حل كتاب الطالب الفصل الأول

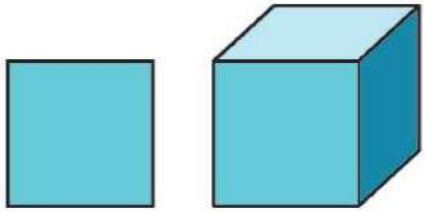
Reveal G5

رابط المجموعة

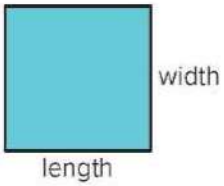
https://t.me/MathG5Mrmohamed

Learn

How are these figures the same?
How are they different?

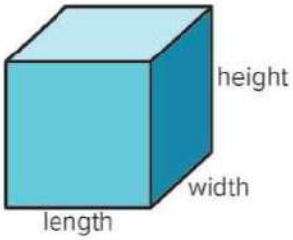


This figure has two dimensions.



Each dimension is a measureable edge length.

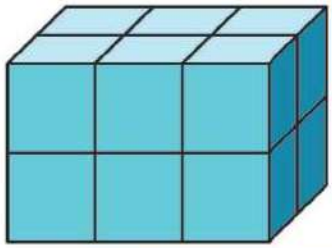
This figure has three dimensions.



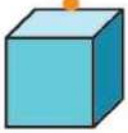
Each dimension is a measureable edge length.

The space occupied by a 3-dimensional figure is called **volume**.

You can pack **rectangular prisms** using **unit cubes** with no gaps or overlaps to establish volume.



A unit cube has edge lengths of 1 unit.

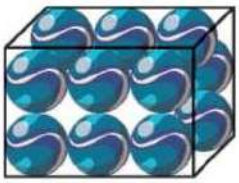


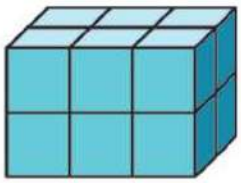
Math is... Precision

Does an empty box have volume? Does a filled box have volume? Explain why or why not.

Work Together

One student used marbles to pack a rectangular prism. Another student used unit cubes.





What do you notice about these strategies?

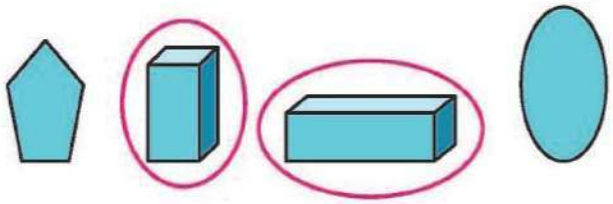
Sample answer: The marbles do not completely fill the rectangular prism because there are gaps. The unit cubes fill the rectangular prism with no gaps.

On My Own

MATH REPLAY | GO ONLINE

Name _____

1. Which of these figures have volume? Justify your reasoning.



Sample answer:
Only 3-dimensional figures have volume.

For the situation, would you measure the *length*, *area*, or *volume*? Explain.

2. the amount of soil needed to fill a flower pot

volume; Sample answer: You are filling a 3-dimensional figure.

3. the distance of a bike ride

length; Sample answer: Distance is length.

4. the amount of wall space covered by a poster

area; Sample answer: You are covering a 2-dimensional figure.

5. the amount of concrete needed to fill a patio

volume; Sample answer: The concrete is filling a 3-dimensional figure.

6. the space inside a moving truck

volume; Sample answer: You are packing a 3-dimensional figure.

7. the distance around a building

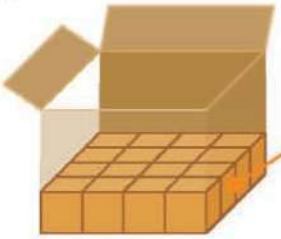
length; Sample answer: Perimeter is length.

Learn

How can you determine the volume of this box?

You can pack the box with unit cubes to determine the volume. A unit cube has a volume of one **cubic unit**.

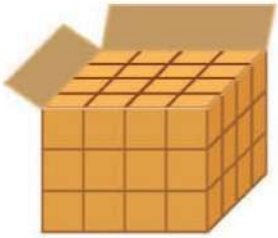
Sixteen cubes fill the bottom of the box.



16 unit cubes

Are there gaps or overlaps?

