

7 Which fractions are equivalent to $\frac{2}{10}$? Select *all* that apply.

(A) $\frac{1}{5}$ (B) $\frac{4}{16}$ (C) $\frac{6}{30}$ (D) $\frac{20}{50}$

For Problems 8–11, determine the value of the expression.

8 8×7 _____

9 9×3 _____

10 $81 \div 9$ _____

11 $20 \div 5$ _____

Notes:

Sub-Unit

2

Multiplication With Fractions

Unit Story: Finny

Artem Glushchenko/Shutterstock.com

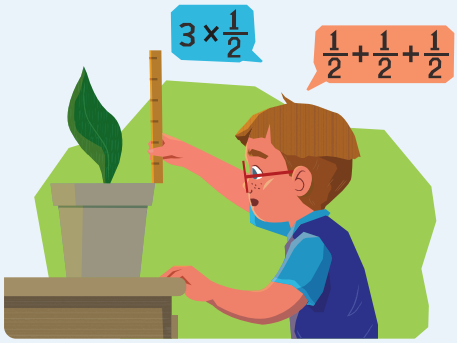
Henry was about to give up on taking care of Finny until he found the instructions. When do you prefer to try things out in math class on your own first, and when do you prefer some help with getting started right away?

Name _____ Date _____

Fraction Flexibility | Visual Fraction Models | 4.NF.4, 4.NF.3.d, SMP.2, SMP.7

Fractions Different Ways

Let's relate descriptions, diagrams, and expressions for groups of fractions.



Warm-Up

eyes on teacher

I can be all of me in math class. What do mathematicians do when they have a challenging math problem to solve?

Activity 1 Using Addition and Multiplication

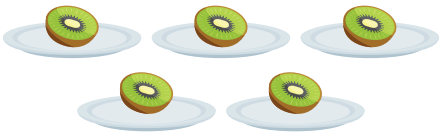
Write an addition expression and a multiplication expression to represent each story problem.

1. Henry had 3 baskets. He put 4 garden shovels in each basket. How many garden shovels did he put in the baskets?

addition expression: _____

multiplication expression: _____

2. Henry had 5 plates. He put $\frac{1}{2}$ of a kiwi on each plate. How many kiwis did he put on the plates?



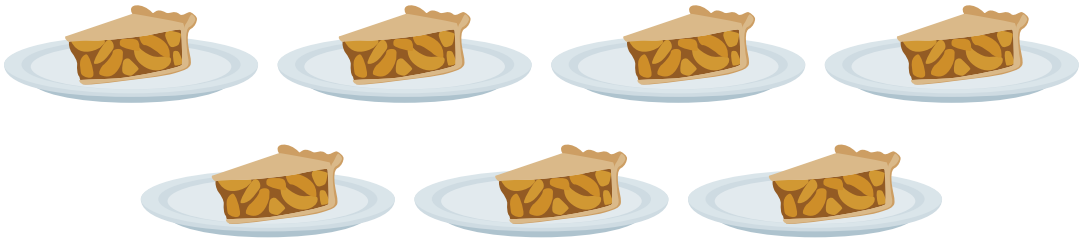
addition expression: _____

multiplication expression: _____

Name _____ Date _____

Using Addition and Multiplication (continued)

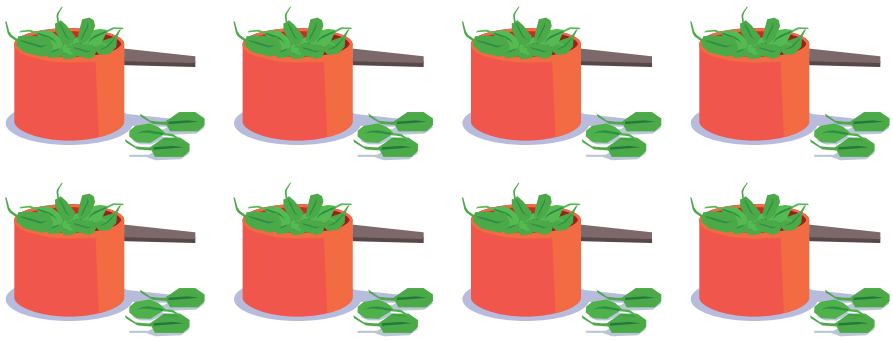
3 Henry prepared 7 plates with $\frac{1}{8}$ of a pie on each plate.
How much pie did he put on the plates?



addition expression: _____

multiplication expression: _____

4 Henry scooped $\frac{1}{3}$ cups of spinach 8 times. How many cups of spinach did he scoop?



addition expression: _____

multiplication expression: _____

5 Discuss

- How do your expressions connect with the images?
- How do the multiplication expressions relate to the addition expressions?

Activity 2

Name _____ Date _____

What Could It Mean?

The expressions in Problems 6 and 7 can be interpreted as representing equal groups. For each problem:

- **Write a situation that the expression could represent.**
- **Create a drawing to represent the situation.**

6 $8 \times \frac{1}{2}$

Show your thinking.

situation:

drawing:

Name _____ Date _____

What Could It Mean? (continued)

7 $7 \times \frac{1}{6}$

Show your thinking.

situation:

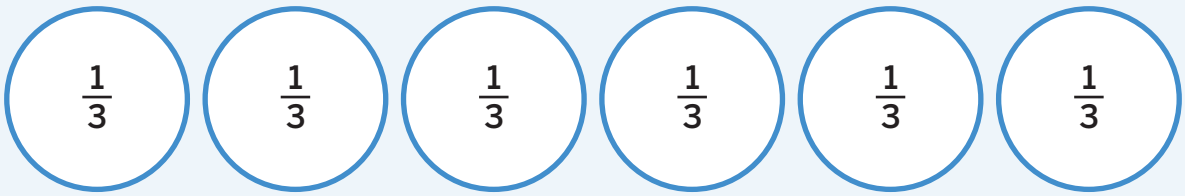
drawing:

8 Discuss

- How did you decide what each number in each expression would represent in your situation?
- How does your drawing represent the whole number and the fraction?

Summary 3.08

Situations involving equal groups of a unit fraction can be represented using repeated addition or multiplication. In a multiplication expression, the whole number represents the number of equal groups of the unit fraction.



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

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

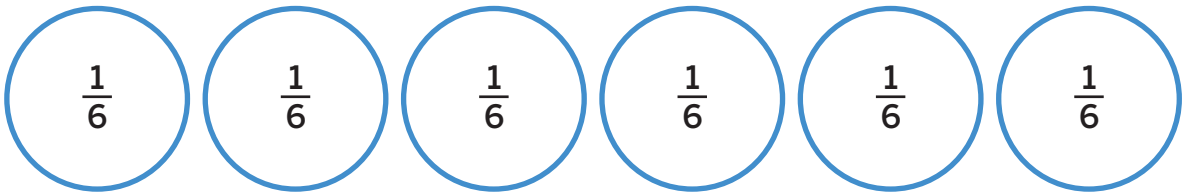
Practice 3.08

1 Han had 5 plates. He put $\frac{1}{8}$ of a veggie pizza on each plate. Write a multiplication expression to represent how much pizza Han put on the plates.

_____

Name _____ Date _____

2 Which expression represents the drawing?



A 5×6

B $6 \times \frac{1}{6}$

C $5 \times \frac{1}{6}$

D $5 + \frac{1}{6}$

3 Create a drawing to represent the expression $4 \times \frac{1}{3}$.

Draw

For Problems 4 and 5, consider the expression $6 \times \frac{1}{3}$.

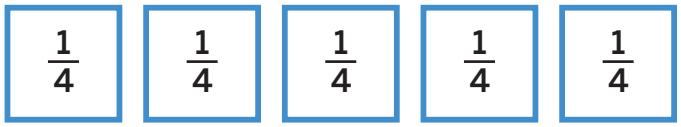
4 Write a story that the expression could represent.

5 Create a drawing to represent the expression.

Draw

Name _____ Date _____

6 Write an addition expression and a multiplication expression to represent the drawing.



addition expression: _____

multiplication expression: _____

Spiral Review

7 Use factors to determine 2 fractions that are equivalent to $\frac{30}{50}$.

Show or explain your thinking.

answer: _____

For Problems 8–11, determine the value of the expression.

8 90 ÷ 10 _____

9 32 ÷ 4 _____

10 9 × 6 _____

11 11 × 3 _____

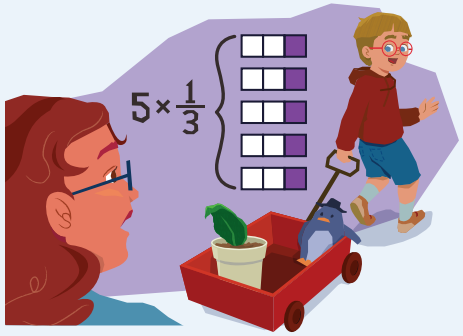
Unit 3
Lesson
9

Name _____ Date _____

Fraction Flexibility 4.NF.4, 4.NF.4.a, 4.NF.4.c, SMP.2, SMP.3, SMP.6

Equal Groups of Fractions

Let's look at diagrams and expressions that can help when multiplying a whole number and a fraction.



Warm-Up

eyes on teacher

I can be all of me in math class.
What word or phrase describes you in math class?

Activity 1

Card Sort: Expressions, Diagrams, and Products

Hands-On

You and your partner will be given a set of cards with multiplication expressions and diagrams.

1 Match each expression with the diagram that represents the same value. Record the letter of the matching diagram in the table.

Expression	Diagram	Product
$3 \times \frac{1}{4}$		
$4 \times \frac{1}{3}$		
$5 \times \frac{1}{5}$		
$6 \times \frac{1}{8}$		

Name _____ Date _____

Card Sort: Expressions, Diagrams, and Products (continued)

2 Determine the product of each expression in Problem 1. Use the matching diagrams if they are helpful. Record the products in the table in Problem 1. Be prepared to explain your thinking.

3 **Discuss**

Join with another pair to compare your matches and your products.

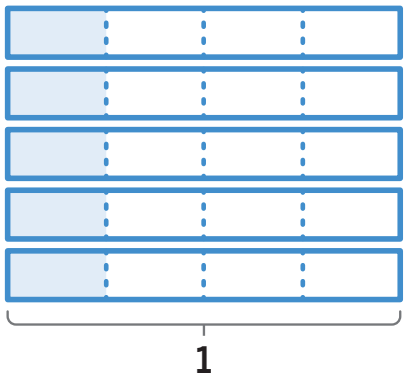
- How did you determine the product of each expression?
- What patterns do you notice when you compare each product to its expression?

Activity 2

Name _____ Date _____

Different Representations

4 Write a multiplication expression to represent the diagram. Then determine the product of the expression.



expression: _____ **product:** _____

5 Draw a diagram that represents the expression $6 \times \frac{1}{3}$. Then determine the product of the expression.

Draw

expression: $6 \times \frac{1}{3}$ **product:** _____

Name _____ Date _____

Different Representations (continued)

6 Draw a diagram and write a multiplication expression to represent the product $\frac{7}{2}$.

Draw

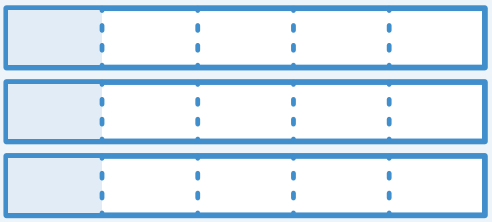
expression: _____ **product:** $\frac{7}{2}$

7 **Discuss**

How can you determine the product of a whole number and a unit fraction?

Summary 3.09

To multiply a whole number and a unit fraction, multiply the whole number and the numerator of the unit fraction to determine the numerator of the product, which represents the number of equal parts. The denominator of the product is the same as the denominator of the unit fraction, which represents the size of the equal parts.



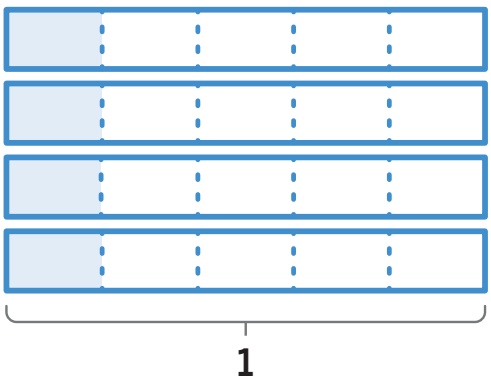
expression: $3 \times \frac{1}{5}$

product: $\frac{3}{5}$

Practice 3.09

1 Which diagram represents the expression $4 \times \frac{1}{5}$? Complete the sentence.

A



B

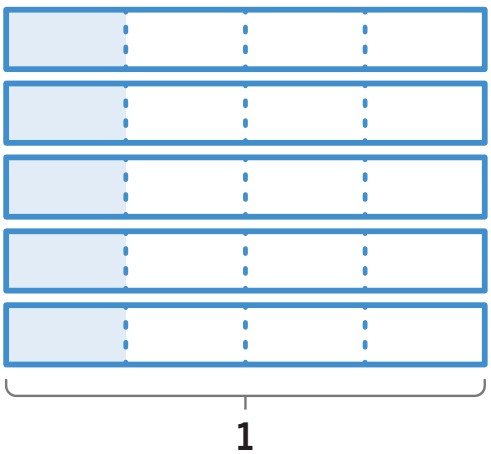


Diagram _____ represents the expression.

Name _____ Date _____

2 Select the value of the expression $4 \times \frac{1}{5}$.

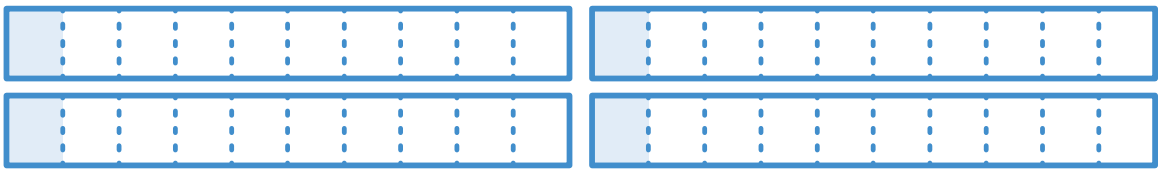
(A) $\frac{4}{20}$ (B) $\frac{4}{5}$ (C) $\frac{5}{4}$ (D) $\frac{20}{5}$

3 Draw a diagram to represent the expression $4 \times \frac{1}{2}$. Then determine the product of the expression.

Draw

answer: _____

4 Write a multiplication expression to represent the diagram. Then determine its value.



expression: _____ **value:** _____

Name _____ Date _____

Spiral Review

5 On Monday, Han walked his puppy $\frac{2}{5}$ miles. On Tuesday, he walked his puppy $\frac{4}{5}$ miles. On Wednesday, he walked his puppy $\frac{3}{5}$ miles. Draw a visual model to represent how many miles Han walked his puppy over the 3 days. Then write an expression and determine the solution.

Show your thinking.

expression: _____ **answer:** _____

6 In a recent election, $\frac{2}{10}$ of voters voted *yes* for a new mall in town. Use factors or multiples to determine 2 equivalent fractions to $\frac{2}{10}$.

Show or explain your thinking.

answer: _____

For Problems 7–11, determine the value of the expression.

7 $84 \div 7$ _____

8 2×7 _____

9 $15 \div 3$ _____

10 7×6 _____

11 $55 \div 11$ _____

Unit 3
Lesson
10

Name _____ Date _____

Fraction Flexibility 4.NF.4.b, 4.NF.4, 4.NF.4.c, SMP.2, SMP.3, SMP.8

Fractions in the Soil

Let's use diagrams to help us multiply whole numbers and any fraction.

Warm-Up

eyes on teacher

I am a doer of math.
Think of a math problem you enjoyed solving. Why did you enjoy it?

Activity
1

Potting Soil

Use the given diagrams to help represent each story problem. Then write a multiplication expression to represent the problem and complete the sentence.

Show your thinking.

1 Henry fills 5 small jars with potting soil to share with his friends. Each jar can fit $\frac{3}{4}$ cups of soil. How many cups of soil are in the small jars?

expression: _____

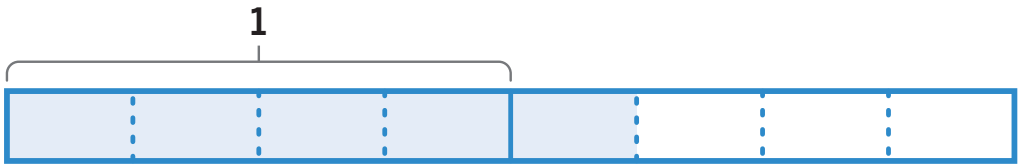
There are _____ cups of soil in the small jars.

Name _____ Date _____

Potting Soil (continued)

Show your thinking.

2 Henry has some soil left. He takes 3 large jars and puts $\frac{5}{4}$ cups of soil in each jar. How many cups of soil are in the large jars?



expression: _____

There are _____ **cups of soil in the large jars.**

Activity 2

Name _____ Date _____

How Do We Multiply?

This diagram represents a value of $\frac{1}{6}$.

Draw a similar diagram that represents each expression.
Then use your diagram to determine the product of the expression.

Show your thinking.

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

answer: _____

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

answer: _____

Name _____ Date _____

How Do We Multiply? (continued)

Show your thinking.

5 $2 \times \frac{5}{6}$

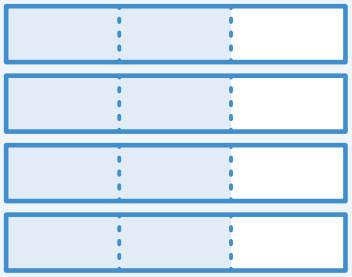
answer: _____

6 $4 \times \frac{5}{6}$

answer: _____

Summary 3.10

To multiply a whole number and any fraction, multiply the whole number and the numerator of the fraction to determine the numerator of the product, which represents the number of equal parts. The denominator of the product is the same as the denominator of the fraction, which represents the size of the equal parts.

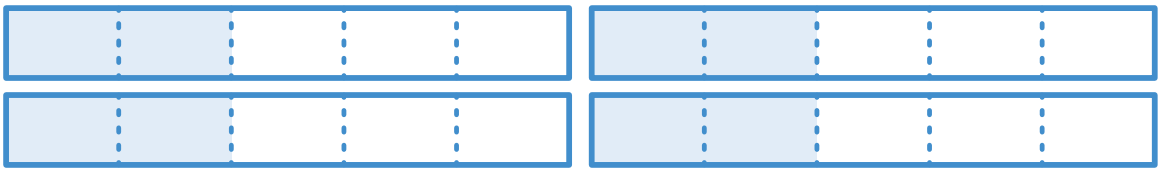


expression: $4 \times \frac{2}{3}$

product: $\frac{8}{3}$

Practice 3.10

1 Write a multiplication expression to represent the diagram. Then determine the product.

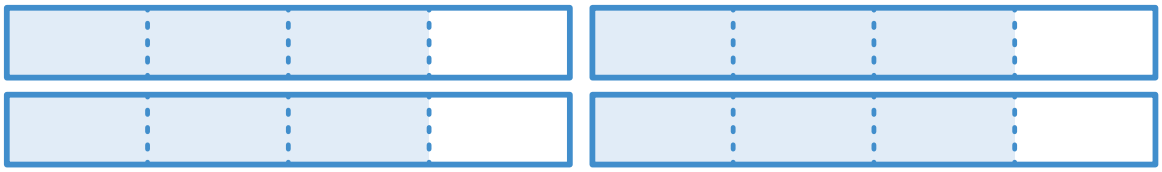


expression: _____

product: _____

Name _____ Date _____

2 Select the multiplication expression that represents the diagram.



(A) $4 \times \frac{3}{4}$ (B) $2 \times \frac{3}{4}$ (C) $4 \times \frac{1}{4}$ (D) $3 \times \frac{3}{4}$

3 Draw a diagram to represent the expression $3 \times \frac{7}{8}$.

Draw

4 Explain how you could use your diagram in Problem 3 to determine the product of the expression $3 \times \frac{7}{8}$.

Name _____ Date _____

5 Draw a diagram that represents the expression $5 \times \frac{2}{3}$. Then determine the product.

Draw

answer: _____

Spiral Review

For Problems 6 and 7, fill in the blank to make the comparison statement true.

6 $\frac{\square}{10} < \frac{3}{10}$

7 $\frac{\square}{12} > \frac{10}{6}$

For Problems 8–11, determine the value of the expression.

8 2×12 _____

9 5×8 _____

10 $30 \div 5$ _____

11 $49 \div 7$ _____

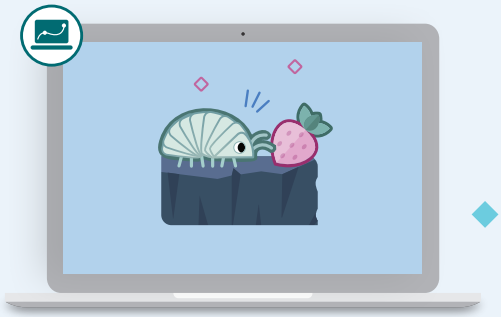
Unit 3
Lesson
11

Name _____ Date _____

Factors and Area Model | Number and Shape Patterns | Fraction Flexibility | 4.NF.4.b, 4.NF.4.a, 4.OA.2, 4.OA.4, SMP.7

Ronnie the Roly Poly

Let's write multiplication expressions in different ways.



I can be all of me in math class. What do mathematicians do when they are not sure how to solve a problem?

Warm-Up

1-2 eyes on teacher

Activity
1

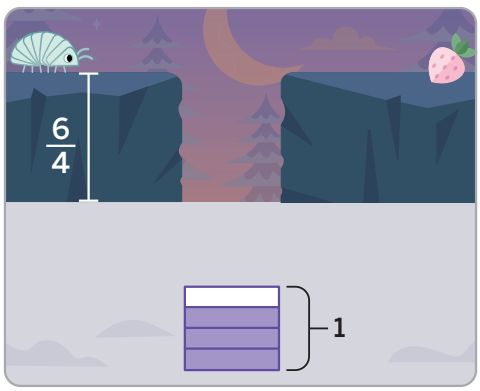
Get the Strawberry

Help Ronnie the Roly Poly get to the strawberry.

3 Determine 2 ways that you can fill the gaps with the given blocks to help Ronnie get to the strawberry.

Number of blocks	Size of blocks
	$\frac{1}{8}$
	$\frac{2}{8}$

4 How many blocks of size $\frac{3}{4}$ are needed to help Ronnie get to the strawberry? Complete the expression.



_____ × $\frac{3}{4}$

Name _____ Date _____

Get the Strawberry (continued)

5 Henry wants to help Ronnie get to the strawberry using 4 blocks. What size of blocks should he use? Complete the expression.

4 × _____

6 List as many multiplication expressions as you can to represent the value of $\frac{8}{12}$.

Activity 2

Name _____ Date _____

Fill the Gaps!

Complete the tables using different sized blocks and numbers of blocks to fill the gaps for Ronnie so he can get to the strawberry.

7 Determine 3 different ways to fill the gaps.

Number of blocks	Size of blocks	Multiplication expression

Name _____ Date _____

Fill the Gaps! (continued)

8 Determine 2 different ways to fill the gaps.

Number of blocks	Size of blocks	Multiplication expression

9 Discuss

- Are there other multiplication expressions that could represent $\frac{8}{10}$? How do you know?
- Are there other multiplication expressions that could represent $\frac{5}{6}$? How do you know?

10 Let's compare expressions.

Summary 3.11

Equivalent multiplication expressions can be used to represent non-unit fractions. Every non-unit fraction is a multiple of a unit fraction, and some non-unit fractions are multiples of other non-unit fractions.

$\frac{7}{9}$	$\frac{8}{9}$
$7 \times \frac{1}{9} = \frac{7}{9}$	$4 \times \frac{2}{9} = \frac{8}{9}$ $2 \times \frac{4}{9} = \frac{8}{9}$ $8 \times \frac{1}{9} = \frac{8}{9}$

Practice 3.11

For Problems 1–6, determine the missing factor that makes the equation true.

1. $\frac{10}{3} = \_\_\_\_\_ \times \frac{1}{3}$

2. $\frac{10}{3} = \_\_\_\_\_ \times \frac{2}{3}$

3. $\frac{10}{3} = \_\_\_\_\_ \times \frac{5}{3}$

4. $\frac{4}{5} = 4 \times \_\_\_\_\_$

5. $\frac{4}{5} = 2 \times \_\_\_\_\_$

6. $\frac{6}{8} = 2 \times \_\_\_\_\_$

Name _____ Date _____

7 Draw 2 different diagrams that are equivalent to $\frac{6}{8}$. Then write the multiplication expression that the diagram represents.