There are 3 layers of unit cubes.



$3 \times 16 = 48$

The volume of the box is 48 cubic units.

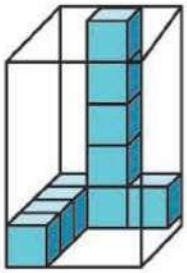
Math is... Structure

Why can you use addition or multiplication to determine the number of unit cubes?

One way to determine the volume of a 3-dimensional figure is to pack it with unit cubes and count the cubes.

Work Together

How can you determine the volume of this box?



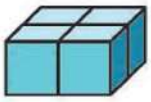
Sample answer: There are 4 × 3, or 12, unit cubes in each layer. There are 5 layers and 12 × 5 = 60.

On My Own

MATH REPLAY | GO ONLINE

Name _____

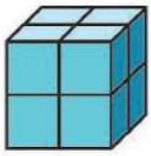
Determine the volume of the figure.

1. 

Number of layers: 1

Number in each layer: 4

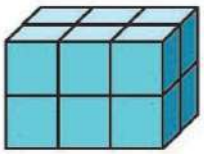
Volume: 4 cubic units

2. 

Number of layers: 2

Number in each layer: 4

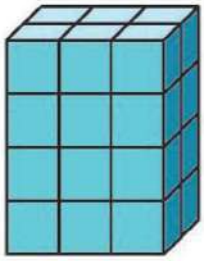
Volume: 8 cubic units

3. 

Number of layers: 2

Number in each layer: 6

Volume: 12 cubic units

4. 

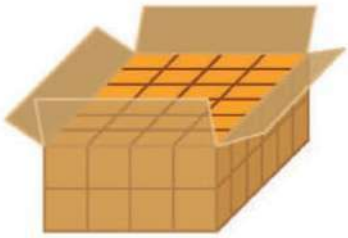
Number of layers: 4

Number in each layer: 6

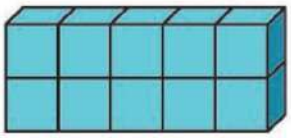
Volume: 24 cubic units

5. How can you determine the volume of the box?

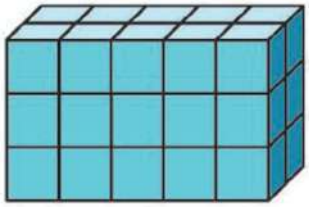
Sample answer: There are 4 × 6 unit cubes in a layer and 2 layers; 4 × 6 × 2 = 48.



What is the volume of the figure?

6. 

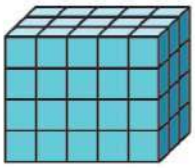
10 cubic units

7. 

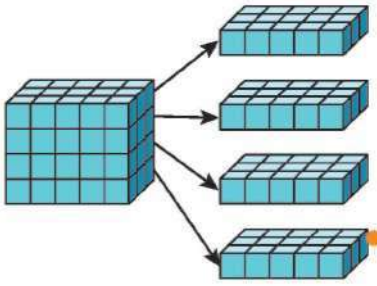
30 cubic units

Learn

What are some ways to determine the volume of this rectangular prism?



One Way Multiply to find the number of cubes in one layer. Then, multiply by the number of layers.



base layer

$3 \times 5 = 15$

Volume = *Base* × *height*

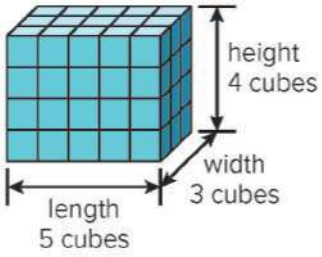
$V = B \times h$

$V = 15 \times 4$

$V = 60$ cubic units

A **formula** is a rule that uses math symbols.

Another Way Multiply the three attributes.



Volume = length × width × height

$V = l \times w \times h$

$V = 5 \times 3 \times 4$

$V = 60$ cubic units

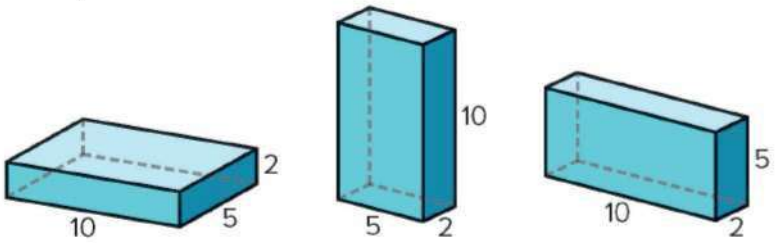
You can use a volume formula to determine the volume of a rectangular prism.