Draw

expression: _____

expression: _____

8 Write 4 different multiplication expressions that are equivalent to $\frac{10}{12}$.

$\frac{10}{12}$ = _____ × _____

$\frac{10}{12}$ = _____ × _____

$\frac{10}{12}$ = _____ × _____

$\frac{10}{12}$ = _____ × _____

Name _____ Date _____

9 Determine whether each expression is *equal to* $\frac{9}{10}$ or *not equal to* $\frac{9}{10}$. Place a check mark in the correct column.

	Equal to $\frac{9}{10}$	Not equal to $\frac{9}{10}$
$9 \times \frac{1}{10}$		
$3 \times \frac{3}{10}$		
$4 \times \frac{2}{10}$		
$4 \times \frac{5}{10}$		

Spiral Review

10 Determine whether each statement is *true* or *false*. Place a check mark in the correct column.

	True	False
$\frac{4}{5}$ is greater than $\frac{5}{4}$.		
$\frac{10}{18}$ is greater than $\frac{3}{9}$.		
$\frac{7}{8}$ is greater than $\frac{3}{4}$.		
$\frac{75}{100}$ is greater than $\frac{3}{4}$.		

For Problems 11–14, determine the value of the expression.

11 12×6 _____

12 8×6 _____

13 $45 \div 5$ _____

14 $54 \div 9$ _____

Name _____ Date _____

Fraction Flexibility 4.NF.4.c, 4.NF.4., 4.NF.4.b, SMP.2, SMP.3, SMP.7

Making Banana Bread

Let's solve real-world problems with fractions.

We are a math community.
How is being part of a math community helpful to mathematicians?

Warm-Up

eyes on teacher

Activity 1 Banana Bread

Clare likes to make banana bread to share with her friends and family. Here is Clare's recipe for 1 loaf of banana bread.

1. On Monday, Clare made 2 loaves of banana bread to share with her family. Complete the table to show how much of each ingredient she used.

Ingredient	Multiplication expression	Total amount of ingredient
bananas		
butter		
baking soda		
sugar		
eggs		
flour		

Name _____ Date _____

Banana Bread (continued)

2 On Tuesday, Clare wants to make 4 loaves of banana bread to share with her friends, but she is not sure whether she has enough butter and sugar.

- If Clare has 3 cups of butter and 2 cups of sugar, does she have enough to make 4 loaves of banana bread?
- If she does not have enough for 4 loaves, how many loaves of banana bread can she make with what she has?

Show or explain your thinking.

Summary 3.12

Real-world problems about equal groups of fractions can be solved by multiplying whole numbers and fractions.

A recipe for a loaf of wheat bread calls for $\frac{5}{4}$ teaspoons of salt. How many teaspoons of salt are needed to make 3 loaves of wheat bread?

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

$$3 \times \frac{5}{4} = \frac{3 \times 5}{4} = \frac{15}{4}$$

$\frac{15}{4}$ **teaspoons**

Practice 3.12

1 A veterinarian spends $\frac{5}{6}$ hours performing 1 spay surgery on a puppy. If the veterinarian has 3 spay surgeries scheduled, how many hours will it take?

Show your thinking.

answer: _____

Name _____ Date _____

2 The table shows the amount of each ingredient for 1 batch of tomato soup. Complete the table to show how much of each ingredient Diego needs to make 3 batches of tomato soup.

Ingredient	Multiplication expression	Total amount of ingredient
$\frac{1}{2}$ large onion		
$\frac{3}{2}$ cups vegetable stock		
$\frac{7}{2}$ cups canned tomatoes		
$\frac{3}{4}$ teaspoons sea salt		

3 The recipe explains that the tomato soup can be made creamy by adding $\frac{2}{3}$ cups of coconut milk. If Diego has 2 cups of coconut milk, does he have enough to make 3 batches of creamy tomato soup? Explain your thinking.

Name _____ Date _____

4 Priya ran $\frac{8}{10}$ miles every day for 5 days. What was the total distance Priya ran over the 5 days?

(A) $\frac{8}{50}$ miles (B) $\frac{40}{50}$ miles (C) 4 miles (D) $6\frac{2}{50}$ miles

Show your thinking.

Spiral Review

5 Circle the *greater* fraction.

Show or explain your thinking.

$\frac{4}{9}$ or $\frac{8}{15}$

For Problems 6–10, determine the value of the expression.

6 $36 \div 6$ _____

7 7×4 _____

8 $45 \div 9$ _____

9 3×12 _____

10 $18 \div 9$ _____

Sub-Unit

3

Working With Tenths, Hundredths, and Line Plots

Unit Story: Finny

New Africa/Shutterstock.com

With a little help, Henry learned from the mistakes he made taking care of Finny. When is a time you made a mistake in math class that actually helped you understand something better?

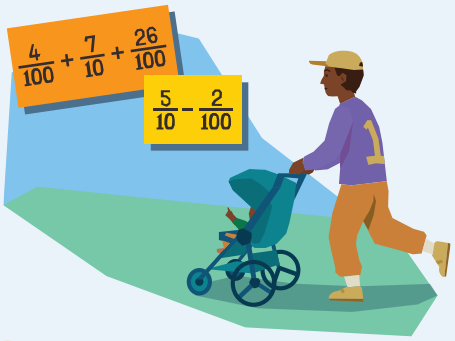
Unit 3
Lesson
13

Name _____ Date _____

Factors and Area Models | Circles, Fractions, and Decimals | Fraction Flexibility | 4.NF.5, 4.NF.1, 4.OA.4, SMP.2, SMP.7

Tenths and Hundredths, Together

Let's add tenths and hundredths.



I can be all of me in math class.
How can you make sure your ideas are heard while working with a partner in math class?

Warm-Up

eyes on teacher

Activity 1 Tenths and Hundredths

1 Complete the table with equivalent fractions in tenths or hundredths. If there is no possible equivalent fraction, write *none*.

Tenths	Hundredths
$\frac{4}{10}$	
	$\frac{62}{100}$
$\frac{1}{10}$	
	$\frac{50}{100}$
$\frac{12}{10}$	
	$\frac{125}{100}$
	$\frac{200}{100}$
	$\frac{90}{100}$

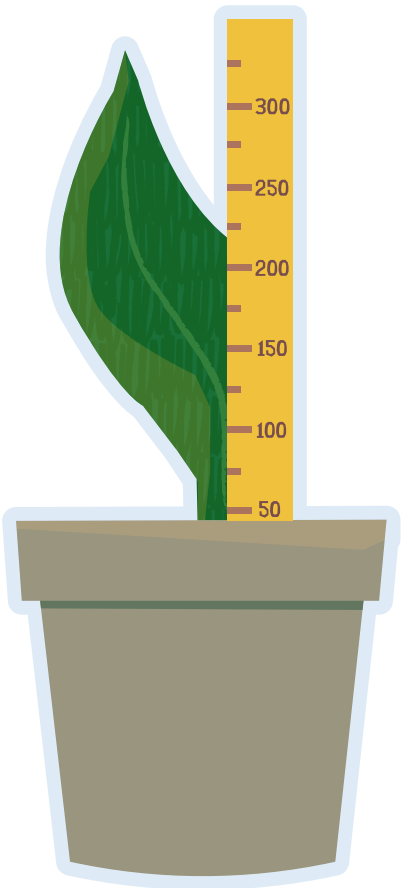
Name _____ Date _____

Tenths and Hundredths (continued)

2 Discuss

Join with a partner to compare your work for Problem 1.

- How did you determine equivalent fractions for the fractions in the table?
- Which fractions did not have an equivalent tenth or hundredth? Why was there no equivalent fraction?



Activity 2

Name _____ Date _____

Which Denominator?

Evaluate the expressions using any strategy.

Show your thinking.

3 $\frac{4}{100} + \frac{3}{10}$

answer: _____

4 $\frac{50}{100} + \frac{2}{10}$

answer: _____

5 $\frac{15}{100} + \frac{4}{10}$

answer: _____

Name _____ Date _____

Which Denominator? (continued)

Show your thinking.

6 $\frac{30}{100} + \frac{7}{10}$

answer: _____

7 $\frac{120}{100} + \frac{4}{10}$

answer: _____

Summary 3.13

Fractions with denominators of 10 and 100 can be added using equivalent fractions.

$$\frac{2}{10} + \frac{60}{100}$$

$$\frac{2 \times 10}{10 \times 10} = \frac{20}{100}$$

$$\frac{20}{100} + \frac{60}{100} = \frac{80}{100}$$

$$\frac{2}{10} + \frac{60}{100}$$

$$\frac{60 \div 10}{100 \div 10} = \frac{6}{10}$$

$$\frac{2}{10} + \frac{6}{10} = \frac{8}{10}$$

hundredth 1 part of 100 equal parts.

tenth 1 part of 10 equal parts.

Practice 3.13

1 Complete the table with equivalent fractions in tenths or hundredths.

Tenths	Hundredths
$\frac{8}{10}$	
	$\frac{30}{100}$
$\frac{40}{10}$	
	$\frac{160}{100}$

Name _____ Date _____

For Problems 2 and 3, evaluate the expression using any strategy.

Show your thinking.

2 $\frac{1}{10} + \frac{3}{100}$

answer: _____

3 $\frac{24}{100} + \frac{4}{10}$

answer: _____

4 Determine whether each equation is *true* or *false*. Place a check mark in the correct column.

	True	False
$\frac{35}{100} + \frac{6}{10} = \frac{95}{100}$		
$\frac{1}{10} + \frac{15}{100} = \frac{16}{100}$		
$\frac{4}{10} + \frac{3}{100} = \frac{43}{10}$		
$\frac{70}{100} + \frac{2}{10} = \frac{9}{10}$		
$\frac{5}{100} + \frac{5}{100} = \frac{10}{100}$		

Name _____ Date _____

Spiral Review

5 Draw a diagram and evaluate the expression $3 \times \frac{1}{8}$.

Draw

diagram:

answer: _____

6 Which statements are true? Select *all* that apply.

(A) $\frac{5}{5} < \frac{3}{4}$

(B) $\frac{3}{2} < \frac{7}{4}$

(C) $\frac{4}{6} = \frac{8}{14}$

(D) $\frac{3}{8} > \frac{1}{4}$

For Problems 7–11, determine the value of the expression.

7 6×8 _____

8 5×10 _____

9 9×7 _____

10 $32 \div 8$ _____

11 $72 \div 6$ _____

Unit 3
Lesson
14

Name _____ Date _____

Circles, Fractions, and Decimals | Fraction Flexibility | 4.NF.5, SMP.7, SMP.8

What's Missing?

Let's add more tenths and hundredths.

Warm-Up eyes on teacher

I am a doer of math.
How might your ability to do something new change after you have had time to practice?

Activity 1 Card Sort: Less Than, Equal to, or Greater Than 1

Hands-On

Your group will be given a set of cards with addition expressions.

1. Sort the cards based on whether the value of the expression is *less than 1*, *equal to 1*, or *greater than 1*.

Less than 1	Equal to 1	Greater than 1

2. Visit another group's card sort.
   - Did they sort the cards the same way as your group?
   - For any cards that do not match, consider which placement you agree with.
   - Leave a note for the group members to discuss.

Name _____ Date _____

Card Sort: Less Than, Equal to, or Greater Than 1 (continued)

3 Return to your group's card sort.

- Discuss any notes left for your group and revise your sort using what you learned from other groups.
- Record the expressions from the cards in the correct column of the table.

Less than 1	Equal to 1	Greater than 1

Activity 2

Name _____ Date _____

What's Missing?

Each equation is missing a fraction in tenths or hundredths. Determine the fraction that makes each equation true.

Show your thinking.

4 $\frac{16}{100} + \frac{4}{10} =$ _____

5 $\frac{110}{100} +$ _____ $= \frac{15}{10}$

Name _____ Date _____

What's Missing? (continued)

Show or explain your thinking.

6 _____ + $\frac{7}{10} = 1\frac{90}{100}$

Summary 3.14

You can determine missing values in addition equations involving tenths and hundredths by using equivalent fractions and what you know about adding fractions.

$$\frac{3}{10} + \underline{\quad} = \frac{50}{100}$$

$$\frac{3 \times 10}{10 \times 10} = \frac{30}{100}$$

$$\frac{50}{100} - \frac{30}{100} = \frac{20}{100}$$

Practice 3.14

1 Determine whether each expression has a value less than 1, equal to 1, or greater than 1. Place a check mark in the correct column.

	Less than 1	Equal to 1	Greater than 1
$\frac{8}{10} + \frac{20}{100}$			
$\frac{49}{100} + \frac{4}{10}$			
$\frac{3}{10} + \frac{70}{100}$			
$\frac{4}{10} + \frac{64}{100}$			

Name _____ Date _____

For Problems 2–4, use tenths or hundredths to determine the fraction that makes the equation true.

Show your thinking.

2 $\frac{3}{10} + \_\_\_\_\_ = \frac{37}{100}$

3 $\frac{13}{10} + \frac{7}{100} = \_\_\_\_\_$

4 $\_\_\_\_\_ + \frac{7}{10} = \frac{100}{100}$

Name _____ Date _____

5 Complete each addition expression so that the values are *less than 1*, *equal to 1*, and *greater than 1*.

Less than 1	Equal to 1	Greater than 1
$\frac{\quad}{100} + \frac{\quad}{10}$	$\frac{\quad}{100} + \frac{\quad}{10}$	$\frac{\quad}{100} + \frac{\quad}{10}$

Spiral Review

6 Order the fractions from *least* to *greatest*.

Show or explain your thinking.

$\frac{3}{5}, \frac{3}{8}, \frac{1}{2}$

answer: _____

For Problems 7–10, determine the value of the expression.

7 $60 \div 12$ _____

8 $33 \div 11$ _____

9 4×9 _____

10 8×10 _____

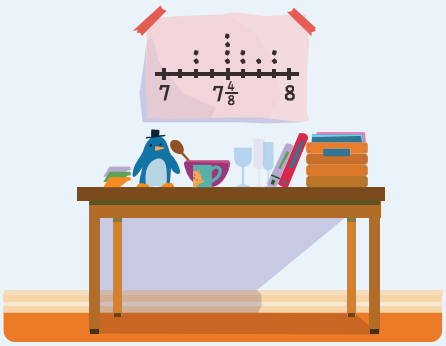
Unit 3
Lesson
15

Name _____ Date _____

Measuring and Plotting | Fraction Flexibility | 4.MD.4, 4.NF.3.c, 4.MD.2, SMP.2, SMP.6

Plotting the Data

Let's analyze data on line plots.



We are a math community. How can you show someone you value their ideas in math class even if their ideas are different from yours?

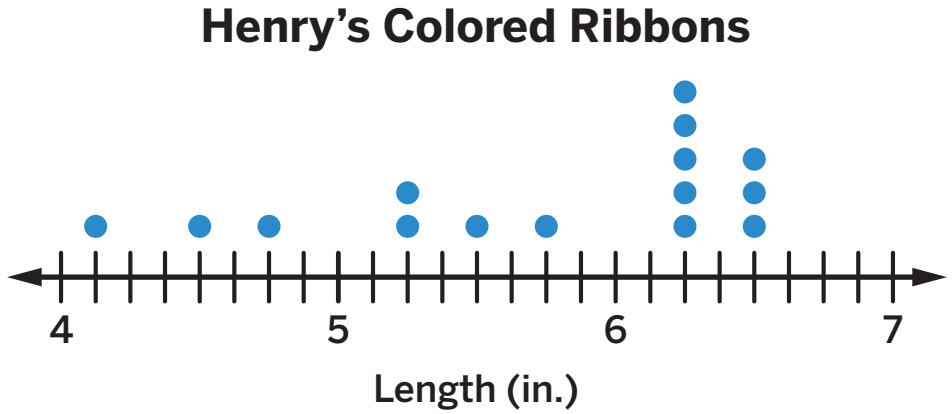
Warm-Up

eyes on teacher

Activity 1

Henry's Colored Ribbons

Henry wants to use leftover colored ribbons to decorate picture frames. He measured the length of all the pieces of ribbon to the nearest $\frac{1}{8}$ inch and displayed the data on the line plot shown.



1 What is the length of the *shortest* piece of ribbon? _____

2 What is the length of the *longest* piece of ribbon? _____

Name _____ Date _____

Henry's Colored Ribbons (continued)

3 If Henry placed the shortest and longest pieces of ribbon end to end along 1 side of a picture frame, what would be the combined length?

Show or explain your thinking.

answer: _____

4 Henry said the most common length of colored ribbon he has is $6\frac{1}{4}$ inches. Do you agree or disagree with Henry? Explain your thinking.

Activity 2

Name _____ Date _____

Height of Plants

At the library, Henry researched the heights of different kinds of plants and plotted the data on the line plot shown.

Height of Plants

Height (in.)

5 Represent the data on the line plot.

10	$9\frac{1}{8}$	$8\frac{6}{8}$	$7\frac{6}{8}$	$9\frac{4}{8}$	$8\frac{1}{8}$	$7\frac{6}{8}$	$9\frac{4}{8}$	$8\frac{1}{8}$	$9\frac{4}{8}$

6 What is the *most common* plant height? _____

7 What is the *shortest* plant height? _____

8 What is the *tallest* plant height? _____

Name _____ Date _____

Height of Plants (continued)

9 What is the difference between the tallest plant height and the shortest plant height?

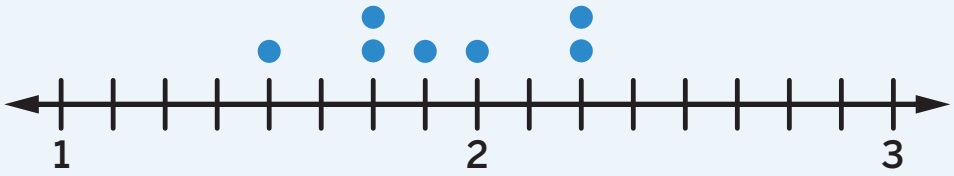
Show or explain your thinking.

answer: _____

Summary 3.15

Line plots can be used to organize and represent a set of fractional measurements. Then they can be used to analyze and answer questions about the data.

Length of Crayons



Length (in.)

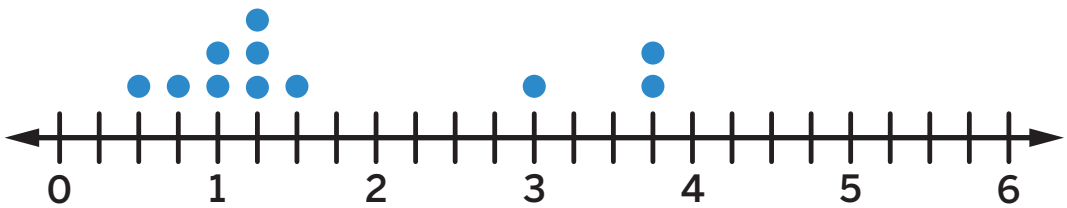
What is the shortest length of crayon?

$1\frac{4}{8}$ inches

Practice 3.15

1 Clare researched the amount of erosion, by month, at beaches near her town. She plotted the data on the line plot shown. Add these values to the line plot.

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



Erosion (in.)

Name _____ Date _____

Use the information for Problems 2–4.
Jada measured a set of colored pencils to the nearest $\frac{1}{8}$ inch. Here is a list of the measurements.

$4\frac{5}{8}$ $2\frac{1}{8}$ $5\frac{2}{8}$ $4\frac{3}{8}$ $6\frac{1}{8}$ $6\frac{4}{8}$ $5\frac{2}{8}$

2 Plot the measurement data on the line plot.

Jada's Colored Pencils

Length (in.)

3 What is the difference in length between the longest colored pencil and the shortest colored pencil?

Show your thinking.

answer: _____

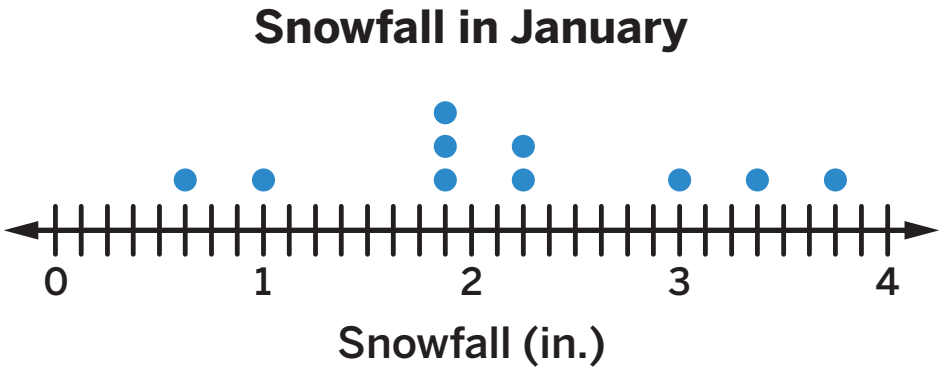
4 What is the combined length of the longest colored pencil and the shortest colored pencil?

Show your thinking.

answer: _____

Name _____ Date _____

5 The line plot shows the amount of snowfall, in inches, in Jada's town on the first 10 days in January.



Determine the difference in snowfall between the day with the most amount of snow and the day with the least amount of snow.

_____

Spiral Review

6 Which fraction is the *greatest*?

(A) $\frac{7}{10}$ (B) $\frac{9}{8}$

(C) $\frac{5}{4}$ (D) $\frac{10}{6}$

For Problems 7–11, determine the value of the expression.

7 12×4 _____

8 5×6 _____

9 3×4 _____

10 $50 \div 5$ _____

11 $32 \div 4$ _____

Unit 3
Lesson
16

Name _____ Date _____

Measuring and Plotting | Fraction Flexibility | 4.MD.4, 4.MD.2, 4.NF.4.c, SMP.2, SMP.6

Farm Fresh

Let's solve problems involving measurement data on line plots.

Warm-Up

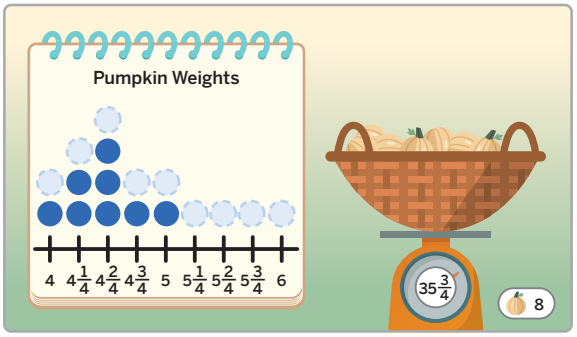
1 eyes on teacher

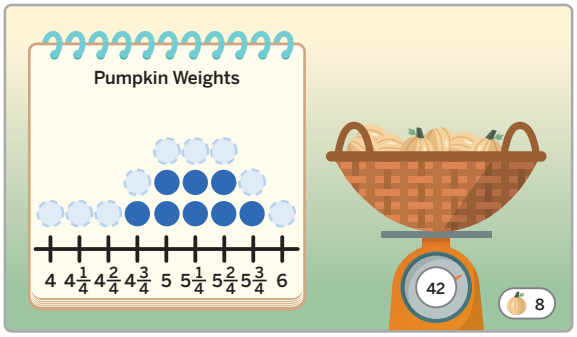
We are a math community.
How can you use the perspective of others to help you learn in math class today?

Activity 1 Mixed Vegetables

2 Discuss

Compare the 2 line plots. What is similar? What is different?



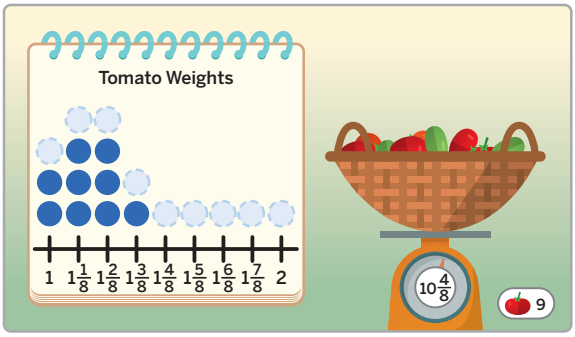


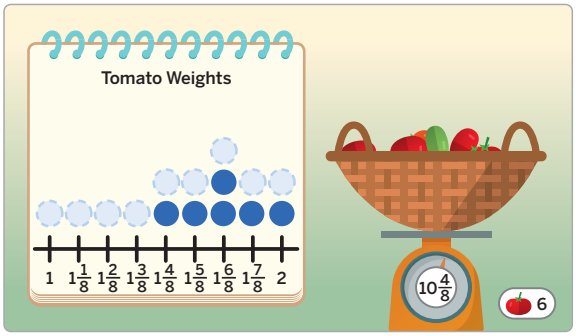
Name _____ Date _____

Mixed Vegetables (continued)

3-4 Discuss

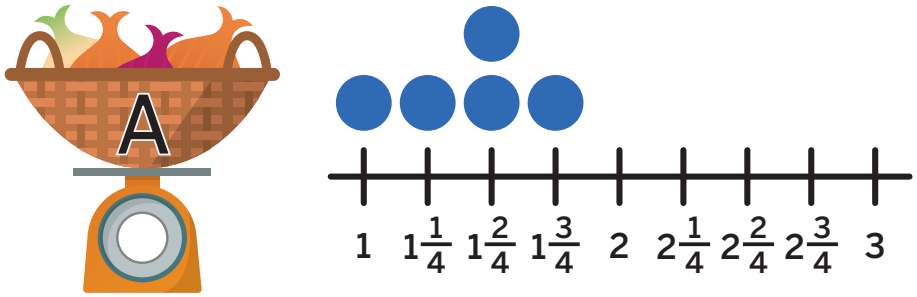
Compare the 2 line plots. What is similar? What is different?

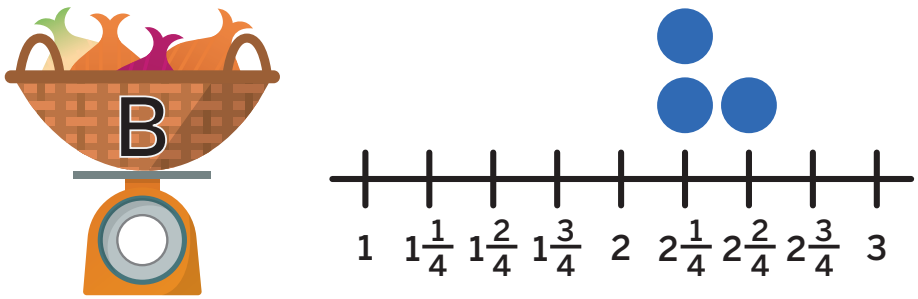




5 Discuss

2 baskets of onions are shown. Which basket weighs more? How do you know?

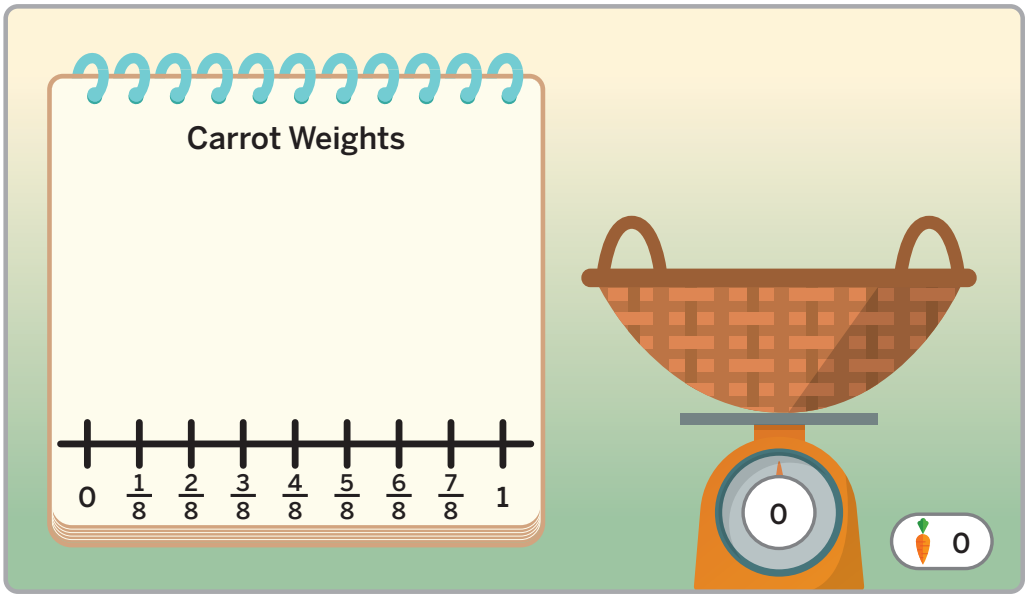




Name _____ Date _____

Can You Dig It?

6 Add at least 4 carrot weights to the line plot to represent a basket with a total weight of 3 pounds.

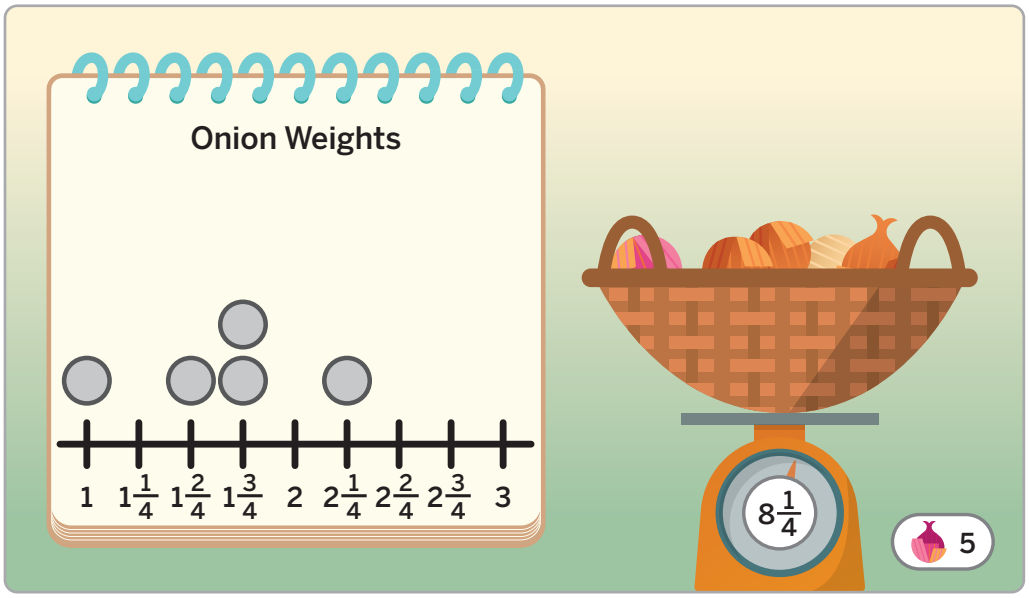


Show or explain your thinking.

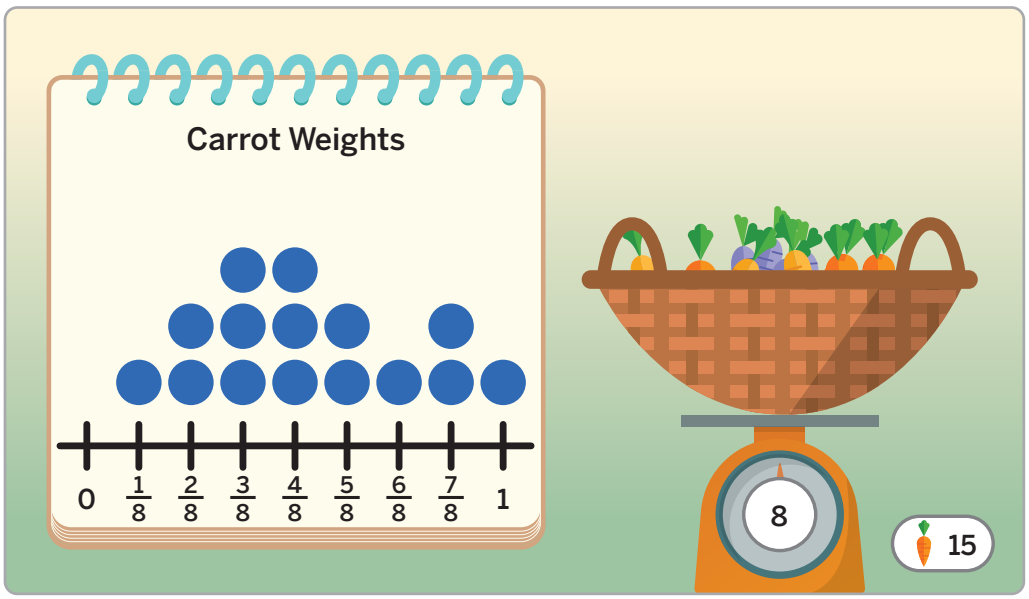
Name _____ Date _____

Can You Dig It? (continued)

7 This basket of onions weighs $8\frac{1}{4}$ pounds. Add onion weights to the line plot so that it represents a basket with a weight of 12 pounds.



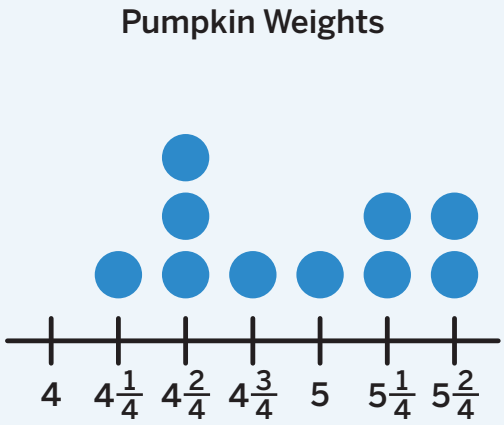
8 This basket of carrots weighs 8 pounds. Show what the line plot could look like if 3 pounds were removed. Draw X's through data points you want to remove.



Summary 3.16

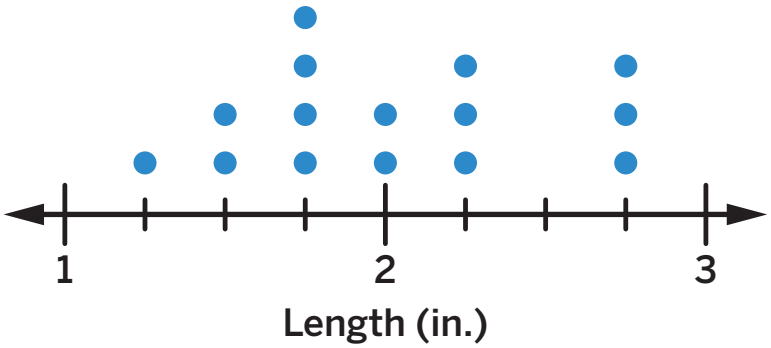
You can solve problems involving sets of measurements represented on line plots by using what you know about operations with fractions.

This line plot represents pumpkins that weigh a total of 49 pounds. What could the line plot look like if it represented pumpkins that weighed a total of 58 pounds?



Practice 3.16

1 Shawn measured the lengths of caterpillars that hatched in a butterfly exhibit. He plotted the data on a line plot. What is the difference in inches between the longest and shortest caterpillars Shawn measured?

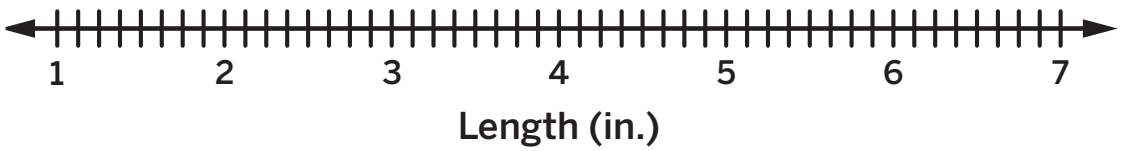


Name _____ Date _____

Use the information for Problems 2 and 3.
Diego measured the lengths of leaves he found while hiking.
Here is a list of the measurements.

$1\frac{5}{8}$ $4\frac{4}{8}$ $2\frac{2}{8}$ $6\frac{3}{8}$ $5\frac{2}{8}$ $6\frac{6}{8}$ $5\frac{3}{8}$ $6\frac{6}{8}$ $4\frac{4}{8}$ $6\frac{7}{8}$

2 Plot the measurement data on the line plot.



Length (in.)

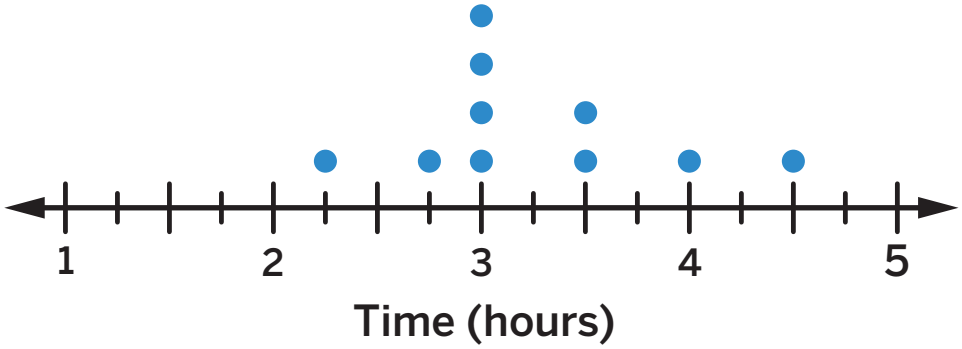
3 What is the total length, in inches, of leaves that are between 4 and 6 inches long?

Show your thinking.

answer: _____

Name _____ Date _____

4 A piano teacher had his students record the amount of time they spent practicing piano over the last week. The line plot shows the amount of time in hours.



What is the difference between the most number of hours spent practicing and least number of hours spent practicing?

_____

Spiral Review

5 Which statements are true about the fraction $\frac{5}{8}$? Select *all* that apply.

- (A) The fraction is less than $\frac{8}{10}$.
- (B) The fraction is less than $\frac{3}{6}$.
- (C) The fraction is greater than $\frac{3}{4}$.
- (D) The fraction is greater than $\frac{3}{5}$.

For Problems 6–9, determine the value of the expression.

6 $21 \div 7$ _____

7 $40 \div 8$ _____

8 4×9 _____

9 12×2 _____

Math at Work

Did you know that plants make their own food? They use sunlight, water, and carbon dioxide to create sugar. They can only use a fraction, about $\frac{2}{100}$, of the light that reaches Earth. Even with this small amount, they have enough to grow.

Horticulturists take care of plants, such as flowers, trees, and grasses. They collect data about plant growth and might use fractions and decimals to measure plant heights and display them on a line plot.

Kues/Shutterstock.com, Proonty/Shutterstock.com

Math in the World

At 379.1 feet, Hyperion is the tallest tree in the world. It is located in California's Redwood National Park. Write this height as a fraction.

Stephen Moehle/Shutterstock.com

Math Mindset

How can diagrams or equations help you add and subtract fractions or multiply fractions by whole numbers?

Unit 4

From Hundredths to Hundred Thousands

Big Ideas in This Unit

CC1 Measuring and Plotting
CC2 Multi-Digit Numbers
Number and Shape Patterns
CC3 Circles, Fractions and Decimals
Visual Fraction Models
CC4 Connected Problem Solving

Questions for Investigation

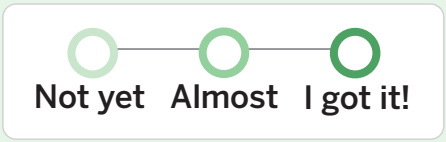
- How does place value extend to numbers less than 1?
- How does place value extend to multi-digit numbers greater than 1,000?

Explore: Different Units
When is a ten not a ten?

Unit Story: Myles and the Loggerheads
In this story, Myles describes his experiences working with his mother at the local Sea Turtle Patrol.

Watch Your Knowledge Grow

This is the math you'll explore in this unit. Rate your understanding to see how your knowledge grows!



I can . . .	Before	After
Use decimal notation to represent fractions or mixed numbers with denominators of 10 or 100.		
Represent a fraction with a denominator of 10 with an equivalent fraction with a denominator of 100.		
Represent a fraction with a denominator of 100 with an equivalent fraction with a denominator of 10.		
Compare 2 decimals to the hundredths place using <, >, or =.		
Read, write, and represent multi-digit numbers.		
Describe the relationship between the digits in multi-digit numbers.		
Compare 2 multi-digit numbers.		
Round multi-digit whole numbers to different place values and estimate sums.		
Add multi-digit whole numbers using the standard algorithm.		
Subtract multi-digit whole numbers using the standard algorithm.		

Sub-Unit

1

Decimals With Tenths and Hundredths

Unit Story: Myles and the Loggerheads

randy andy/Shutterstock.com

Myles observed the volunteers helping the turtles.

What can he use to keep track of the turtles they are helping?

Name _____ Date _____

Multi-Digit Numbers | Building Toward 4.NBT.1, SMP.1, SMP.7

Explore: Different Units

When is a ten not a ten?

Warm-Up

eyes on teacher

We are a math community. What does it look like and sound like to be engaged in math?

Discuss What do you notice? What do you wonder?

Activity

Name _____ Date _____

Hands-On

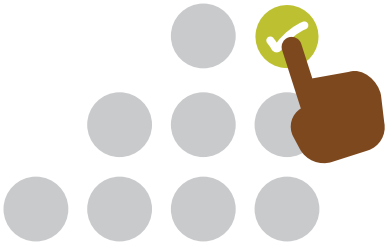
You and your partner will be given base-ten blocks. Complete each row of the table based on the value of the given block.

Ways to be a mathematician

1 I can take my time to think about a challenging problem before trying to solve it.

Not yet — Almost — I got it!

2 I can see how ideas are connected and use patterns to help solve problems.



Not yet — Almost — I got it!

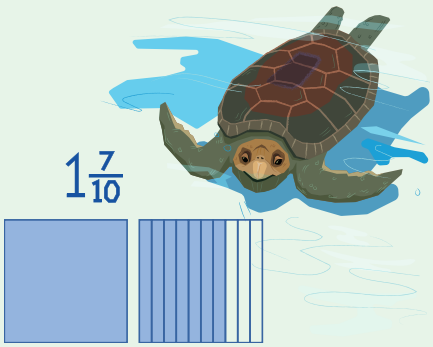
Unit 4
Lesson
2

Name _____ Date _____

Visual Fraction Models | Circles, Fractions, and Decimals | 4.NF.6, SMP.2, SMP.7

A New Way to Write Tenths

Let's learn another way to represent fractions and mixed numbers with a denominator of 10.



Warm-Up

eyes on teacher

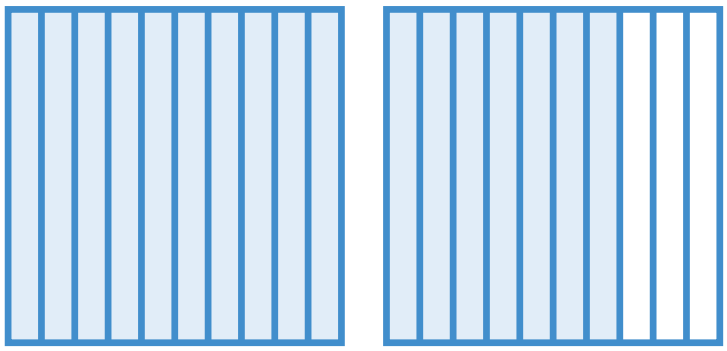
We are a math community. What does it mean to be a part of a math community?

Activity
1

What Is a Decimal?

Each large square in the diagrams represents 1.

This diagram represents 1.7 and $1\frac{7}{10}$.



1.7 is a type of number called a decimal. 1.7 is equivalent to $1\frac{7}{10}$.

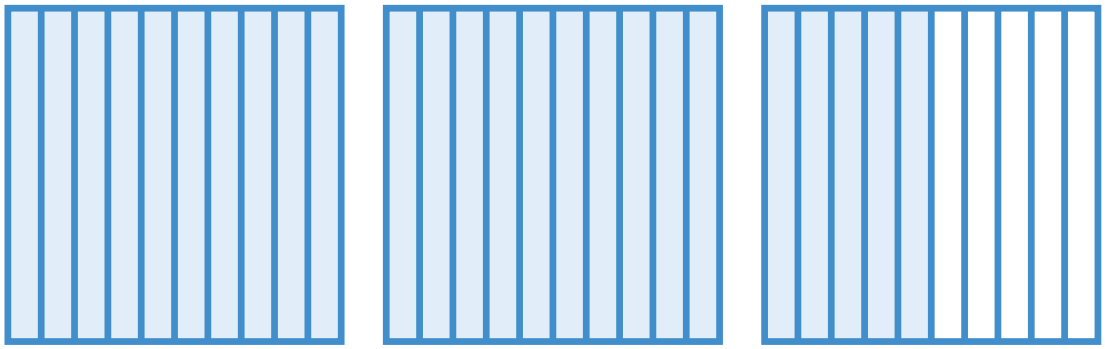
1 Discuss

- What does the 1 in 1.7 represent?
- What does the 7 in 1.7 represent?
- What is the purpose of the dot in 1.7?

Name _____ Date _____

What Is a Decimal? (continued)

This diagram represents 2.5 and a mixed number that is equivalent to 2.5.



2 What mixed number does the diagram represent? _____

3 In the decimal 2.5, what does the 2 represent? _____

4 In the decimal 2.5, what does the 5 represent? _____

5 **Discuss**

- What do you notice about the decimals and mixed numbers you worked with in Problems 1–4? What is similar? What is different?
- What do you wonder about decimals?

Activity 2

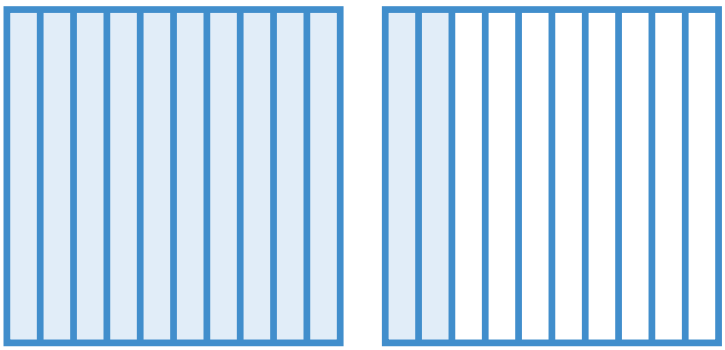
Name _____ Date _____

Connecting Representations

Each large square in the diagrams represents 1.

Use the given information to fill in the missing diagram, fraction, mixed number, or decimal. Be prepared to explain your thinking.

6 diagram:



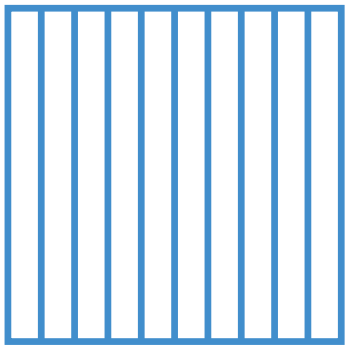
fraction or mixed number: _____

decimal: _____

Name _____ Date _____

Connecting Representations (continued)

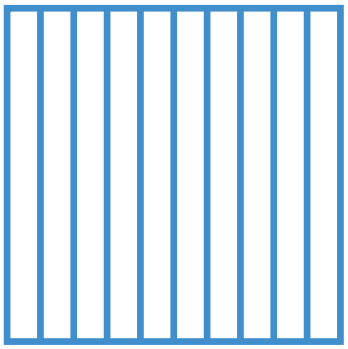
7 **diagram:**



fraction or mixed number: $\frac{8}{10}$

decimal: _____

8 **diagram:**



fraction or mixed number: _____

decimal: 0.6

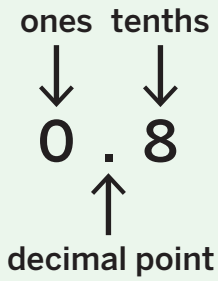
9 **Discuss**

Consider how the representations in Problems 6–8 are connected.

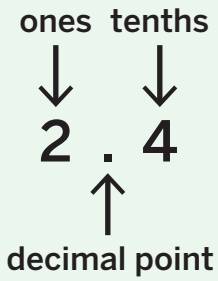
- How does each decimal represent the diagram?
- How does each decimal represent the fraction or mixed number?
- How are tenths represented in each diagram, fraction or mixed number, and decimal?