Math is... Modeling

How are the two formulas related?

Work Together

What do you notice about the volumes of the rectangular prisms? Explain why this occurs.



They all have the same volume. Sample explanation: They all have the same dimensions; $10 \times 5 \times 2 = 100$

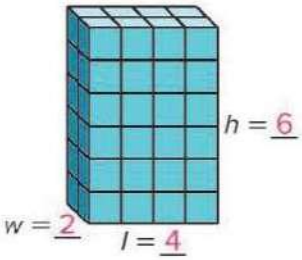
On My Own

MATH REPLAY | GO ONLINE

Name _____

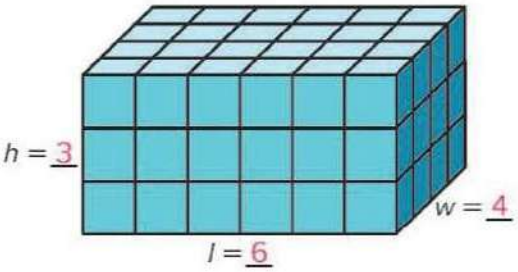
Label the dimensions and then determine the volume of the figure.

1.



$V =$ **48** cubic units

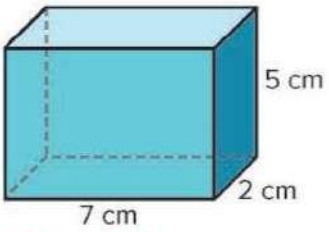
2.



$V =$ **72** cubic units

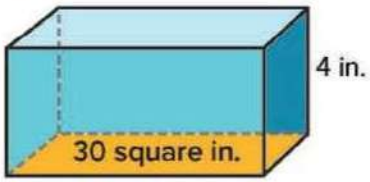
What is the volume of the figure? Tell which volume formula you used and why. **Check students' explanations.**

3.



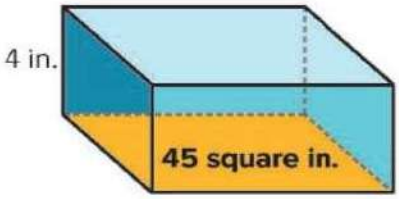
70 cubic cm

4.



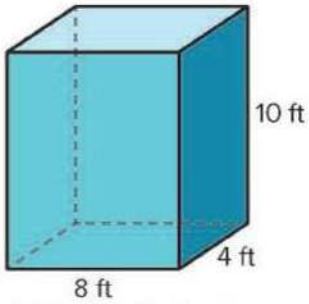
120 cubic in.

5.



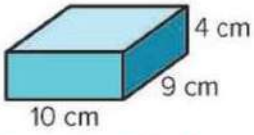
180 cubic in.

6.



320 cubic ft

7. Explain how the Associative Property can be used to mentally find the volume of this figure.



Sample answer: It is easier to mentally multiply 9 × 4, then by 10.

8. A freezer, shaped like a rectangular prism, is 6 feet long, 2 feet wide, and 3 feet tall. What is the volume of the freezer?

36 cubic ft

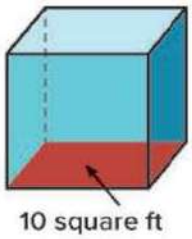
9. An Olympic swimming pool is 2 meters deep. What is the volume of the swimming pool? **2,500 cubic m**

10. **Extend Your Thinking** Do you agree or disagree with this statement? Justify your reasoning. When the edge lengths of a rectangular prism are doubled, the volume is also doubled.

Disagree; Sample answer: When the edge lengths are doubled the volume is 8 times as much because $2 \times 2 \times 2 = 8$.

11. **Error Analysis** Colton says that he does not have enough information to find the volume of the figure. Do you agree? Explain.

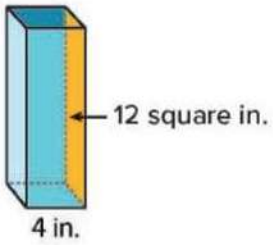
Yes. Sample answer: You also need to know the height of the figure to find the volume.