Summary 4.02

Decimals are another way to represent fractions and mixed numbers with a denominator of 10. Fractions, mixed numbers, and decimals that represent the same value are read aloud the same way. In a decimal, the tenths place is to the right of the **decimal point**.



zero and eight tenths



two and four tenths

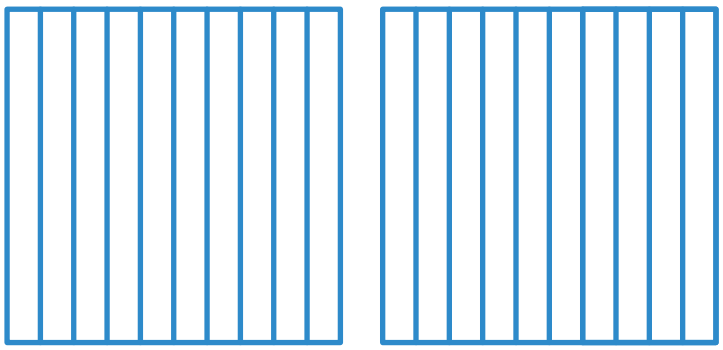
decimal A way to write fractional values using single digits for each place value.

decimal point A dot that separates the whole number part from the fractional part of a decimal number.

Practice 4.02

1 Each large square represents 1. Use the given information to fill in the missing diagram and decimal.

diagram:



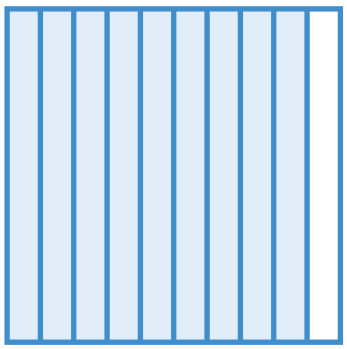
mixed number: $1\frac{6}{10}$

decimal: _____

Name _____ Date _____

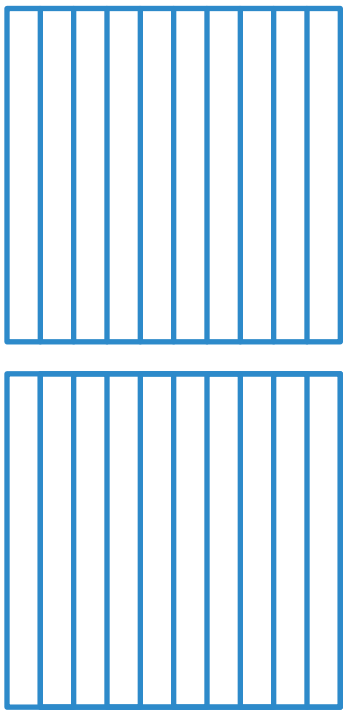
The large square in Problems 2 and 3 represents 1. Use the given information to fill in the missing diagram or decimal.

2 **diagram:**



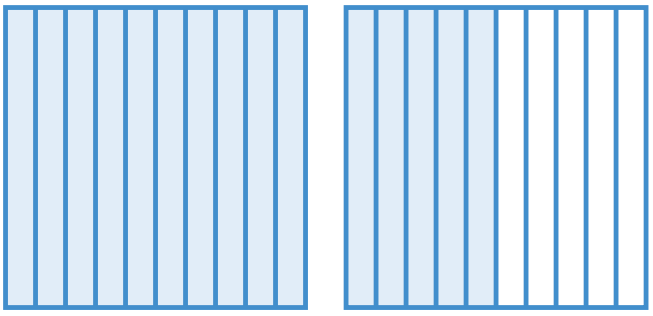
decimal: _____

3 **diagram:**



decimal: 1.1

4 What fraction or mixed number does the diagram represent?



(A) $\frac{5}{10}$

(B) $1\frac{4}{10}$

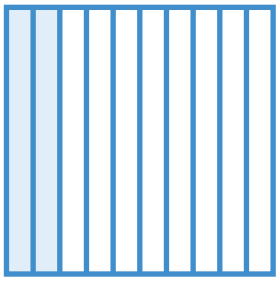
(C) $1\frac{5}{10}$

(D) $1\frac{6}{10}$

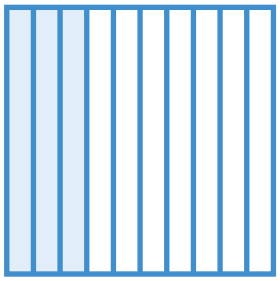
Name _____ Date _____

5 Each large square represents 1. Which diagram represents 0.3?

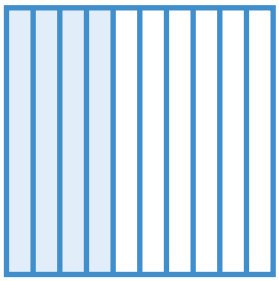
A



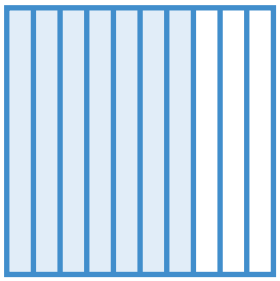
B



C



D



Spiral Review

6 A rectangle has an area of 18 square units. Which pairs of numbers could be the side lengths of the rectangle? Select *all* that apply.

A 1 and 18

B 2 and 9

C 3 and 6

D 4 and 7

E 5 and 3

F 8 and 10

For Problems 7–11, determine the value of the expression.

7 3×6 _____

8 6×9 _____

9 $84 \div 12$ _____

10 $35 \div 5$ _____

11 11×4 _____

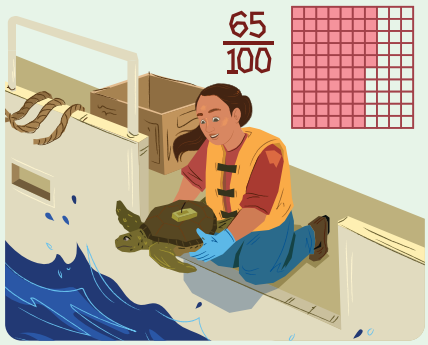
Unit 4
Lesson
3

Name _____ Date _____

Visual Fraction Models | Circles, Fractions, and Decimals | 4.NF.6, SMP.2, SMP.7

A New Way to Write Hundredths

Let's learn about decimals with another place value.



We are a math community. Why is it important to talk about math with others in math class?

Warm-Up

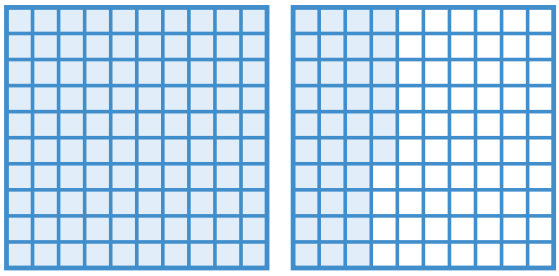
eyes on teacher

Activity
1

Extending Decimals

Each large square in the diagrams represents 1.

This diagram represents 1.36 and a mixed number that is equivalent.



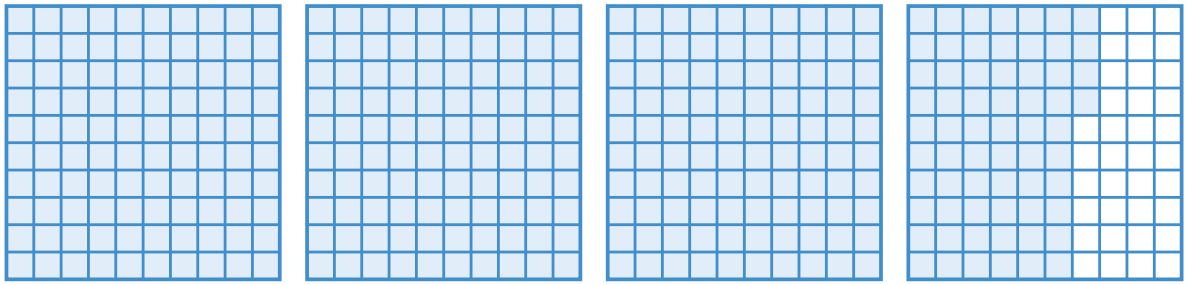
1 Discuss

- What mixed number does the diagram represent?
- What does the 1 in 1.36 represent?
- What does the 36 in 1.36 represent?

Name _____ Date _____

Extending Decimals (continued)

This diagram represents 3.64 and a mixed number that is equivalent.



2 What mixed number does the diagram represent? _____

3 In the decimal 3.64, what does the 3 represent? _____

4 In the decimal 3.64, what does the 64 represent? _____

5 **Discuss**

- What do you notice about the decimals and mixed numbers in Problems 1–4? What is similar? What is different?
- What do you wonder about decimals?

Activity 2

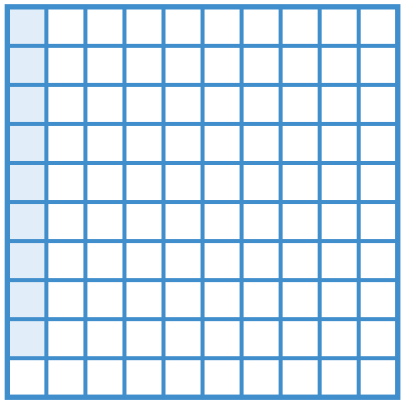
Name _____ Date _____

Representing Hundredths?

Each large square in the diagrams represents 1.

Use the given information to fill in each missing diagram, fraction, mixed number, or decimal. Be prepared to explain your thinking.

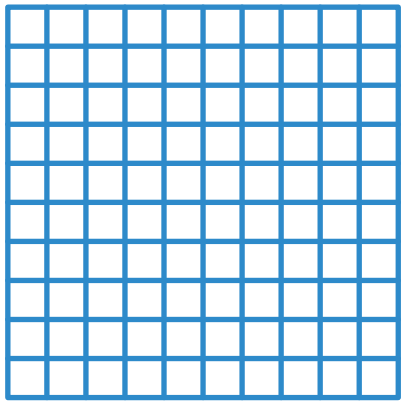
6 diagram:



fraction or mixed number: _____

decimal: _____

7 diagram:



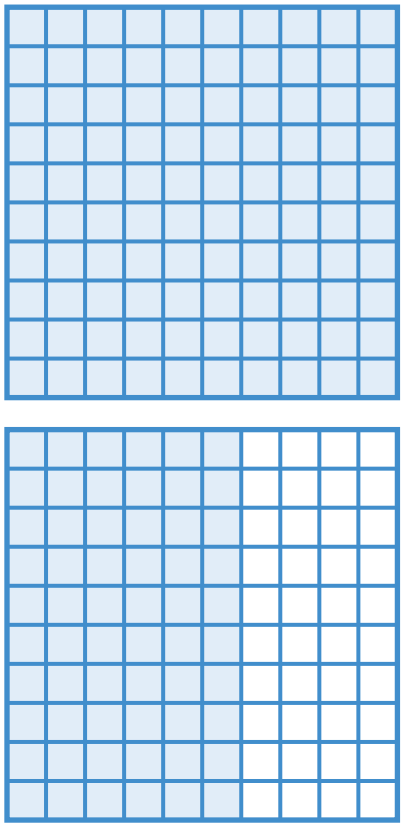
fraction or mixed number: $\frac{55}{100}$

decimal: _____

Name _____ Date _____

Representing Hundredths? (continued)

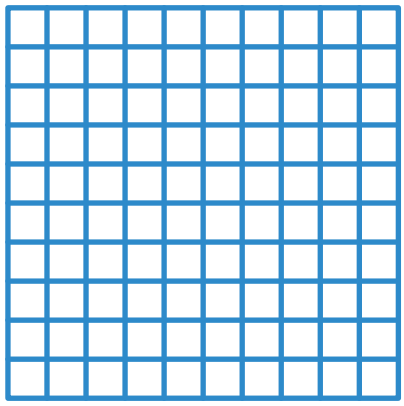
8 diagram:



fraction or mixed number: _____

decimal: _____

9 diagram:

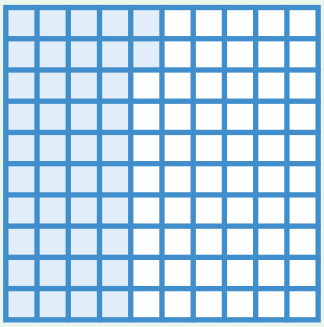


fraction or mixed number: _____

decimal: 0.79

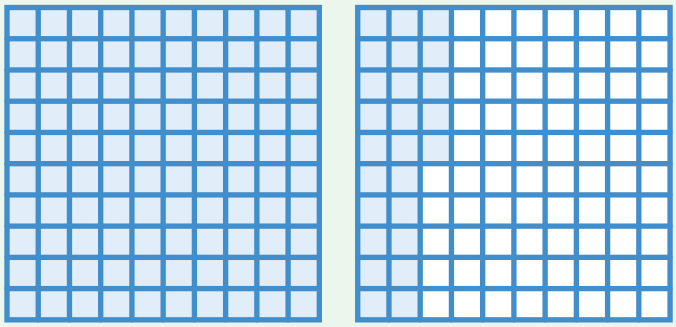
Summary 4.03

The hundredths place of a decimal is to the right of the tenths place. A fraction or mixed number can be written as an equivalent decimal, and both can be represented on the same diagram.



fraction: $\frac{42}{100}$

decimal: 0.42



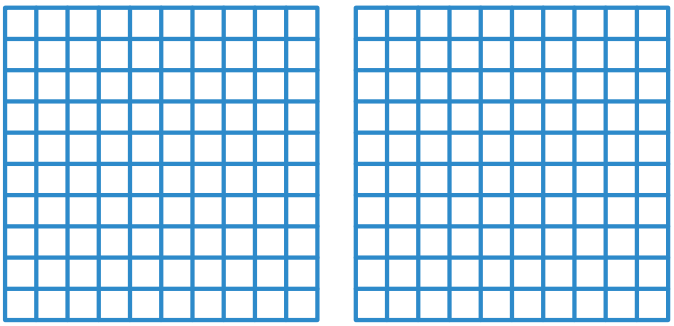
mixed number: $1\frac{25}{100}$

decimal: 1.25

Practice 4.03

1 Each large square represents 1. Use the given information to fill in the missing diagram and decimal.

diagram:



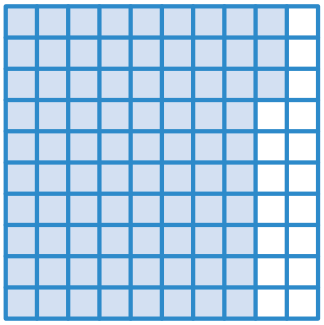
mixed number: $1\frac{24}{100}$

decimal: _____

Name _____ Date _____

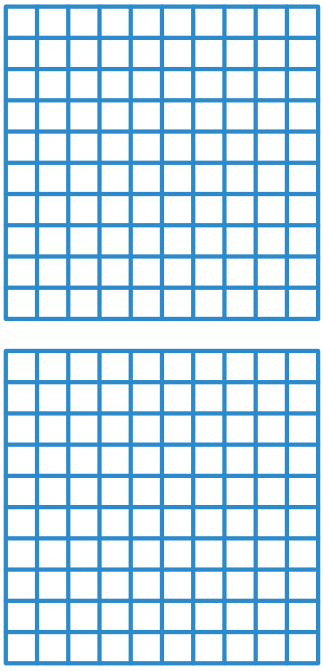
The large square in Problems 2 and 3 represents 1. Use the given information to fill in the missing diagram or decimal.

2 **diagram:**



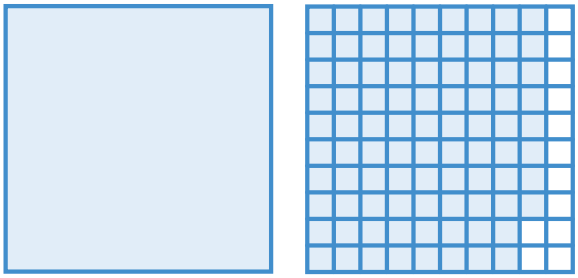
decimal: _____

3 **diagram:**



decimal: 1.49

4 What mixed number does the diagram represent?



(A) $1\frac{72}{100}$

(B) $1\frac{78}{100}$

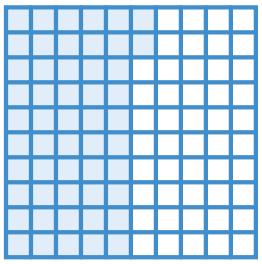
(C) $1\frac{82}{100}$

(D) $1\frac{88}{100}$

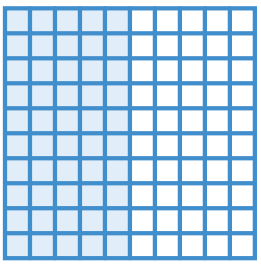
Name _____ Date _____

5 Each large square represents 1. Which diagram represents 0.52?

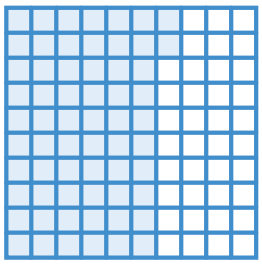
A



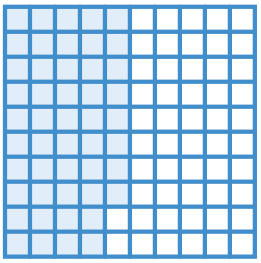
B



C

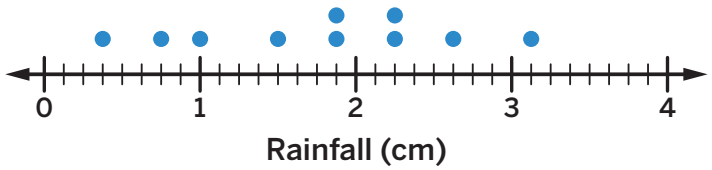


D



Spiral Review

6 The line plot shows the amount of rainfall in centimeters in Shawn's town on the first 10 days of January. Determine the difference in rainfall between the day with the *most* amount of rain and the day with the *least* amount of rain.



answer: _____

For Problems 7–10, determine the value of the expression.

7 $28 \div 7$ _____

8 $72 \div 8$ _____

9 12×9 _____

10 6×4 _____

Unit 4
Lesson
4

Name _____ Date _____

Visual Fraction Models | Circles, Fractions, and Decimals | 4.NF.6, 4.NF.5, SMP.2, SMP.3, SMP.7

Are They Equivalent?

Let's think about equivalent fractions, mixed numbers, and decimals.

I am a doer of math.
Do you prefer to work on math problems alone or with others? Why?

Warm-Up

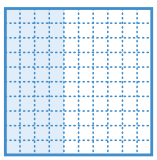
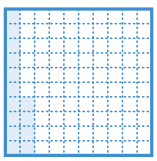
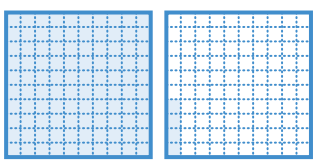
eyes on teacher

Activity 1 Card Sort: Fractions, Mixed Numbers, and Decimals

Hands-On

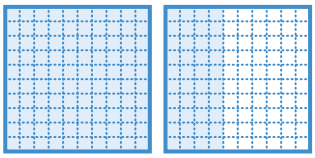
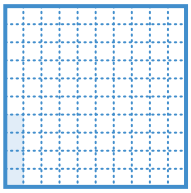
You and your group will be given a set of cards with fractions, mixed numbers, decimals, and diagrams. In the diagrams, each large square represents 1.

1 Sort the cards into groups so that the representations in each group have the same value. Record the groups in the table.

Diagram	Fraction(s)	Decimal(s)
		
		
		

Name _____ Date _____

Card Sort: Fractions, Mixed Numbers, and Decimals (continued)

Diagram	Fraction(s)	Decimal(s)
		
		

2 Join another group and compare your card sorts.

- What similarities and differences do you see in how your groups sorted the cards?
- How did you determine which diagrams, fractions, mixed numbers, and decimals represented the same value?
- If your group makes any changes to your sort based on the discussion, record the changes in the table in Problem 1.

Activity 2

Name _____ Date _____

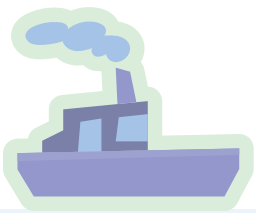
True or False

3 Determine whether each equation in the table is *true* or *false*. Place a check mark in the correct column. For each equation that is false, change 1 number to make it true and write the new equation in the last column. The number on one side of the equal sign should not be identical to the number on the other side. Be prepared to explain your thinking.

Equation	True	False	New equation
$\frac{50}{100} = 0.50$			
$0.05 = 0.5$			
$0.3 = \frac{3}{10}$			
$0.4 = \frac{4}{100}$			
$0.3 = 0.30$			

4 **Discuss**

- For each equation in the table, how did you know whether it was true or false?
- For equations that were false, what helped you determine what numbers to use to make them true?



Name _____ Date _____

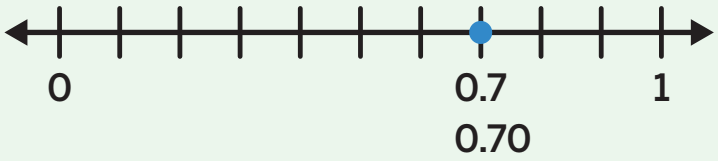
True or False (continued)

5 Jada says that if she locates the numbers 0.05, 0.5, and 0.50 on the number line, she will end up with only 2 points. Do you agree with Jada? Use the number line to explain your thinking.

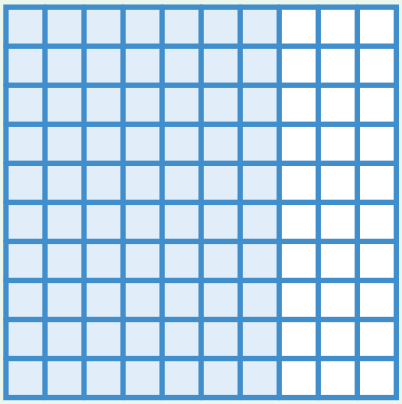
Summary 4.04

Diagrams, number lines, and fractions or mixed numbers can be used to show that 2 decimals represent the same value.

$$\frac{7}{10} = \frac{70}{100}$$



$$0.7 = 0.70$$



Practice 4.04

1 Decide whether each number is equivalent to $\frac{2}{10}$. Select Yes or No for each number.

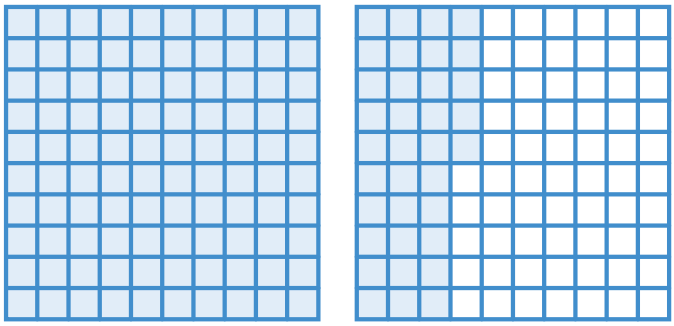
	Yes	No
0.5		
0.2		
$\frac{25}{100}$		
0.20		

2 Decide whether each number is equivalent to $\frac{60}{100}$. Select Yes or No for each number.

	Yes	No
0.06		
$\frac{60}{10}$		
$\frac{6}{10}$		
0.6		

Name _____ Date _____

3 Each large square represents 1. Write a fraction or mixed number and a decimal that represent the diagram.

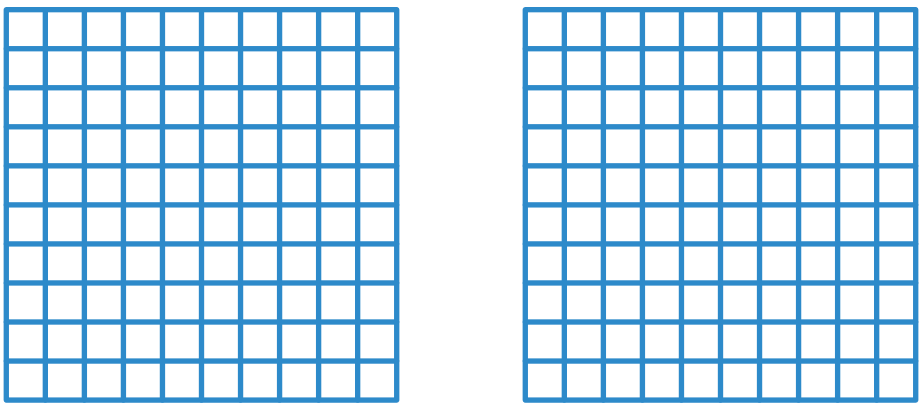


fraction or mixed number: _____

decimal: _____

4 Each large square represents 1. Priya says that 0.4 and $\frac{4}{100}$ are equivalent. Do you agree with Priya? Use the diagrams to help show your thinking.

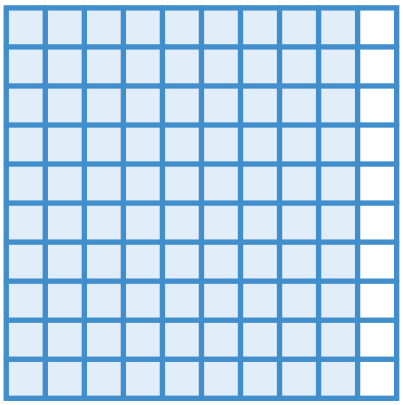
Show or explain your thinking.



answer: _____

Name _____ Date _____

5 The large square represents 1. Write 2 different fractions or mixed numbers and a decimal to represent the diagram.

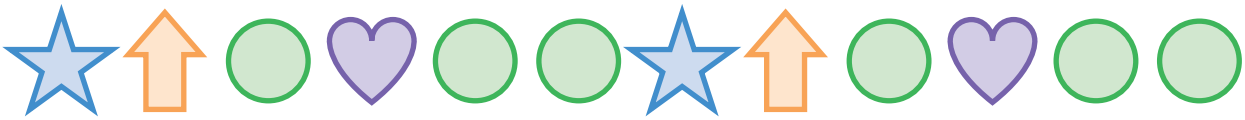


fractions or mixed numbers: _____

decimal: _____

Spiral Review

6 Which shape will be the 30th shape in the pattern?



A 

B 

C 

D 

For Problems 7–12, determine the value of the expression.

7 $32 \div 4$ _____

8 $42 \div 7$ _____

9 11×9 _____

10 8×5 _____

11 12×6 _____

12 $14 \div 2$ _____

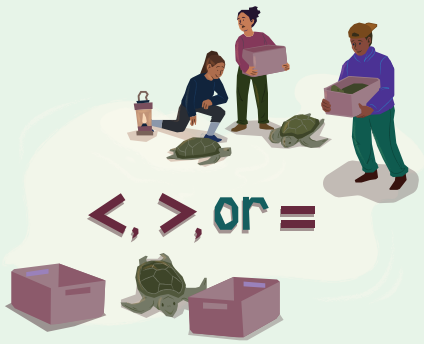
Unit 4
Lesson
5

Name _____ Date _____

Circles, Fractions, and Decimals 4.NF.7, 4.NF.5, SMP.3, SMP.5, SMP.7

How Can You Compare?

Let's reason about the size of decimals to compare them.



Warm-Up eyes on teacher

We are a math community.
How is working with others in math class helpful when trying to solve a problem?

Activity
1

Comparing Animal Weights

To learn more about baby sea turtles and how their sizes compare to other baby animals, Myles researched baby animals' weights in pounds.

Complete each comparison using <, >, or =. Use diagrams or number lines if they are helpful.

1 Compare the weight of a baby sea turtle to the weight of a baby cheetah.

0.01 _____ 0.9

2 Compare the weight of a baby panther to the weight of a baby brown bear.

1.02 _____ 1.20

3 Compare the weight of a baby orangutan to the weight of a baby pig.

3.6 _____ 3.60

Name _____ Date _____

Comparing Animal Weights (continued)

4 Compare the weight of a baby coyote to the weight of a baby swan.

0.54 _____ 0.45

5 Compare the weight of a baby goose to the weight of a baby armadillo.

0.3 _____ 0.30

6 Compare the weight of a baby snake to the weight of a baby emperor penguin.

0.07 _____ 0.7

7 **Discuss**

- Which pairs of decimals could you compare right away? Why?
- Which pairs of decimals were more challenging to compare? Why?

Activity 2

Name _____ Date _____

Mix and Mingle: Comparing Decimals

Hands-On

You will be given a card with a decimal. Compare your decimal to each partner's decimal and record the comparisons using <, >, or = in the table. Use diagrams or number lines if they are helpful.

8 My decimal: _____

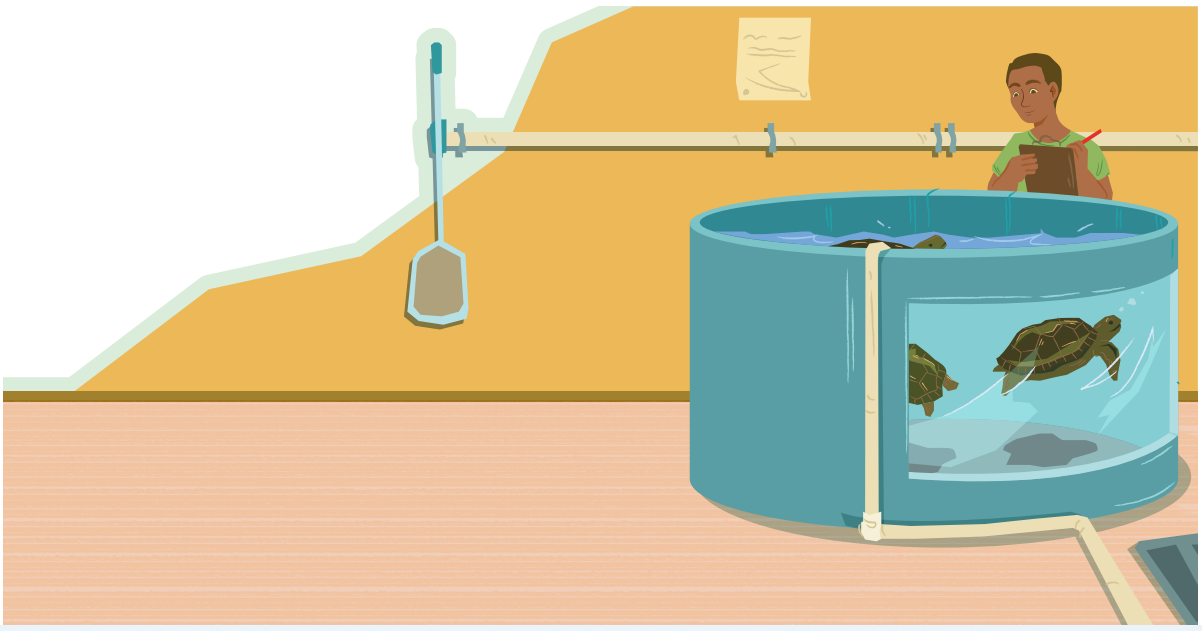
My decimal	<, >, =	My partner's decimal

Name _____ Date _____

Mix and Mingle: Comparing Decimals (continued)

9 Discuss

- How did you use your conjecture from Activity 1 when comparing different numbers?
- Was your conjecture always true? If not, how would you refine your conjecture so that it is always true?



Summary 4.05

When comparing decimals, you can represent the decimal as a fraction or mixed number and use what you know about equivalent fractions to compare. The fraction with the greater value represents the greater decimal. These comparisons are true because the decimals refer to the same whole.

$$0.56 > 0.34$$

$$\frac{56}{100} > \frac{34}{100}$$

$$0.7 < 0.85$$

$$0.7 = \frac{7}{10} = \frac{70}{100}$$

$$\frac{70}{100} < \frac{85}{100}$$

Practice 4.05

For Problems 1–3, complete the comparison using < or >.

1. 0.6 _____ 0.35

2. 0.19 _____ 0.91

3. 2.05 _____ 2.50

Name _____ Date _____

4 A typical golden retriever puppy weighs 0.88 pounds at birth. A typical poodle puppy weighs 0.68 pounds at birth. Write a comparison statement using < or > to compare the typical weights of the puppies.

_____

5 Complete each comparison using <, >, or =.

Decimal	<, >, =	Decimal
0.09		0.9
1.18		1.08
0.35		0.53
0.40		0.4
1		1.01
1.8		1.80
0.5		0.49

Name _____ Date _____

For Problems 6 and 7, write a decimal that will make the comparison statement true.

6 0.3 > _____

7 1.34 < _____

Spiral Review

8 Select *all* the possible pairs of side lengths for a rectangle with an area of 54 square units.

(A) 1 × 54 (B) 2 × 27 (C) 3 × 18

(D) 4 × 16 (E) 5 × 11 (F) 6 × 9

9 List *all* the possible pairs of side lengths for a rectangle with an area of 55 square units.

_____

For Problems 10–14, determine the value of the expression.

10 11 × 5 _____ **11** 2 × 8 _____

12 81 ÷ 9 _____ **13** 48 ÷ 6 _____

14 60 ÷ 5 _____

Name _____ Date _____

Circles, Fractions, and Decimals | 4.NF.7, SMP.1

Build-a-Bot

Let's compare and order decimals from least to greatest.

Warm-Up

1 eyes on teacher

We are a math community. What makes your math class a community?

Activity 1 Decimal Duel

Use the digits 0–9 to make each comparison statement true.

2 5. ___ 2 < 5. ___ 2

3 1. 9 ___ < 1. 9 ___

4 4. ___ 6 > 4. 9 ___

Name _____ Date _____

Decimal Duel (continued)

5 Discuss

- What is one digit that could make both of these comparison statements true?

$6.35 < 6.8$ _____

$6.85 < 6.8$ _____

- What strategy did you use to compare the decimals?

Activity 2

Name _____ Date _____

All in Order

6 Order the numbers from least to greatest: 1.4, 1.17, 0.98

Least Greatest

_____ _____ _____

7 Use the digits 0–9 to fill in the blanks so the numbers are in order from least to greatest.

Least Greatest

7. _____ _____ 7.45 7. _____ _____

8 Use the digits 0–9 to fill in the blanks so the numbers are in order from least to greatest.

Least Greatest

3. _____ _____ _____ . _____ 3. _____ _____

9 Use the digits 0, 3, and 4 to fill in the blanks so the numbers are in order from least to greatest.

Least Greatest

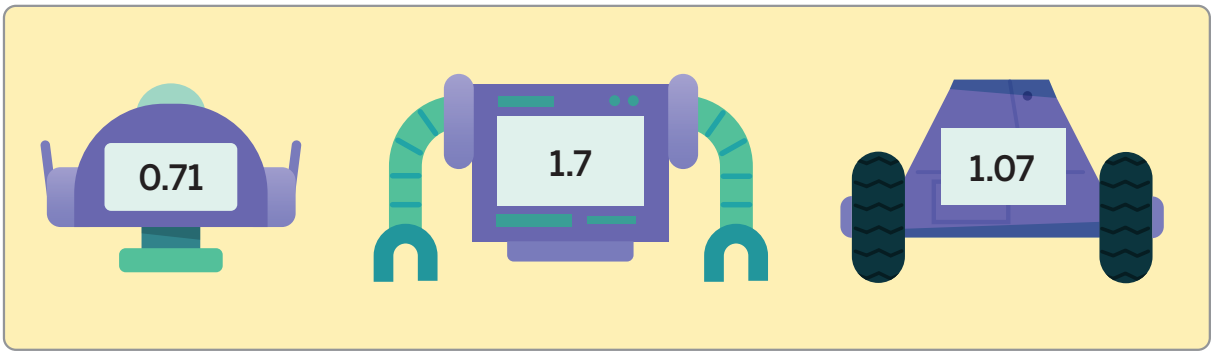
8. _____ _____ 8. _____ _____ 8. _____ _____

Name _____ Date _____

All in Order (continued)

10 Discuss

- Will the order of these decimals make a robot? Why or why not?
- Explain the strategy you used to determine your answer.



Summary 4.06

One strategy for comparing or ordering decimals is to compare the whole numbers first. Then, if necessary, you can compare the digits representing the fractional amounts.

2.6, 0.7, 2.43

0 is the smallest whole number, so 0.7 is the smallest decimal number.

$2.6 = 2\frac{6}{10} = 2\frac{60}{100}$ and $2.43 = 2\frac{43}{100}$

$2\frac{43}{100} < 2\frac{60}{100}$, so the order from least to greatest is 0.7, 2.43, 2.6.

Practice 4.06

For Problems 1–4, order the decimals from *least* to *greatest*.

1 1.95, 0.59, 1.59 _____

2 0.3, 0.03, 0.33 _____

3 1.82, 1.08, 1.8 _____

4 0.7, 1.7, 0.1 _____

Name _____ Date _____

5 Which set of decimals is ordered from *greatest* to *least*?

(A) 0.6, 0.16, 0.68

(B) 0.14, 0.41, 0.4

(C) 0.9, 0.09, 1.9

(D) 0.58, 0.5, 0.45

For Problems 6 and 7, order the decimals from *least* to *greatest*.

Show or explain your thinking.

6 1.06, 1.6, 0.65

answer: _____

7 0.9, 0.08, 0.89

answer: _____

Name _____ Date _____

8 During their migration, monarch butterflies cluster in groves in Pacific Grove, California. Diego measured and recorded the wingspans of 5 monarch butterflies in inches.

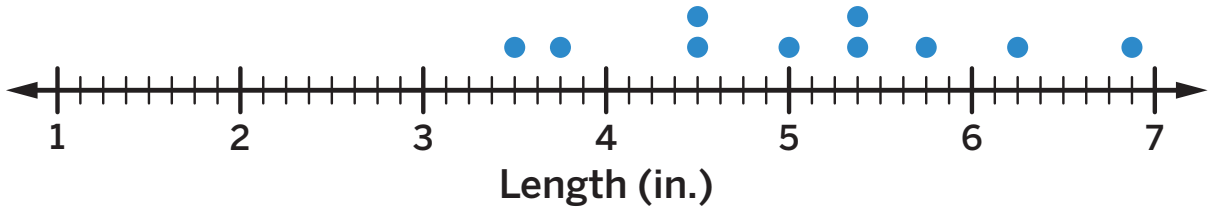
3.92 in.	3.8 in.	4.2 in.	4 in.	3.25 in.

Order the wingspans from *greatest* to *least*.

_____

Spiral Review

9 The line plot shows the lengths of pine cones Priya collected while hiking.



What is the difference in length between the *longest* pine cone and the *shortest* pine cone Priya collected?

_____

For Problems 10–13, determine the value of the expression.

10 3×7 _____

11 8×4 _____

12 5×6 _____

13 $63 \div 7$ _____

Unit 4
Lesson
7

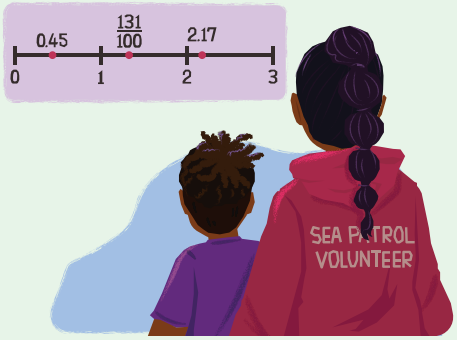
Name _____ Date _____

Measuring and Plotting | Visual Fraction Models | Circles, Fractions, and Decimals

4.NF.5, 4.NF.6, 4.NF.7, SMP.7, SMP.8

What's the Order?

Let's put decimals, fractions, and mixed numbers in order.



Warm-Up

eyes on teacher

I can be all of me in math class.
What are some of your strengths in math class?

Activity 1 Ordering Again and Again

Hands-On

A group of scientists were tracking the size of leatherback turtles. You and your partner will be given 3 cards with the lengths of leatherback turtles written as a decimal, fraction, or mixed number.

1 Compare the 3 values. Order them from *least* to *greatest*.

_____

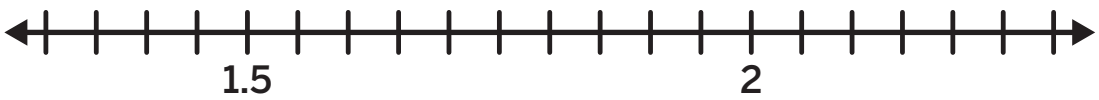
2 Join another pair and order all the numbers from *least* to *greatest*.

_____

Name _____ Date _____

Ordering Again and Again (continued)

3 With your group of 4, join another group of 4. Order *all* numbers from *least* to *greatest*. Create a line plot to show the collected data.



4 **Data Talk!**

Using the group's data, discuss the following questions with your partner.

- What strategies did you use to order a set of fractions, mixed numbers, and decimals?
- How did you identify equivalent lengths? How are they represented on the line plot?

Summary 4.07

Decimals with tenths or hundredths can be put in order by comparing the values of the decimals as fractions or mixed numbers.

Decimal	1.45	0.05	0.8	0.74
Fraction or mixed number	$1\frac{45}{100}$	$\frac{5}{100}$	$\frac{8}{10} = \frac{80}{100}$	$\frac{74}{100}$

Decimals from least to greatest:

0.05, 0.74, 0.8, 1.45

Practice 4.07

For Problems 1–4, determine whether the comparison statement is *true* or *false*.

1. $\frac{55}{100} > 0.45$ _____

2. $0.3 = \frac{30}{100}$ _____

3. $0.62 > \frac{8}{10}$ _____

4. $\frac{8}{10} < 1.08$ _____

Name _____ Date _____

For Problems 5 and 6, create a number line to show the numbers in numerical order. Then write the numbers in order from *least* to *greatest*.

Show your thinking

5

$\frac{50}{100}$ 0.4 $\frac{35}{100}$ 0.05 $\frac{2}{10}$

answer: _____

6

2.6 $1\frac{7}{10}$ 1.07 $2\frac{45}{100}$ $\frac{15}{10}$

answer: _____

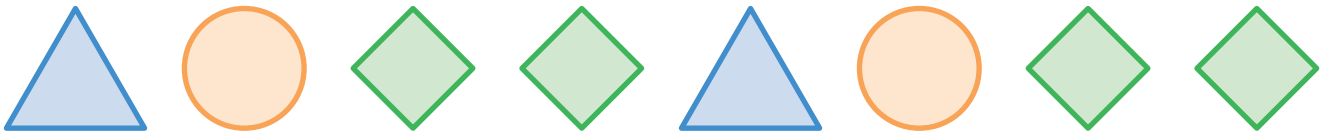
Name _____ Date _____

7 Determine if each statement is true or false. Select True or False for each statement.

	True	False
$\frac{7}{10} > 0.71$		
$0.16 = \frac{16}{100}$		
$\frac{75}{100} < 0.7$		
$1.2 < \frac{125}{100}$		
$1.7 = \frac{17}{100}$		

Spiral Review

8 Han created a pattern with shapes. Which shape will be the 26th shape in the pattern?



Draw

For Problems 9–14, determine the value of the expression.

9 $99 \div 11$ _____

10 $72 \div 9$ _____

11 11×4 _____

12 10×12 _____

13 6×7 _____

14 7×3 _____

Notes:

Sub-Unit

2

Place Value Relationships Through 1,000,000

Unit Story: Myles and the Loggerheads

ESB Professional/Shutterstock.com

Myles and his mother observed the migration of the turtles.

How can he determine the distance they have traveled?

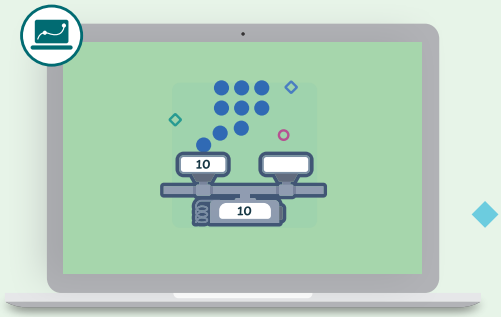
Unit 4
Lesson
8

Name _____ Date _____

Multi-Digit Numbers 4.NBT.1, SMP.1, SMP.2

Base-Ten Builders

Let's build multi-digit numbers.



We are a math community.
How is being a member of a math community helpful for mathematicians?

Warm-Up

1 eyes on teacher

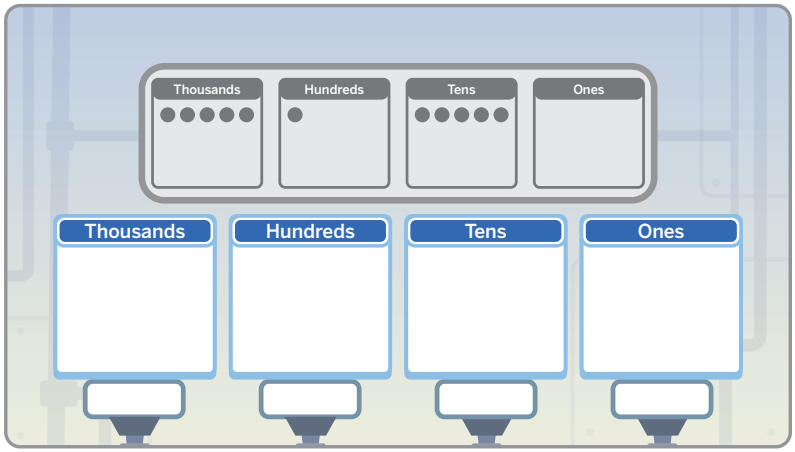
Activity 1 Tenfold Treasures

2 Use the place value mats to represent 1,000 in 2 different ways.

Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

3 One way to represent 5,150 is shown. Represent 5,150 in a different way.



Name _____ Date _____

Tenfold Treasures (continued)

4 Design a Challenge

You will create a number that can be modeled with more than 1 representation and use the *Design a Challenge* sheet to record your representations of your partners' challenges.

- Choose a number that can be represented in different ways.
- Represent the number one way on the place value mat.
- Trade books with a partner.
- Use the *Design a Challenge* sheet to represent your partner's number a different way than they represented it.
- When you have completed the challenge, trade books with another partner.
- Repeat with a new partner until all 3 place value mats are completed.

Write a number that can be modeled with more than 1 representation.

_____

Record 1 representation of your number on the place value mat.

Thousands	Hundreds	Tens	Ones

Activity 2

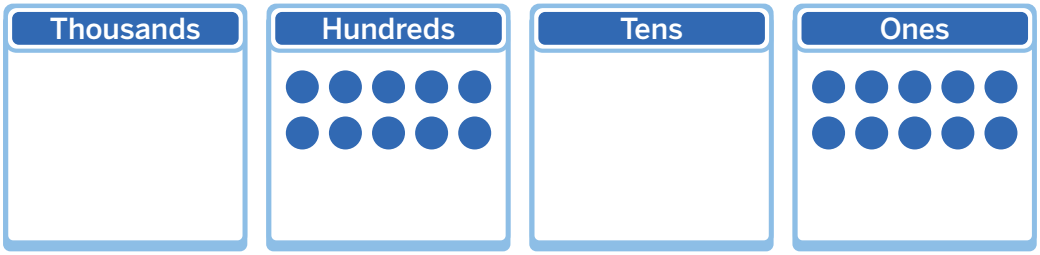
Name _____ Date _____

Efficiency, Efficiency, Efficiency

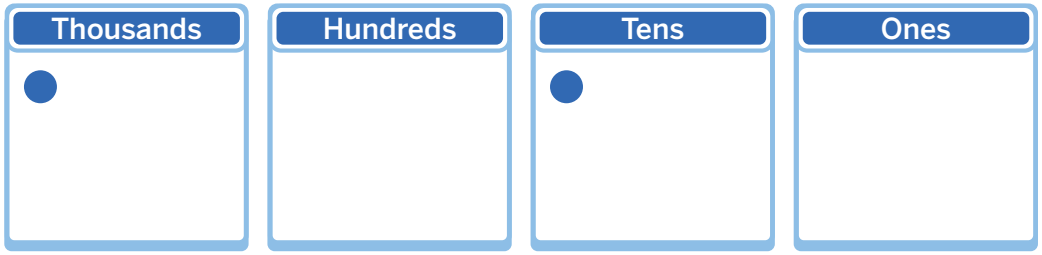
5 Discuss

What do you notice about the 2 values represented? How are they similar? How are they different?

A.

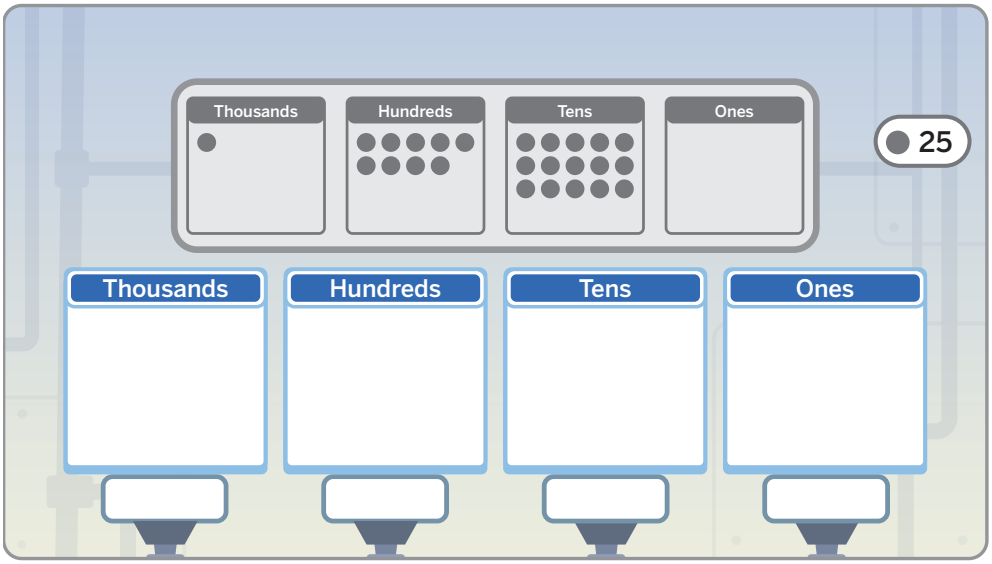


B.