Reflect

Can you use a formula to find the volume of this rectangular prism? Explain why or why not.

Answers may vary.

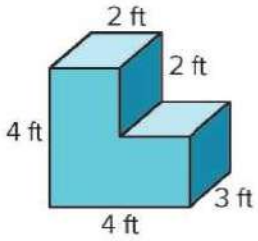


Math is... Mindset

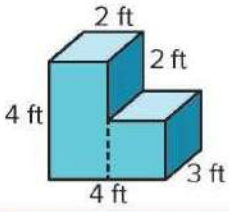
How did you stay focused on your work?

Learn

How can you determine the volume of this figure?



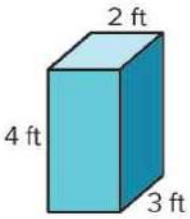
Look for a way to make two rectangular prisms.



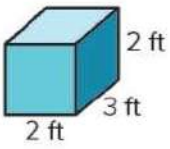
Math is... Connections

Why should the volume be the same whichever way you decompose a composite figure?

Determine the volume of each rectangular prism.



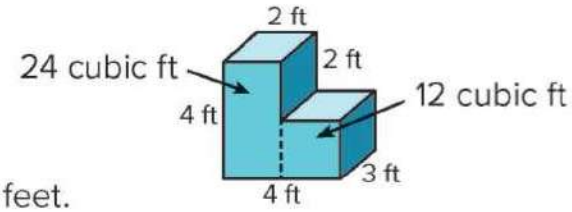
$V = 2 \times 3 \times 4$
$V = 24$ cubic ft



$V = 2 \times 3 \times 2$
$V = 12$ cubic ft

Add the volumes.

$24 + 12 = 36$



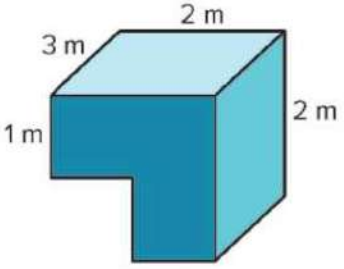
The volume of the figure is 36 cubic feet.

You can determine the volume of the **composite solid figure** by adding the volumes of the rectangular prisms that compose it.

Work Together

Draw lines to show how you could decompose the solid. What is the volume of the figure?

9 cubic meters

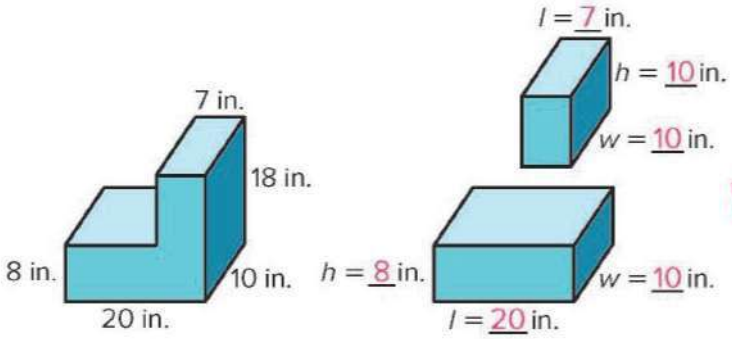


On My Own

MATH REPLAY | GO ONLINE

Name _____

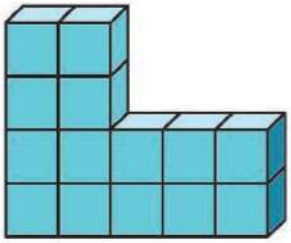
1. Label the unknown dimensions of the decomposed figure and then find the volume of the composite solid figure.



V = 2,300 cubic in.

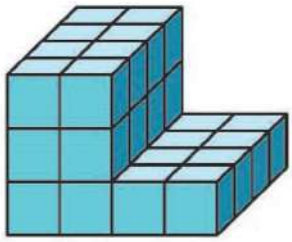
What is the volume of the figure?

2.



$V =$ **14** cubic units

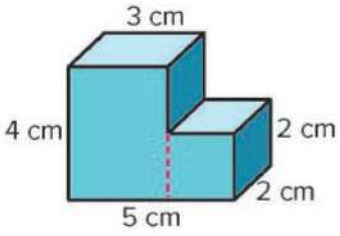
3.