6

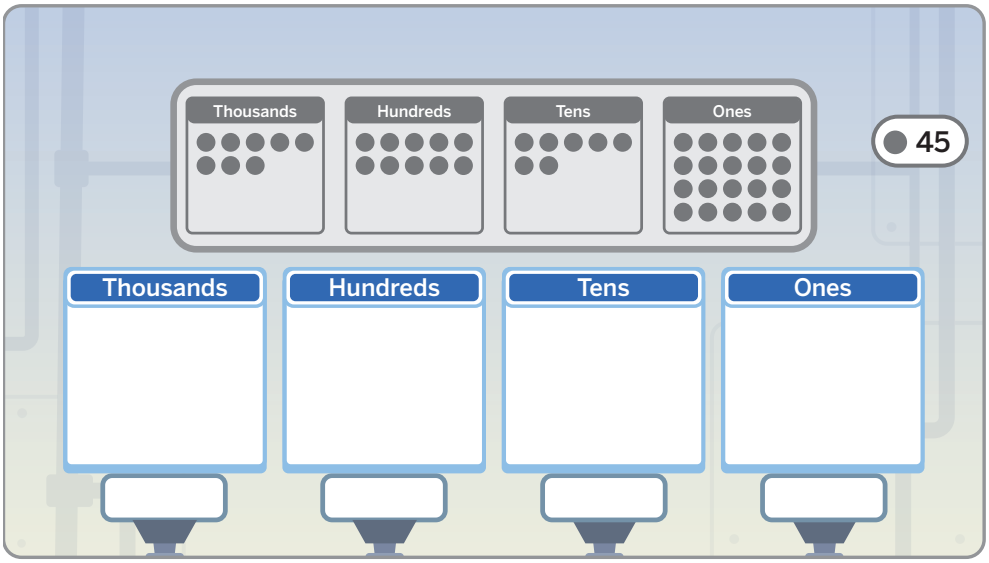
One way to represent 2,050 is shown. Represent 2,050 using fewer tokens.



Name _____ Date _____

Efficiency, Efficiency, Efficiency (continued)

7 One way to represent 9,090 is shown. Represent 9,090 using the fewest number of tokens possible.



8 **Discuss**

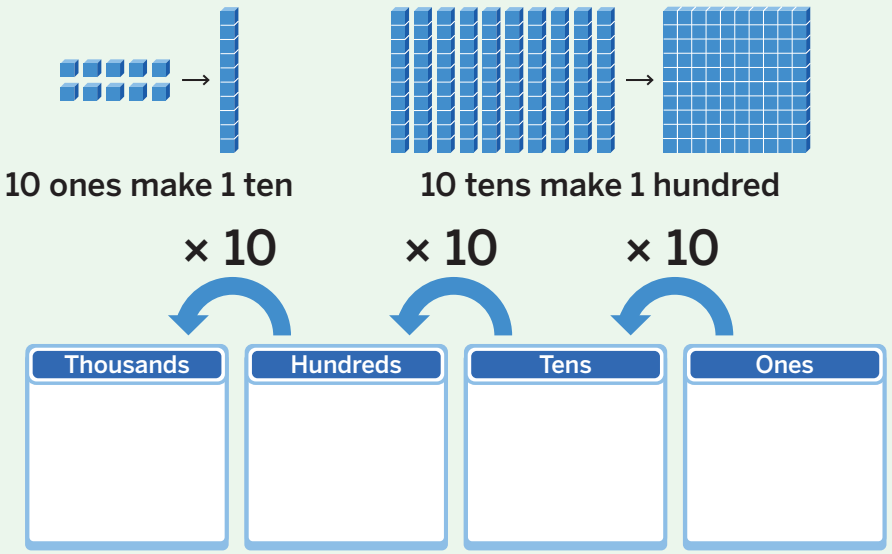
What is the *fewest* number of tokens needed to represent 10,000?
What is the *greatest* number of tokens needed to represent 10,000?

Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

Summary 4.08

In the base-ten place value system, 10 of the same unit make 1 of the next largest unit.



thousand The base ten place value unit composed of 10 hundreds. One thousand is written as 1,000.

Practice 4.08

1 How many hundreds are in 2,000? _____

2 Draw a diagram to represent 5,400.

Draw

Name _____ Date _____

3 Complete the table by determining how many thousands and hundreds it will take to make each number.

Number	How many thousands?	How many hundreds?
6,000		
8,000		
10,000		

4 Complete the table by determining how many hundreds and tens it will take to make each number.

Number	How many hundreds?	How many tens?
1,000		
600		
15,000		
3,000		
28,000		
2,800		

5 How many tens are in 8,000?

(A) 8

(B) 80

(C) 800

(D) 8,000

Name _____ Date _____

6 How many hundreds are in 16,000?

(A) 1 (B) 6 (C) 16 (D) 160

Spiral Review

7 Determine whether each number is *prime* or *composite*. Place a check mark in the correct column.

	Prime	Composite
3		
7		
10		
13		
35		
39		

For Problems 8–13, determine the value of the expression.

8 24 ÷ 4 _____

9 40 ÷ 5 _____

10 3 × 9 _____

11 12 × 9 _____

12 7 × 7 _____

13 4 × 12 _____

Name _____ Date _____

Multi-Digit Numbers 4.NBT.2, 4.NBT.1, SMP.3, SMP.6, SMP.7

Numbers Into the 100,000s

Let's read, write, and represent multi-digit numbers.

Warm-Up

eyes on teacher

We are a math community. How do your classmates support you in math class?

Activity 1 What Number Is Represented?

Each number is represented on a place value mat. Write each number in standard form.

1

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
	●●●●	●●●●● ●●●●		●	●●●●●

_____

2

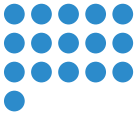
Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
●●	●●●●● ●●●●● ●●●●		●●●●● ●●●●	●●	●●●●● ●●●

_____

Name _____ Date _____

What Number Is Represented? (continued)

3

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
					

_____

Each number is represented in unit form. Write each number in standard form. Use a place value chart if it is helpful.

4 6 hundred thousands, 5 thousands, 6 ones

_____

5 8 tens, 7 ten thousands, 2 hundreds, 13 thousands

_____

6 3 hundred thousands, 14 hundreds, 6 thousands, 5 ones

_____

Activity 2

Name _____ Date _____

Change the Form

7 Write the digits in the number 250,718 in the place value chart.

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones

8 Write 250,718 in expanded form.

_____

9 **Discuss**

How did you represent each digit in expanded form?

Name _____ Date _____

Change the Form (continued)

10 Complete the table. Use a place value chart if it is helpful.

Standard form	Expanded form
117,903	
	1,000 + 80,000 + 70 + 5
50,031	
	1,000 + 30
99,098	
	200,000 + 900 + 10 + 60,000 + 5,000 + 1

Summary 4.09

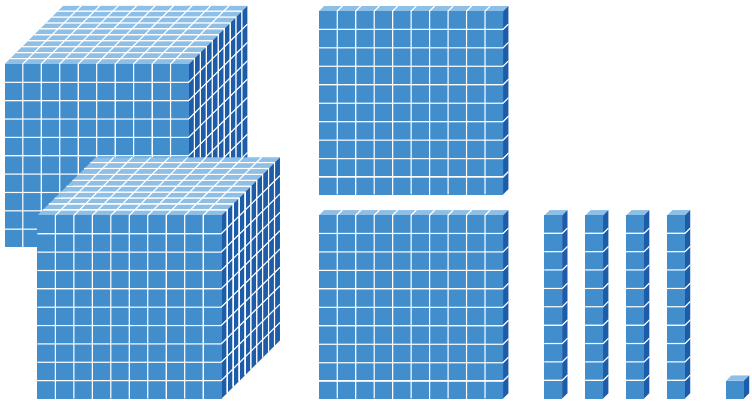
The expanded form of numbers shows the value of each non-zero digit in the number when written in standard form.

$$24{,}350 = 20{,}000 + 4{,}000 + 300 + 50$$
$$302{,}765 = 300{,}000 + 2{,}000 + 700 + 60 + 5$$

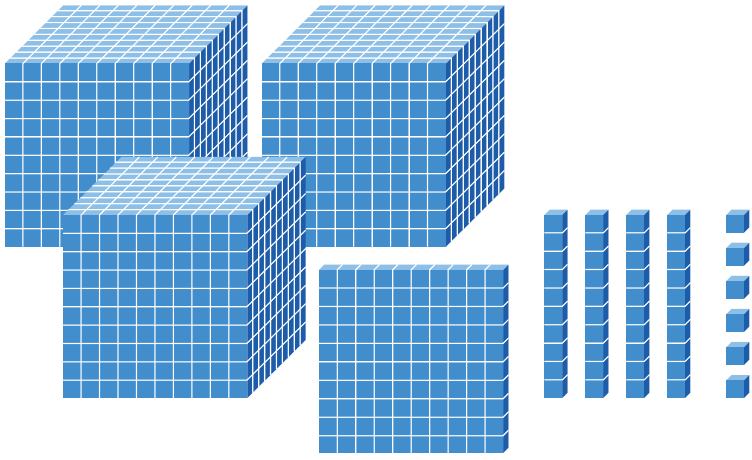
million The base-ten place value unit composed of 10 hundred thousands. One million is written as 1,000,000.

Practice 4.09

1 A small cube represents a value of 1. What value do the blocks represent?

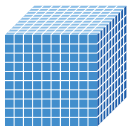
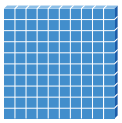


2 A small cube represents a value of 10. What value do the blocks represent?



Name _____ Date _____

Use the table for Problems 3 and 4. The small cube represents a value of 1.

Type of block				
Number of blocks used	7	5	2	4

3 What number is represented in the table?

(A) 7,524

(B) 1,111

(C) 11,110

(D) 75,240

4 Which expression represents the value of the blocks in expanded form?

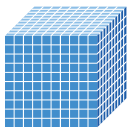
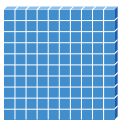
(A) 1,000 + 100 + 10 + 1

(B) 7,000 + 500 + 20 + 4

(C) 70,000 + 5,000 + 200 + 40

(D) 17,000 + 500 + 20 + 1

Use the table for Problems 5 and 6. The small cube represents a value of 10.

Type of block				
Number of blocks used	9	3	6	8

5 Write the number that represents the value of the blocks in standard form.

_____

6 Write the number that represents the value of the blocks in expanded form.

_____

Name _____ Date _____

7 Write 3,000 + 20,000 + 9 + 500 + 60 in standard form. _____

8 Write 6 + 7,000 + 400,000 + 800 in standard form. _____

9 Write 651,023 in expanded form.

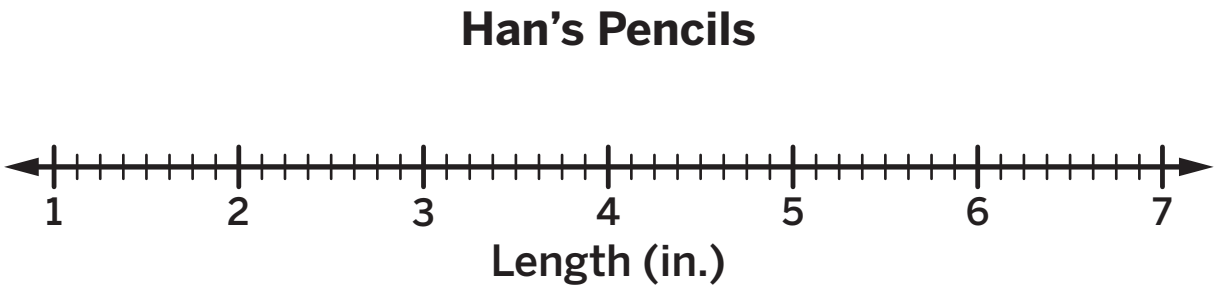
_____

Spiral Review

10 Han measured a set of pencils to the nearest $\frac{1}{8}$ inch. Here is a list of the measurements.

5	$5\frac{2}{8}$	$6\frac{6}{8}$	$3\frac{7}{8}$	$5\frac{2}{8}$	$6\frac{1}{8}$	$5\frac{7}{8}$	$4\frac{5}{8}$

Plot the measurement data on the line plot.



For Problems 11–14, determine the value of the expression.

11 12 × 12 _____

12 3 × 8 _____

13 64 ÷ 8 _____

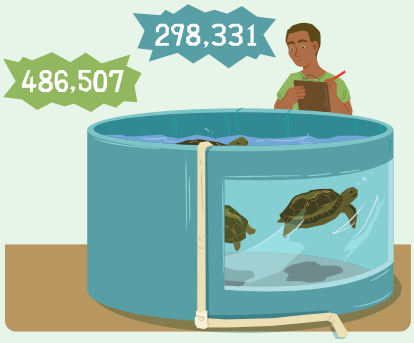
14 16 ÷ 4 _____

Name _____ Date _____

Multi-Digit Numbers 4.NBT.2, 4.NBT.1, SMP.3, SMP.7

Same Digit, Different Value

Let's describe the relationship between the digits in multi-digit numbers.



I am a doer of math.
How does having time to think in math class support you as a mathematician?

Warm-Up

eyes on teacher

Activity 1 Card Sort: Large Numbers

Hands-On

You and your partner will be given cards with multi-digit numbers. Sort the cards in a way that makes sense to you. Be prepared to explain your reasoning.

1 Sort

Record your sort in the space provided.

Name _____ Date _____

Card Sort: Large Numbers (continued)

2 Discuss

Meet with another pair and explain how you sorted your cards.

Each number is written in standard form. Write each number in expanded form.

3 4,990 _____

4 49,900 _____

5 499,000 _____

6 Discuss

- What is the value of the 4 in each number?
- What do you notice about the relationship between the value of the 4 in each number?

Activity 2

Name _____ Date _____

Expanding Large Numbers

7 Write each number in standard form, expanded form, and in words.

Standard form	Expanded form	In words
784,003		
	50,000 + 9,000 + 300 + 60 + 1	
		eight hundred three thousand, ninety-nine
310,060		
		nine hundred thirty-four thousand, nine hundred

Activity 2

Name _____ Date _____

Expanding Large Numbers (continued)

Choose numbers from the number bank to make the statements true.

934,900	59,361	310,060	803,099	784,003

8 The 3 in _____ is 10 times the value of the 3 in _____.

9 The 3 in _____ is 10 times the value of the 3 in _____.

10 The 3 in _____ is 10 times the value of the 3 in _____.

11 **Discuss**

How did you determine which numbers make each statement true?

Summary 4.10

The same digit can have different values depending on its place.
Multi-digit numbers can be written in expanded form and used to describe the relationship between the values of digits.

35,687	41,509
30,000 + 5,000 + 600 + 80 + 7	40,000 + 1,000 + 500 + 9

The value of the 5 in 35,687 is 5,000.
The value of the 5 in 41,509 is 500.

5,000 is 10 times 500.

Practice 4.10

For Problems 1–3, write the number in expanded form.

1 929,348

2 430,752

3 81,502

Name _____ Date _____

4 How are the values of the 5s in 430,752 and 81,502 related?

_____

_____

5 Each number is given in expanded form or in words. Write each number in standard form.

Expanded form or words	Standard form
eight hundred seventeen thousand, nine hundred three	
80,000 + 1,000 + 300 + 70 + 5	
100,000 + 20,000 + 5,000 + 30	
sixty-three thousand, two hundred fifty-two	
four hundred five thousand, one hundred thirty-nine	
100,000 + 80,000 + 7,000 + 200 + 50	

Name _____ Date _____

6 Which number is the same as 70,000 + 5,000 + 80 + 2 in standard form?

(A) 7,582

(B) 75,082

(C) 75,802

(D) 75,820

Spiral Review

7 Shawn follows a rule to build the pattern of the blocks shown. Draw Step 3 in Shawn's pattern.

Step 1

Step 2

Draw

Step 3

For Problems 8–13, determine the value of the expression.

8 70 ÷ 7 _____

9 32 ÷ 4 _____

10 36 ÷ 6 _____

11 9 × 2 _____

12 5 × 4 _____

13 11 × 11 _____

Unit 4
Lesson
11

Name _____ Date _____

Multi-Digit Numbers | Number and Shape Patterns | 4.NBT.1, 4.OA.1, SMP.2, SMP.3, SMP.7

Ten Times as Much

Let's describe the relationship between the digits in multi-digit numbers.

We are a math community. How can you make our math class community a place where everyone feels valued?

Warm-Up

eyes on teacher

Activity 1 Alike but Not the Same

1 Complete the table to show the value of the 8 in each number.

Number	Value of the 8
100,008	
100,080	
100,800	
108,000	
180,000	

Name _____ Date _____

Alike but Not the Same (continued)

2 **Discuss**

Describe the relationship between the value of the 8 in each number.

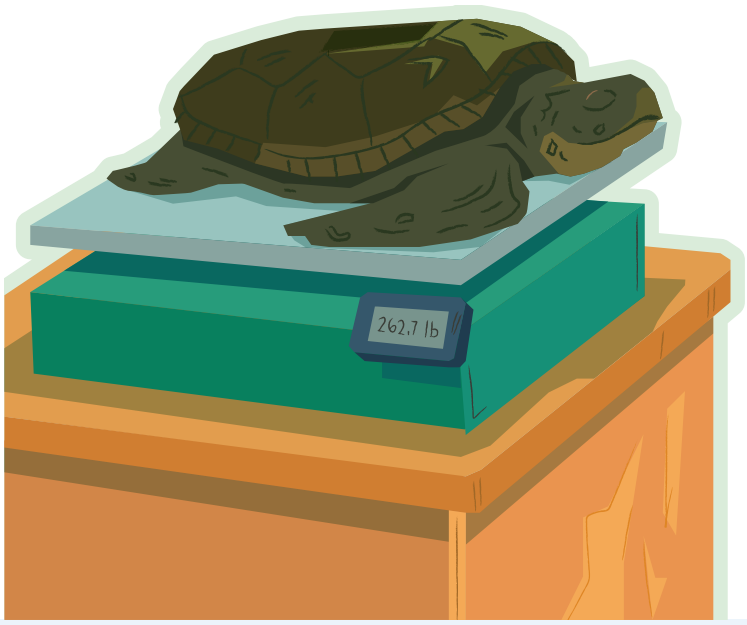
Write a multiplication or division equation to represent the relationship between the values of the 8 in each number.

3 100,800 and 108,000

_____

4 100,080 and 100,008

_____



Activity 2

Name _____ Date _____

What's the Number?

Use the number bank to identify the mystery numbers using the clues.

Number bank		
134,560	213,849	389,641
103,974	329,192	278,430
784,936	264,987	591,230
156,350	26,431	53,921
305,209	87,419	70,682

5 Clues:

The value of the 3 in the mystery number is 10 times as much as the 3 in 134,560.

The value of the 1 in the mystery number is 10 times as much as the 1 in 87,419.

mystery number: _____

6 Clues:

The value of the 5 in the mystery number is 10 times as much as the 5 in 305,209.

The value of the 3 in the mystery number is 10 times as much as the 3 in 591,230.

mystery number: _____

Name _____ Date _____

What's the Number? (continued)

7 Clues:

The value of the 2 in the mystery number is 10 times as much as the 2 in 26,431.

The value of the 4 in the mystery number is 10 times as much as the 4 in 103,974.

mystery number: _____

Your turn! Choose a number from the number bank and write clues to describe your mystery number.

8 Clues:

_____

_____

_____

_____

_____

_____

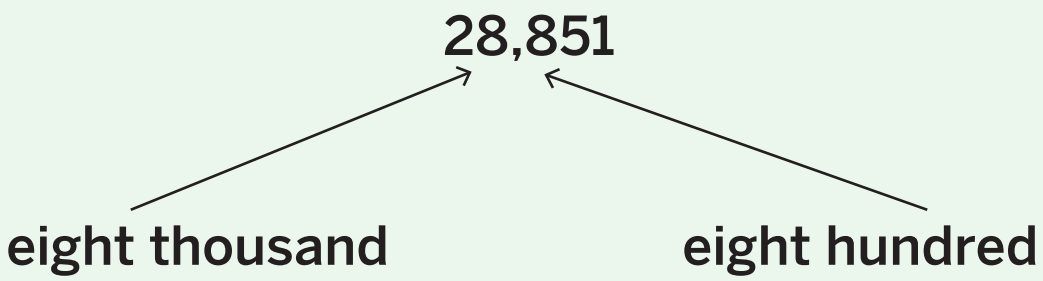
mystery number: _____

9 **Discuss**

Meet with another pair. Read aloud your clues and guess each other's mystery number.

Summary 4.11

In a multi-digit number, a digit in 1 place represents 10 times what it represents in the place to its right and can be related by a multiplication expression.



$$8{,}000 = 10 \times 800$$

Practice 4.11

1 Which numbers have a 5 that is worth 10 times as much as the 5 in 82,534? Select *all* that apply.

- ☐ **A.** 57,396
- ☐ **B.** 5,208
- ☐ **C.** 65,741
- ☐ **D.** 26,457
- ☐ **E.** 524,862
- ☐ **F.** 325,671

2 The value of the 4 in 642,387 is 10 times the value of the 4 in which number?

- (A) 74,205
- (B) 26,452
- (C) 459,317
- (D) 41,305

Name _____ Date _____

For Problems 3–6, use the numbers 872,000 and 700,208.

3 What is the value of the 2 in each number? Complete each sentence.

In 872,000, the 2 has a value of _____.

In 700,208, the 2 has a value of _____.

4 Write a multiplication equation to show the relationship between the values of the 2 in each number.

_____

5 What is the value of the 7 in each number? Complete each sentence.

In 872,000, the 7 has a value of _____.

In 700,208, the 7 has a value of _____.

6 Write a division equation to show the relationship between the values of the 7 in each number.

_____

7 Use the number bank to determine the mystery number.

72,613	64,291	146,982	48,531

Clues:

The value of the 6 in the mystery number is 10 times as much as the 6 in 72,613.

The value of the 4 in the mystery number is 10 times as much as the 4 in 64,291.

mystery number: _____

Name _____ Date _____

8 Use the number bank to determine the mystery number.

972,845	915,872	96,734	43,157

Clues:

The value of the 9 in the mystery number is 10 times as much as the 9 in 96,734.

The value of the 7 in the mystery number is 10 times as much as the 7 in 43,157.

mystery number: _____

Spiral Review

9 List the factors of 15 and 45.

factors of 15: _____

factors of 45: _____

10 What are the common factors of 15 and 45?

_____

For Problems 11–16, determine the value of the expression.

11 10×9 _____

12 8×7 _____

13 6×12 _____

14 $40 \div 5$ _____

15 $54 \div 9$ _____

16 $24 \div 8$ _____

Notes:

Sub-Unit

3

Comparing and Rounding Multi-Digit Numbers

Unit Story: Myles and the Loggerheads

Andy Gin/Shutterstock.com

Myles watched the turtles being weighed.

How can he round their weights to the nearest pound?

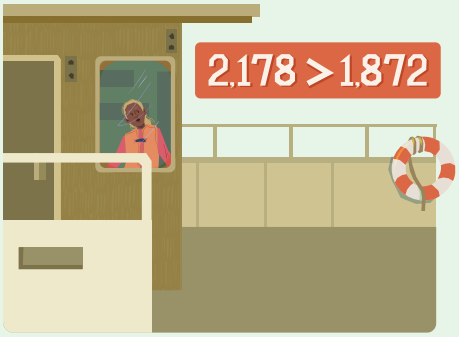
Unit 4
Lesson
12

Name _____ Date _____

Multi-Digit Numbers 4.NBT.2, SMP.3, SMP.6, SMP.7

Which Is Greater?

Let's compare large numbers to see which is greater.



Warm-Up

eyes on teacher

I can be all of me in math class.
How have you learned from a mistake you made in math class?

Activity
1

The Greatest Number

Hands-On

You will be given a set of number cards. You and your partner will each create a number with your cards and then compare the numbers. Record your numbers and complete the comparison using < or >.

1. Use Number cards 2, 7, and 8 to make a three-digit number.
2. Keep Number cards 2, 7, and 8 in the same order but add Number card 1 to create a four-digit number. You can place the 1 anywhere in the number.
3. Repeat the process by adding Number card 5 to create a five-digit number.
4. Repeat the process by adding Number card 9 to create a six-digit number.

Name _____ Date _____

The Greatest Number (continued)

Problem	My number	< or >	My partner's number
1			
2			
3			
4			

5 Discuss

Did the less than (<) or greater than (>) symbol change from Problem 1 to Problem 2? Why does that make sense? What about from Problem 2 to Problem 3? From Problem 3 to Problem 4?

Activity 2

Name _____ Date _____

Ways to Compare

Diego wrote a conjecture for how to compare 2 multi-digit numbers. He wrote, "Compare the first digit in each number. The number with the greater first digit is the greater number. If the first digit is the same, then compare the second digits."

6 In each pair of numbers, is the number with the *greater first or second digit* also the *greater number*? Select *yes* or *no* by placing a check mark in the correct column.

	Yes	No
985,248 and 320,097		
72,050 and 74,830		
320,097 and 58,978		
58,000 and 547,000		
146,001 and 8,901		
58,978 and 547,612		

Name _____ Date _____

Ways to Compare (continued)

7 Write your own conjecture for how to compare *any* pair of multi-digit numbers.

Summary 4.12

When comparing multi-digit numbers, you have to consider the place values of the digits and compare the digits in the greatest place values.

$$2{,}718 > 1{,}872$$

$$320{,}097 > 58{,}978$$

$$64{,}830 < 72{,}050$$

Practice 4.12

For Problems 1–4, complete the comparison using < or >.

1. 1,572 _____ 1,585

2. 8,316 _____ 5,832

3. 27,005 _____ 9,498

4. 14,440 _____ 14,199

Name _____ Date _____

5 Complete the table using <, >, or =.

Number	<, >, or =	Number
57,804		57,840
3,981		3,809
150,360		150,306
24,308		204,308
9,748		19,748
684,709		598,362
87,500		107,481

6 Mount Kanchenjunga in Nepal and India has a height of 28,169 feet. Mount K2 in Pakistan and China has a height of 28,251 feet. Compare the heights of the mountains using < or >.

28,169 _____ 28,251

Name _____ Date _____

7 In Alaska, Mount Saint Elias has a height of 18,009 feet. Mount Foraker has a height of 17,400 feet. Compare the heights of the mountains using < or >.

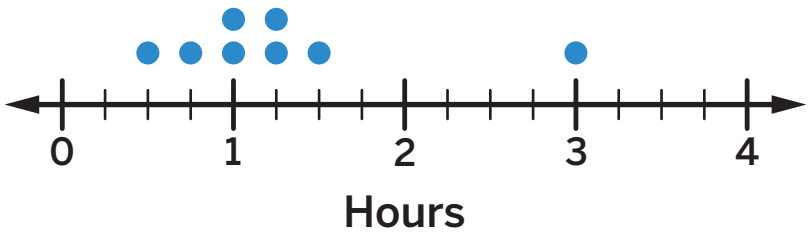
18,009 _____ 17,400

Spiral Review

Jada created a line plot to record the number of hours she spent reading over several days. Use the line plot for Problems 8 and 9.

8 Add the values to the line plot.

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



9 How many days did Jada read more than 1 hour?

_____

For Problems 10–15, determine the value of the expression.

10 11×2 _____

11 5×5 _____

12 $36 \div 6$ _____

13 $16 \div 4$ _____

14 $49 \div 7$ _____

15 $81 \div 9$ _____

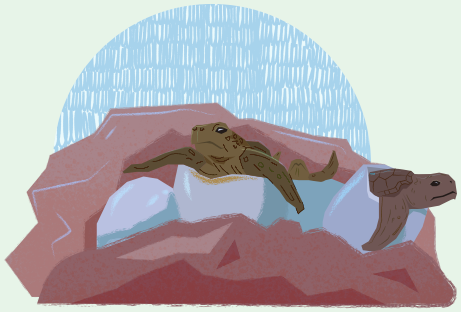
Unit 4
Lesson
13

Name _____ Date _____

Multi-Digit Numbers 4.NBT.2, SMP.3, SMP.7

Greatest and Least

Let's compare more large numbers.



Warm-Up eyes on teacher

We are a math community.
How do you contribute to our community in math class?

Activity
1

Comparing Turtle Nest Counts

Myles's mother and other members of the neighborhood Sea Turtle Patrol spend time every summer collecting data on the number of sea turtle nests found on one of the local beaches. Their data is combined with data collected from other beaches across the state to create yearly totals.

The table shows the number of sea turtle nests that were counted each year for 3 types of sea turtles — green, leatherback, and loggerhead.

	2017	2018	2019	2020	2021
Green sea turtle	53,102	4,546	53,011	26,656	32,680
Leatherback sea turtle	663	949	1,105	1,652	1,390
Loggerhead sea turtle	96,912	91,451	106,373	105,164	96,666

Name _____ Date _____

Comparing Turtle Nest Counts (continued)

1 What were the *least* and *greatest* number of nests counted for the green sea turtles in 1 year? Be prepared to explain your thinking.

least: _____ **greatest:** _____

2 What were the *least* and *greatest* number of nests counted for the leatherback sea turtles in 1 year? Be prepared to explain your thinking.

least: _____ **greatest:** _____

3 What were the *least* and *greatest* number of nests counted for the loggerhead sea turtles in 1 year? Be prepared to explain your thinking.

least: _____ **greatest:** _____

4  **Data Talk!**

- What strategies did you use to determine the least and greatest numbers?
- How does place value help you when determining the least and greatest numbers?

Activity 2

Name _____ Date _____

Introducing the Center, Greatest of Them All

Stage 4

Pairs Let's make and compare six-digit numbers.

You'll need: Number Cards, 0–9, Recording Sheet, one per pair

Set Up Decide who will be Player A and who will be Player B
Shuffle the Number Cards and place them in a stack facedown.

How to Play

1. Each player draws a Number Card and records it in one of the boxes.
2. Repeat until each player has a six-digit number.
3. Write a comparison using <, >, or =. The player with the greater number earns 1 point.

How to Win When the Recording Sheet is full, the player who earns more points wins.

CENTER
Recording Sheet

Name _____ Date _____

Greatest of Them All (continued)

Winner?					
Player B					
Compare using <, >, or =					
Player A					

Summary 4.13

When determining the least and greatest numbers from a set of multi-digit numbers, not all the digits have to be compared. The digits with the greatest place values affect the value of the number the most. You may have to look at more than 1 place to determine the least and greatest numbers.

380,251 | 74,637 | 25,263 | 74,719 | 389,024

least: 25,263 **greatest:** 389,024

Practice 4.13

1 Order the numbers from *least* to *greatest*.

98,107 102,356 752,031 88,207 99,653

least **greatest**

2 Order the numbers from *greatest* to *least*.

94,942 9,042 279,104 9,420 59,000 279,099

greatest **least**

Name _____ Date _____

The table shows the number of students enrolled in 3 different school districts for 3 years. Use the table for Problems 3–6.

School district	2014	2016	2018
City of Chicago, Illinois	392,558	378,199	359,476
Miami-Dade County, Florida	356,964	357,249	350,434
Clark County, Nevada	324,093	326,953	330,225

3 What were the least and greatest number of students enrolled in the City of Chicago school district?

least: _____ **greatest:** _____

4 What were the least and greatest number of students enrolled in the Miami-Dade County school district?

least: _____ **greatest:** _____

5 What were the least and greatest number of students enrolled in the Clark County school district?

least: _____ **greatest:** _____

6 What were the least and greatest number of students enrolled in 2018?

least: _____ **greatest:** _____

Name _____ Date _____

7 Which number is the greatest?

(A) 136,807 (B) 138,708 (C) 137,681 (D) 130,678

8 Which number is the least?

(A) 97,028 (B) 97,280 (C) 97,082 (D) 97,208

Spiral Review

Diego followed a rule to build the pattern of rectangles shown. Use the pattern for Problems 9 and 10.

Step 1 Step 2 Step 3

9 Write a rule to describe the pattern.

_____

_____

10 Determine the area of the rectangle for Step 10. _____

For Problems 11–16, determine the value of the expression.

11 $32 \div 8$ _____

12 $72 \div 6$ _____

13 7×8 _____

14 3×6 _____

15 8×2 _____

16 9×6 _____

Unit 4
Lesson
14

Name _____ Date _____

Multi-Digit Numbers 4.NBT.3, SMP.7

Skiing Adventure

Let's determine multiples of 1,000, 10,000, and 100,000 that are nearest to a number.

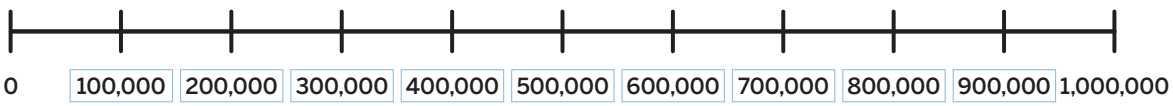
Warm-Up

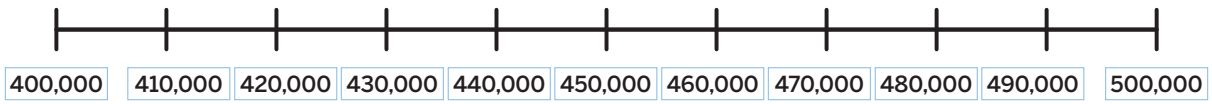
1 eyes on teacher

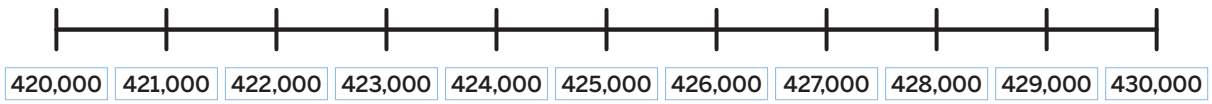
We are a math community.
How did working with a partner in math class help you today?

Activity 1 Closer to Which Numbers?

2 Round 425,193 to the nearest place value on each number line.



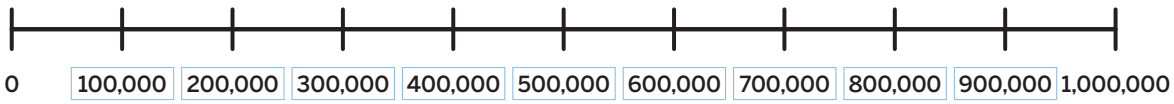


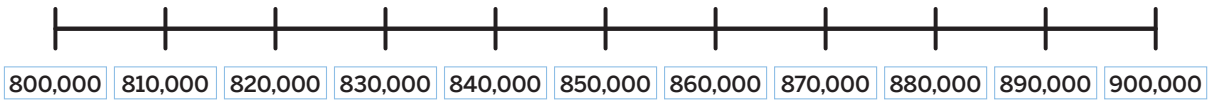


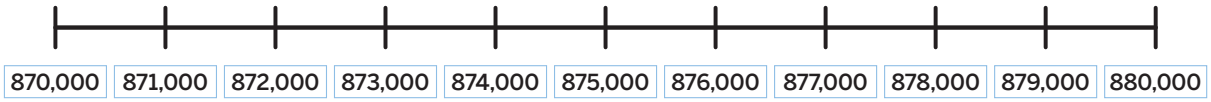
Name _____ Date _____

Closer to Which Numbers? (continued)

3 Round 873,924 to the nearest place value on each number line.







4 **Discuss**

Jada says that 316,951 is closest to 300,000. Diego says that 316,951 is closest to 320,000. Who do you agree with and why?

Activity 2

Name _____ Date _____

Round and Round You Go

Round each number to the given place value.

5 Round 136,850 to the nearest 100,000. _____

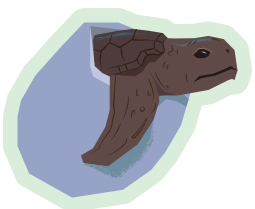
6 Round 785,234 to the nearest 10,000. _____

7 Round 52,659 to the nearest 1,000. _____

8 Round 683,729 to the nearest 100,000. _____

9 Round 84,506 to the nearest 10,000. _____

10 Round 274,187 to the nearest 1,000. _____

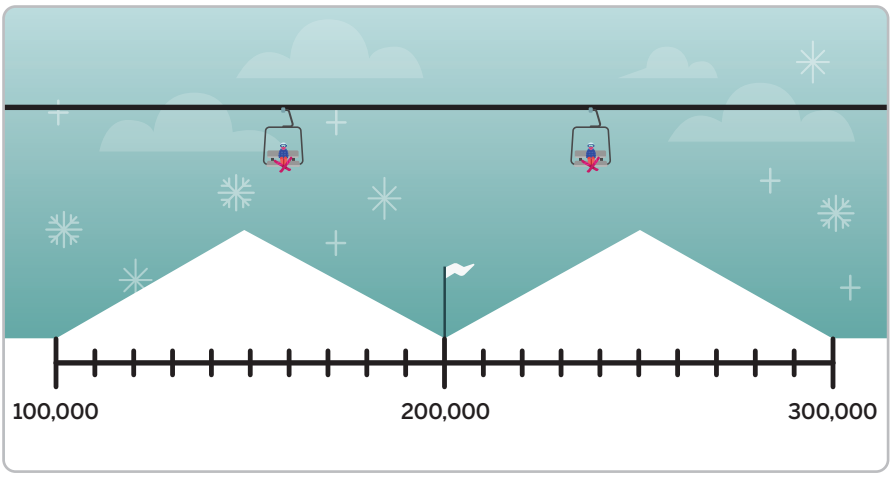


Name _____ Date _____

Round and Round You Go (continued)

11 Discuss

What are numbers that round to 200,000 that could be represented by each skier? How do you know?



Summary 4.14

When rounding a multi-digit number to any place value, you are determining the nearest multiple of that place value unit. If the number falls exactly in the middle of 2 multiples, round up to the greater multiple.

	Nearest 1,000	Nearest 10,000	Nearest 100,000
248,640	249,000	250,000	200,000
255,000	255,000	260,000	300,000

Practice 4.14

For Problems 1 and 2, use the number line if it is helpful.

1 Is 484,300 closer to 480,000 or 490,000? _____

2 Round 591,258 to the nearest 1,000. _____

Name _____ Date _____

For Problems 3–6, round the number to the given place value.

3 Round 583,642 to the nearest 100,000. _____

4 Round 583,642 to the nearest 10,000. _____

5 Round 583,642 to the nearest 1,000. _____

6 Round 583,642 to the nearest 100. _____

For Problems 7–10, complete the statement.

7 Complete the statement using a number that is *less* than 400,000.

_____ rounded to the nearest hundred thousand is 400,000.

8 Complete the statement using a number that is *greater* than 400,000.

_____ rounded to the nearest hundred thousand is 400,000.

9 Complete the statement using a number that is *less* than 580,000.

_____ rounded to the nearest ten thousand is 580,000.

10 Complete the statement using a number that is *greater* than 580,000.

_____ rounded to the nearest ten thousand is 580,000.

Name _____ Date _____

11 Round 58,712 to the nearest 10,000.

(A) 59,000 (B) 58,700 (C) 58,800 (D) 60,000

12 Round 147,499 to the nearest 1,000.

(A) 147,000 (B) 147,400 (C) 147,500 (D) 148,000

Spiral Review

13 Determine whether each number is a multiple of 4, a factor of 36, or both. Place a check mark in the correct column.

	Multiple of 4	Factor of 36
2		
4		
6		
8		
9		
12		

For Problems 14–19, determine the value of the expression.

14 30 ÷ 5 _____

15 42 ÷ 7 _____

16 55 ÷ 11 _____

17 6 × 9 _____

18 5 × 12 _____

19 8 × 8 _____

Unit 4
Lesson
15

Name _____ Date _____

Multi-Digit Numbers 4.NBT.3, SMP.2, SMP.7, SMP.8

Estimating and Rounding

Let's practice rounding large numbers to different place values.

I am a doer of math.
What mathematical connections did you make in math class today?

Warm-Up

eyes on teacher

Activity 1

Let's Play Greatest of Them All

Stage 5

Pairs Let's round six-digit numbers.

You'll need: Number Cards, 0–9, Recording Sheets A–C

Set Up Choose a Recording Sheet. This sheet will tell you which place value you will round to.

Shuffle the Number Cards and place them in a stack facedown.

How to Play

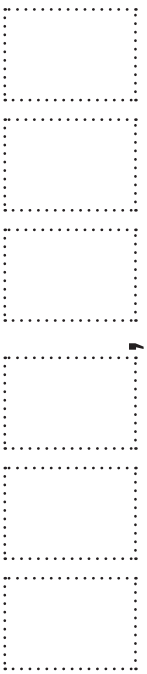
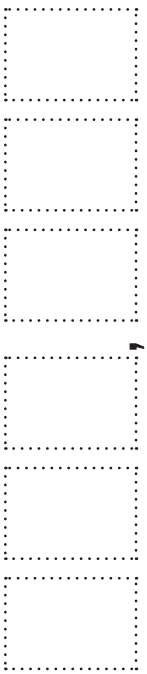
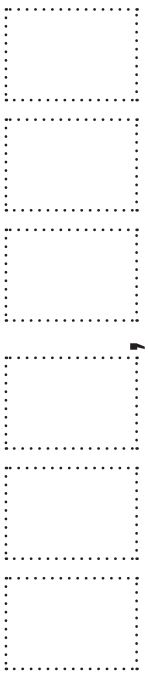
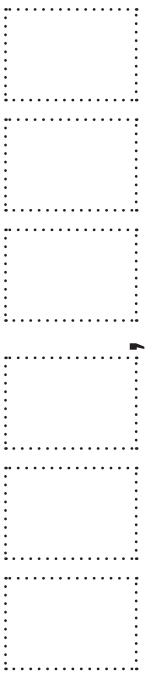
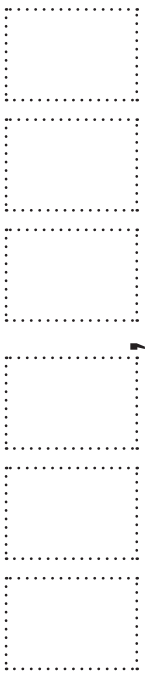
1. Each player draws a Number Card and records it in one of the boxes.
2. Repeat until each player has a six-digit number.
3. Round your number.
4. The player with the greater rounded number earns 1 point.

How to Win When the Recording Sheet is full, the player who earns more points wins.

CENTER
Recording Sheet

Name _____ Date _____

Greatest of Them All (continued)

Winner?					
My partner's rounded number					
Round to the nearest thousand					
Number					

Activity 2

Name _____ Date _____

Rounding Turtle Egg Counts

Members of the Sea Turtle Patrol also count the number of sea turtle eggs found at local beaches. Myles's mother recorded the data from other groups who counted sea turtle eggs at different locations. The data is shown in the table.

1 To estimate the total number of sea turtle eggs from all the locations, each number of eggs could be rounded to the nearest 1,000 or the nearest 10,000. Round each number of sea turtle eggs to both place values.

Location	Number of sea turtle eggs	Rounded to the nearest 1,000	Rounded to the nearest 10,000
Clearview Beach	127,041		
Jewel Jetty	26,443		
Outer Bay	72,681		
Sunny Coast	15,296		
Simmons Beach	1,266		
Indigo Inlet	3,577		

Name _____ Date _____

Rounding Turtle Egg Counts (continued)

2 Discuss

To estimate the total number of sea turtle eggs, which place value do you think would be best to use for rounding? Why?

Summary 4.15

Rounding is a way to estimate large numbers. To decide what place value to round to, consider how the estimate will be used.

	Nearest 100,000	Nearest 10,000	Nearest 1,000	Nearest 100
53,487	100,000	50,000	53,000	53,500
4,896	0	0	5,000	4,900
370,130	400,000	370,000	370,000	370,100
96,500	100,000	100,000	97,000	96,500
985,411	1,000,000	990,000	985,000	985,400

Practice 4.15

For Problems 1–3, round the number to the given place values.

1 267,485

1,000: _____ **10,000:** _____

2 895,274

10,000: _____ **100,000:** _____

3 872,163

100: _____ **1,000:** _____

Name _____ Date _____

4 Round 53,487 to the nearest 100,000. _____

5 Round 53,487 to the nearest 10,000. _____

6 Round 53,487 to the nearest 1,000. _____

7 Round 53,487 to the nearest 100. _____

8 The population of sea lions in California has been declining since the 1990s. Here is the data from 5 years. Round each sea lion population to the given place values.

Year	Sea lion population	Rounded to the nearest 1,000	Rounded to the nearest 10,000
1978	35,972		
1991	43,834		
1997	39,450		
2010	26,826		
2019	15,291		

Name _____ Date _____

For Problems 9 and 10, select the number that completes the sentence.

9 20,358 rounded to the nearest _____ is 0.

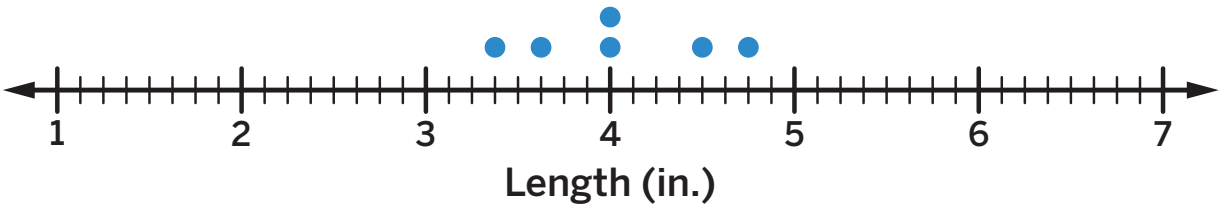
(A) 100,000 (B) 10,000 (C) 1,000 (D) 100

10 585,571 rounded to the nearest _____ is 586,000.

(A) 100,000 (B) 10,000 (C) 1,000 (D) 100

Spiral Review

11 The line plot shows the lengths of hornworms Priya found while gardening.



What is the difference in length between the *longest* hornworm and the *shortest* hornworm?

_____

For Problems 12–16, determine the value of the expression.

12 36 ÷ 12 _____

13 36 ÷ 4 _____

14 9 × 7 _____

15 2 × 9 _____

16 12 × 12 _____

Notes:

Sub-Unit

4

Adding and Subtracting Within 1,000,000

Unit Story: Myles and the Loggerheads

jakkapan/Shutterstock.com

Myles notices the turtle nests where hatchlings are emerging.

How can he predict how far a turtle will travel in its lifetime?

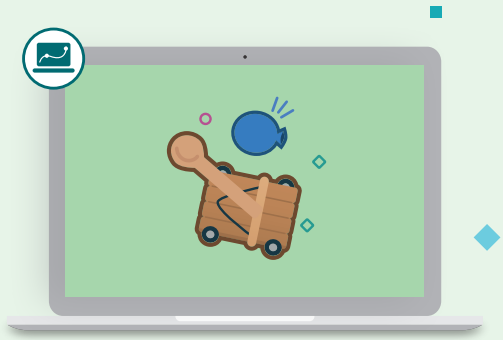
Unit 4
Lesson
16

Name _____ Date _____

Multi-Digit Numbers 4.NBT.3, SMP.7, SMP.8

Mess-timation

Let's estimate sums.



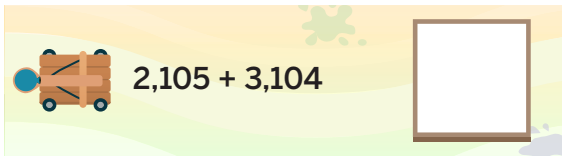
We are a math community. What does it look and sound like to give respectful feedback in math class?

Warm-Up

1 eyes on teacher

Activity 1 Close Enough

2 Estimate the sum to hit the canvas.

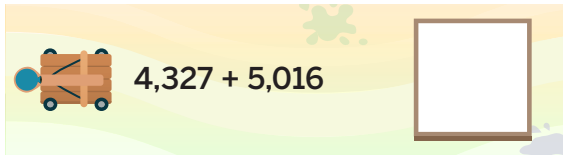


_____

3 **Discuss**

How did you estimate the sum?

4 Estimate the sum to hit the canvas.



_____

5 **Discuss**

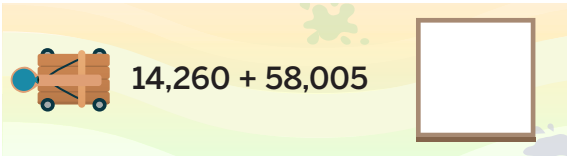
Let's compare different estimates of the same sum.

Activity 2

Name _____ Date _____

Target Practice

6 Estimate each sum to hit the canvas. Complete as many challenges as you have time for.



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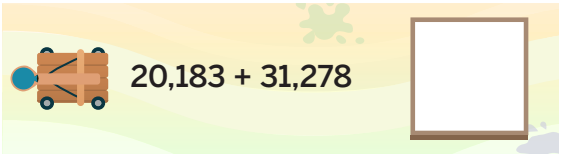

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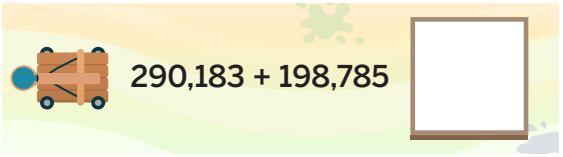

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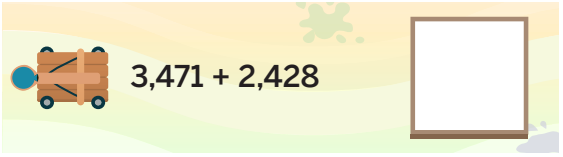

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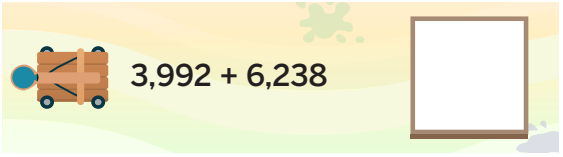

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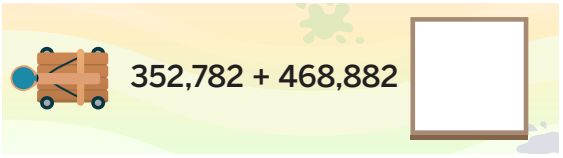


_____

7 Did you use the same strategy to estimate every sum? Why?

_____

_____

_____

_____

_____

Summary 4.16

There are different strategies you can use to estimate sums. To create reasonable estimates, it can be helpful to choose estimation strategies based on the addends.

19,987 + 11,712 20,000 + 12,000 = 32,000	**15,987 + 16,712** 16,000 + 17,000 = 33,000
The addends are close to ten thousands, so I can round to the nearest ten thousand.	The addends are not close to ten thousands, so I chose to round to the nearest thousand.
19,000 is only 1,000 away from 20,000, and 11,000 is 1,000 away from 10,000. So, I chose to round to the nearest ten thousand.	15,000 is 5,000 away from 20,000, and 16,000 is 4,000 away from 20,000. So, I chose to round to the nearest thousand to be more precise.

Practice 4.16

For Problems 1–5, estimate the sum of the expression.

1 4,502 + 6,612

Show or explain your thinking.

answer: _____

Name _____ Date _____

2 123,002 + 526,892

Show or explain your thinking.

answer: _____

3 67,456 + 23,950 _____

4 1,998 + 2,060 _____

5 201,300 + 611,900 _____

For Problems 6 and 7, determine the most reasonable estimate.

6 345,650 + 230,988

(A) 500,000 (B) 580,000 (C) 380,000 (D) 570,000

7 5,890 + 4,450

(A) 10,000 (B) 9,000 (C) 11,000 (D) 9,500

Name _____ Date _____

For Problems 8 and 9, round the number to the given place values.

8 485,267

1,000: _____ **10,000:** _____

9 274,895

10,000: _____ **100,000:** _____

Spiral Review

10 Select *all* the true statements.

- (A) 23 is a prime number.
- (B) The first 2 multiples of 22 are 44 and 88.
- (C) 72 is a composite number.
- (D) 88 is a multiple of 11.
- (E) 7 is a factor of 35.

For Problems 11–18, determine the value of the expression.

11 $88 \div 8$ _____ **12** $96 \div 12$ _____

13 8×7 _____ **14** 8×8 _____

15 9×5 _____ **16** $120 \div 10$ _____

17 6×8 _____ **18** $63 \div 7$ _____

Name _____ Date _____

Multi-Digit Numbers 4.NBT.4, 4.NBT.2, SMP.1, SMP.3

Adding It Up

Let's compose units to add.

Warm-Up eyes on teacher

We are a math community.
What are ways you can support our community in math class today?

Activity
1

Algorithm Comparisons

Here are 2 algorithms used to determine the total number of hatchlings at 2 locations along Joseph Maria Beach.

Expanded form algorithm

$$\begin{array}{r} 10{,}000 + 7{,}000 + 300 + 70 + 5 \\ 10{,}000 + 4{,}000 + \quad 0 + 20 + 4 \\ \hline 20{,}000 + 11{,}000 + 300 + 90 + 9 = 31{,}399 \end{array}$$

Standard algorithm

$$\begin{array}{r} {\scriptstyle 1} \\ 17{,}375 \\ +\ 14{,}024 \\ \hline 31{,}399 \end{array}$$

There are a total of 31,399 hatchlings.

Name _____ Date _____

Algorithm Comparisons (continued)

1 Here are the number of hatchlings at 2 other nest locations. Determine the total number of hatchlings using both algorithms.

- Misty Cove: 27,652
- Sandy Island: 21,624

Show your thinking.

Expanded form algorithm

answer: _____

Standard algorithm

answer: _____

2 Discuss

- Where are compositions of new units shown in each algorithm?
- Which algorithm did you prefer? Why?

Activity 2

Name _____ Date _____

Determining and Checking Sums

Han solved an addition problem.

```
   1  1 1
  18,999
+  9,999
--------
  27,998
```

3 Discuss

- Use estimation to justify whether Han's answer is correct.
- What errors did Han make?

4 Determine the correct sum.

Show or explain your thinking.

answer: _____

Name _____ Date _____

Determining and Checking Sums (continued)

Determine each sum using the standard algorithm.

Show your thinking.

5 642,977 + 48,121

answer: _____

6 51,798 + 27,482

answer: _____

Summary 4.17

The standard algorithm is a useful way to add multi-digit numbers. When a new unit is composed, it is shown with a 1 above the place to the left of the digits that had a sum of 10 or more.

$$\begin{array}{r} {\scriptstyle 1\,1} \\ 56,479 \\ +\,13,231 \\ \hline 69,710 \end{array}$$

Practice 4.17

For Problems 1 and 2, determine the sum using the standard algorithm.

Show your thinking.

1 32,216 + 8,492

answer: _____

Name _____ Date _____

Show your thinking.

2 48,227 + 26,812

answer: _____

For Problems 3 and 4, use the digits 2, 9, 7, and 5 to write 2 different addition expressions. Then determine the sum.

Show your thinking.

3 expression: _____

answer: _____

4 expression: _____

answer: _____

Name _____ Date _____

5 Determine the sum.

81,729 + 429,272

(A) 411,001 (B) 511,001 (C) 511,091 (D) 511,991

Show your thinking.

Spiral Review

6 Select *all* the true statements.

(A) 50 is a prime number.

(B) The first 3 multiples of 50 are 50, 100, and 150.

(C) 35 is a composite number.

(D) 35 has only 2 factors — 1 and 35.

(E) 7 is a multiple of 35.

For Problems 7–12, determine the value of the expression.

7 44 ÷ 4 _____

8 108 ÷ 12 _____

9 6 × 8 _____

10 7 × 4 _____

11 4 × 9 _____

12 100 ÷ 10 _____

Unit 4
Lesson
18

Name _____ Date _____

Multi-Digit Numbers 4.NBT.4, 4.NBT.2, SMP.2, SMP.3, SMP.6

What's the Difference?

Let's determine differences between large numbers.

Warm-Up

eyes on teacher

I can be all of me in math class.
How have you grown as a mathematician this year?

Activity 1 How Many Hatchlings?

Here is data the Sea Turtle Patrol collected about how many eggs were laid and how many eggs hatched at 3 different locations.

Nest location	Number of eggs laid	Number of eggs hatched
Sweeny Island	98,497	72,243
Corley Cove	86,784	66,524
Evergreen Island	102,827	101,456

Name _____ Date _____

How Many Hatchlings? (continued)

Determine the difference between the number of eggs laid and the number of eggs hatched at each location.

Show or explain your thinking.

1. Sweeny Island

answer: _____

2. Corley Cove

answer: _____

3. Evergreen Island

answer: _____

Activity
2

Name ______________________ Date ______________

Subtraction With Algorithms

Here is data about how many eggs were laid and how many eggs hatched at another location.

Nest location	Number of eggs laid	Number of eggs hatched
Little Neck Island	94,423	83,712

Here are 2 ways to determine the difference between the number of eggs laid and the number of eggs hatched at Little Neck Island.

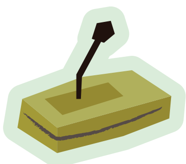
Expanded form algorithm

$$\begin{array}{rcrcrcrcr} & & \overset{3,000}{\cancel{4,000}} & & \overset{1,400}{\cancel{400}} & & & & \\ 90,000 & + & & + & & + & 20 & + & 3 \\ -\;80,000 & + & 3,000 & + & 700 & + & 10 & + & 2 \\ \hline 10,000 & + & 0,000 & + & 700 & + & 10 & + & 1 \end{array} = 10,711$$

Standard algorithm

$$\begin{array}{r} 9\overset{3}{\cancel{4}},\overset{14}{\cancel{4}}23 \\ -\;83,712 \\ \hline 10,711 \end{array}$$

The difference is 10,711 eggs.



Name _____ Date _____

Subtraction With Algorithms (continued)

Determine the difference between the number of eggs laid and the number of eggs hatched at Jackson Cove. First, use the expanded form algorithm. Then use the standard algorithm.

Nest location	Number of eggs laid	Number of eggs hatched
Jackson Cove	139,786	97,465

Show your thinking.

4 Solve using the expanded form algorithm.

answer: _____

5 Solve using the standard algorithm.

answer: _____

Summary 4.18

The standard algorithm is a useful way to subtract multi-digit numbers. When you do not have enough to subtract from in any place, you can decompose 1 unit in the place to the left to make 10 of the units you need.

$$\begin{array}{r} 5\ \ 15 \\ 7\cancel{6},\cancel{5}36 \\ -\,34,824 \\ \hline 41,712 \end{array}$$

Practice 4.18

For Problems 1 and 2, determine the difference using the standard algorithm.

Show your thinking.

1 264,813 – 158,302

answer: _____

Name _____ Date _____

Show your thinking.

2 48,227 – 26,812

answer: _____

For Problems 3 and 4, use the digits 7, 3, 5, 6, and 1 to write 2 five-digit numbers. Determine the sum and the difference of the 2 numbers.

Show your thinking.

3 addition expression: _____

answer: _____

4 subtraction expression: _____

answer: _____

Name _____ Date _____

5 Determine the difference.

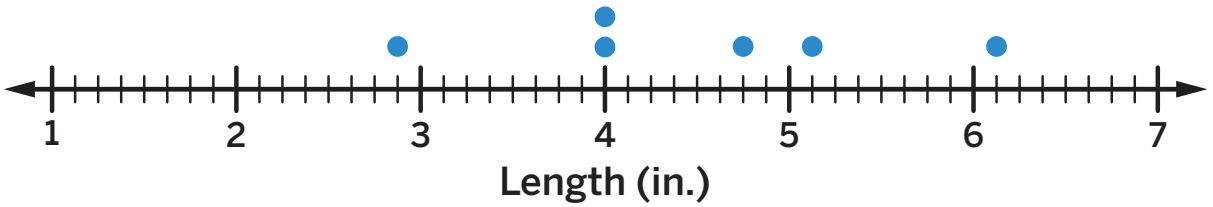
219,714 – 99,628

(A) 120,086 (B) 121,014 (C) 220,014 (D) 220,086

Show your thinking.

Spiral Review

6 The line plot shows the lengths of cucumbers Han picked while gardening.



What is the difference in length between the longest cucumber and the shortest cucumber?

_____

For Problems 7–10, determine the value of the expression.

7 42 ÷ 6 _____

8 40 ÷ 8 _____

9 9 × 8 _____

10 6 × 4 _____

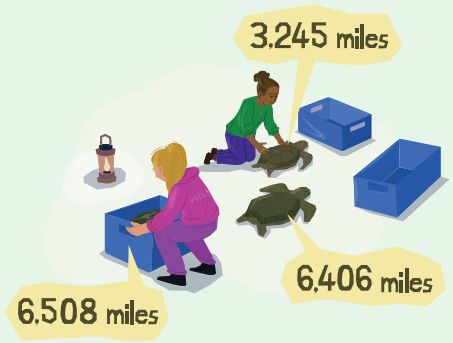
Unit 4
Lesson
19

Name _____ Date _____

Connected Problem Solving 4.NBT.4, SMP.7, SMP.8

Subtracting Across Zeros

Let's subtract large numbers that contain zeros.



Warm-Up

eyes on teacher

We are a math community.
How can you learn from other people in your math class community?

Activity
1

What if There Are Zeros?

Use the standard algorithm to determine each difference.

Show or explain your thinking.

1 Two adult sea turtles migrated to lay their eggs. Patch the sea turtle migrated 6,406 kilometers. Izzy the sea turtle migrated 3,245 kilometers. Determine the difference between the number of kilometers Patch migrated and the number of kilometers Izzy migrated.

answer: _____

Name _____ Date _____

What if There Are Zeros? (continued)

Show or explain your thinking.

2 Four sea turtles migrated a total of 17,408 kilometers. A different group of 4 sea turtles migrated a total of 26,546 kilometers. Determine the difference between the total number of kilometers each group of sea turtles migrated.

answer: _____

3 Leatherback turtles are among the most migratory animals. This year, all leatherback turtles migrated a total of 420,509 kilometers, and a group of 4 sea turtles migrated a total of 17,408 kilometers. Determine the difference between the total number of kilometers all leatherback turtles migrated and the total number of kilometers the 4 sea turtles migrated.

answer: _____

Activity 2

Name _____ Date _____

Decomposing and Zeros

Diego solved a subtraction problem, but there are errors in his work.

$$\begin{array}{r} {\scriptstyle 10} \\ 502,619 \\ -\ 14,407 \\ \hline 592,212 \end{array}$$

4 **Discuss**

How could you use estimation to explain why Diego's answer does not make sense?

5 Determine the correct difference.

502,619 – 14,407

Show or explain your thinking.

answer: _____

Name _____ Date _____

Decomposing and Zeros (continued)

Use the standard algorithm to determine each difference.

Show your thinking.

6 340,689 – 157,276

answer: _____

7 20,028 – 1,436

answer: _____

Summary 4.19

When subtracting multi-digit numbers, you will sometimes need to decompose units in more than 1 place before you have enough to subtract in every place.

$$\begin{array}{r} {\scriptstyle 12}{\scriptstyle 13} \\ 0\,\not{2}\,\not{3}\,10 \\ \not{1}\not{3}\not{4},\not{0}78 \\ -\ \ 59,624 \\ \hline \ \ \ 74,454 \end{array}$$

Practice 4.19

1 Use the standard algorithm to determine the difference.

430,516 – 207,309

Show your thinking.

answer: _____

Name _____ Date _____

For Problems 2 and 3, use the standard algorithm to determine the value of the expression.

Show your thinking.

2 50,082 + 37,568

answer: _____

3 807,090 – 654,803

answer: _____

4 At Niagara Falls, 681,750 gallons of water flow per second over Horseshoe Falls and 75,750 gallons of water flow per second over American and Bridal Veil Falls. How much *more* water per second flows over Horseshoe Falls?

Show your thinking.

answer: _____

Name _____ Date _____

5 Determine the difference.

100,050 – 56,404

(A) 43,636 (B) 43,646 (C) 44,656 (D) 53,646

Show your thinking.

Spiral Review

6 The pattern of rectangles follows a rule.

Step 1 Step 2 Step 3

Write a list of numbers that represents the area of the shape for the first 6 steps in the pattern.

_____

For Problems 7–12, determine the value of the expression.

7 45 ÷ 9 _____

8 96 ÷ 8 _____

9 7 × 8 _____

10 5 × 12 _____

11 6 × 7 _____

12 9 × 12 _____

Unit 4
Lesson
20

Name _____ Date _____

Multi-Digit Numbers 4.NBT.4, 4.NBT.3, SMP.2, SMP.3, SMP.7

Putting It Together

Let's solve problems by adding and subtracting.

Warm-Up eyes on teacher

We are a math community. What is something you recently learned from your math class community?

Activity 1

The Least and Greatest of Them All

Hands-On

You and your partner will be given a set of cards with the numbers 0–9. Shuffle the cards and place them facedown.

Draw 4 cards. Use all 4 cards to form 2 different numbers that will give the following outcomes.

Show or explain your thinking.

1 the *greatest* possible sum

answer: _____

Name _____ Date _____

The Least and Greatest of Them All (continued)

Show or explain your thinking

2 the *least* possible sum

answer: _____

3 the *greatest* possible difference

answer: _____

4 the *least* possible difference

answer: _____

Activity 2

Name _____ Date _____

The Fundraiser

The Sea Turtle Patrol holds an annual fundraiser to raise money for their yearly expenses. This year, the patrol raised $41,560.

In the winter, the patrol will need to spend $3,180 for updated tracking technology, $1,425 for transportation expenses, and $18,790 for new lab equipment.

In the spring, the patrol will need to spend $10,475 for new transmitters, $1,160 for replacement water tanks for rescued turtles, and $912 for new tank thermometers.

5 Estimate whether the amount collected from the fundraiser will be enough to cover all the expenses. Then talk with your partner about how each of you estimated. Explain how you know whether the amount collected is enough to cover the expenses.

Show or explain your thinking.

Name _____ Date _____

The Fundraiser (continued)

6 If the amount collected is enough, how much money will the patrol have left after paying all the expenses? If it is not enough, how much more money will the patrol need?

Show or explain your thinking.

answer: _____

Summary 4.20

Standard algorithms for addition and subtraction can be used to solve multi-step problems involving larger numbers. To determine an estimate or check whether answers are reasonable, it is helpful to round and add or subtract.

$$\begin{array}{r} 5,632 \\ +\ 3,347 \\ \hline 8,979 \end{array} \qquad \begin{array}{r} 6,000 \\ +\ 3,000 \\ \hline 9,000 \end{array}$$

Practice 4.20

1 In 2018, the estimated population of Boston was 694,583, and the estimated population of Seattle was 744,995. What is the population difference between the 2 cities?

A 150,412

B 1,439,578

C 50,412

D 338,458

Name _____ Date _____

The population of sea lions in California has been declining since the 1990s. Use the data from the table for Problems 2 and 3.

Year	Sea lion population
1991	43,834
1997	39,450
2010	26,826

Show your thinking.

2 Estimate the total sea lion population over the 3 years shown in the table.

answer: _____

3 Determine the difference between the population in 1991 and the population in 2010.

answer: _____

Name _____ Date _____

4 Use the digits 5, 8, 1, and 3 to form 2 different numbers that will give the *greatest* possible sum. Then determine the sum.

Show your thinking.

answer: _____

Spiral Review

5 Jada wants to build a rectangle with an area of 18 square units and a width of 6 units. Explain why Jada can or cannot build this rectangle.

_____

_____

_____

For Problems 6–11, determine the value of the expression.

6 54 ÷ 9 _____

7 72 ÷ 8 _____

8 5 × 8 _____

9 5 × 9 _____

10 6 × 11 _____

11 12 × 4 _____

Unit 4
Lesson
21

Name _____ Date _____

Multi-Digit Numbers | Connected Problem Solving | 4.NBT.4, 4.NBT.3, SMP.2, SMP.4, SMP.6

Analyzing Sea Turtle Data

Let's investigate sea turtle populations.

Warm-Up

eyes on teacher

I am a doer of math.
What helps you feel confident in math class?

Activity
1

Turtles, Turtles, and More Turtles

Here is some information about 3 species of sea turtles. Each person in your group will be assigned 1 species. Group member 1 will focus on green sea turtles, 2 will focus on leatherbacks, and 3 will focus on loggerheads.

Green sea turtles

- Hatchlings are about 2.0 inches long and weigh about 0.88 ounces.
- Adults are 31–47 inches long and weigh 265–485 pounds.
- The population size of nesting females is about 90,000.

Leatherback sea turtles

- Hatchlings are about 2.4 inches long and weigh about 1.6 ounces.
- Adults are 48–96 inches long and weigh about 500–2,000 pounds.
- The population size of nesting females is about 35,000.
- Leatherback sea turtles can dive up to 4,000 feet in the water.

Loggerhead sea turtles

- Hatchlings are about 1.8 inches long and weigh about 0.7 ounces.
- Adults are 30–42 inches long and weigh 176–441 pounds.
- The population size of nesting females is about 50,000.
- Loggerhead sea turtles lay about 100,000 total nests in the U.S. each year.

Name _____ Date _____

Turtles, Turtles, and More Turtles (continued)

1 Here are some numbers that could represent facts about green, leatherback, and loggerhead sea turtles. What might each number represent?

Number	What it might represent
2.2	
39	
478	
1,123	
95,300	

2 **Data Talk!**

Which numbers could represent facts about more than 1 species of sea turtle?

Activity 2

Name _____ Date _____

Missing Turtle Data

During sea turtle nesting season, members of the Sea Turtle Patrol go to their local neighborhood beach to record data on the number of sea turtle eggs and hatchlings. Myles's mother is in charge of collecting all the data and sharing it with other groups working on turtle conservation efforts.

The table shows counts for each month and the totals for the entire nesting season. Unfortunately, some entries in the table are missing.

Month	Number of sea turtle eggs	Number of sea turtle hatchlings
May	21,240	
June	17,389	9,685
July		10,070
August	15,972	8,896
Total for nesting season	72,681	42,885

3 Discuss

How could you make an estimate for each missing value?

Name _____ Date _____

Missing Turtle Data (continued)

4 Determine the missing values and write them in the table.

Show your thinking.

Summary 4.21

Using an understanding of place value and multi-digit numbers can help you solve addition and subtraction problems using the standard algorithm.

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ \ \ \ } \\ 69,725 \\ +\ 28,542 \\ \hline 98,267 \end{array} \qquad \begin{array}{r} {\scriptstyle 7\ 12\ 15\ 8\ 14} \\ \cancel{8}\,\cancel{3},\cancel{5}\,\cancel{9}\,\cancel{4} \\ -\ 37,627 \\ \hline 45,967 \end{array}$$

Practice 4.21

For Problems 1 and 2, determine the value of the expression.

Show your thinking.

1 35,891 + 19,342

answer: _____

2 35,891 – 19,342

answer: _____

Name _____ Date _____

For Problems 3 and 4, use the standard algorithm to determine the value of the expression.

Show your thinking.

3 304,068 + 98,909

answer: _____

4 304,068 – 98,909

answer: _____

5 In 1960, the population of Charlotte, North Carolina was 201,564. In 2020, the population was 876,747. What is the difference between the populations in 2020 and 1960?

(A) 675,223

(B) 675,183

(C) 1,078,311

(D) 535,223

Name _____ Date _____

6 Use the digits 7, 4, 2, and 8 to write 2 different numbers that will give the *greatest* possible difference. Then determine the difference.

Show your thinking.

answer: _____

Spiral Review

7 The pattern of rectangles follows a rule. Determine the area of the rectangle in Step 10.

Step 1 Step 2 Step 3

_____

For Problems 8–13, determine the value of the expression.

8 10 ÷ 5 _____

9 84 ÷ 7 _____

10 28 ÷ 7 _____

11 8 × 5 _____

12 6 × 6 _____

13 5 × 7 _____

Math at Work

Peregrine falcons are the fastest birds in the world. When diving to reach prey, they can reach speeds greater than 200 miles per hour! In 1975, there were only 324 pairs of peregrine falcons in the United States. With conservation efforts, there are now over 3,000 pairs!

Wildlife ecologists study wildlife and their environments. They collect data on the population, health, and behavior of wildlife. They might analyze data using decimals and large numbers. They might also estimate or round as they work with these numbers.

Ground Picture/Shutterstock.com. Sriram Bird Photographer/ Shutterstock.com.

Math in the World

A kudu is an African antelope. They can weigh up to about 272,155 grams (600 pounds). Write the weight in grams in expanded form.

paula french/Shutterstock.com.

Math Mindset

How can place value or expanded form help you add or subtract multi-digit numbers?