$V =$ **32** cubic units

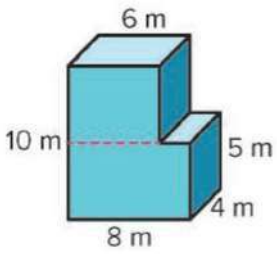
Draw line(s) to show how you decomposed the figure.
What is the volume of the figure? Sample lines shown.

4.



$V =$ **32 cubic cm**

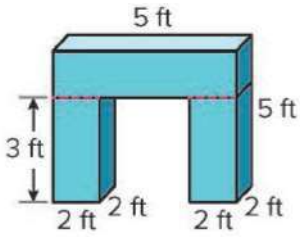
5.



$V =$ **280 cubic m**

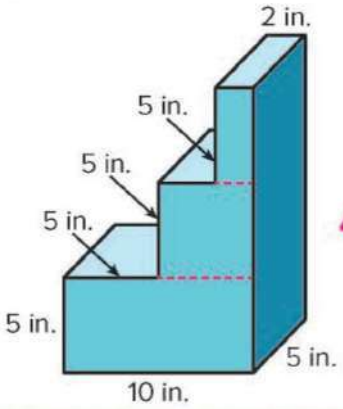
Draw line(s) to show how you decomposed the figure.
What is the volume of the figure? Sample lines shown.

6.



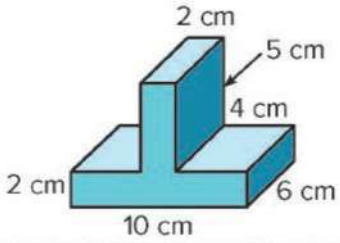
44 cubic ft

7.



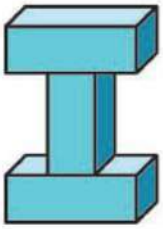
425 cubic in.

8. STEM Connection An ocean engineer is designing an underwater robot. The robot will have two pieces like the one shown. What is the volume of the robot?



360 cubic cm

9. A sign company made this letter using rectangular prisms. Each prism is 12 inches by 4 inches by 4 inches. What is the volume of the letter? Explain.



576 cubic in.; Check students' explanations.

10. Extend Your Thinking Two rectangular prisms have a combined volume of 18 cubic feet. The volume of one prism is twice the volume of the other prism. What is the volume of each prism? Record your thinking.

6 cubic ft and 12 cubic ft; Check students' work.

Reflect

How is finding the volume of composite figures similar to finding the area of composite figures?

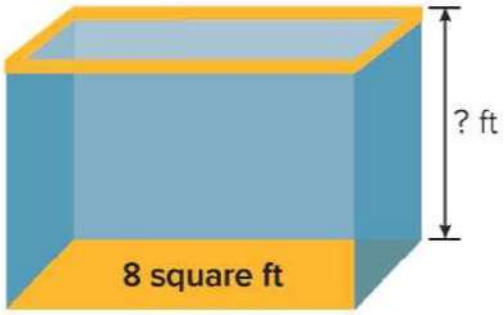
Answers may vary.

Math is... Mindset

What did you do today to build a better relationship with a classmate?

Learn

A fish tank has a volume of 24 cubic feet.
How can you determine the height of the fish tank?



Math is... Quantities

How can you describe the relationship between the given quantities?

You can use a volume formula to solve problems.

The volume of the tank is 24 cubic feet. The base is 8 square feet.

$$V = B \times h$$

$$24 = 8 \times h$$

To solve the equation, write a related division equation.

$$24 = 8 \times h$$

$$24 \div 8 = h$$

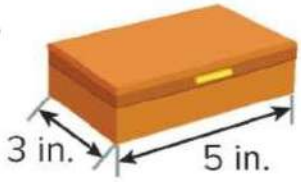
$$24 \div 8 = 3$$

The fish tank has a height of 3 feet.

When solving problems involving volume, you can use the given information to help you determine which volume formula to use.

Work Together

A jewelry box has a volume of 30 cubic inches. What is the height of the jewelry box? Show your work.



2 inches; Sample answer:
$30 = 5 \times 3 \times h$;
$30 = 15 \times h$;
$30 \div 15 = h$; $h = 2$

Unit Review Name _____

Vocabulary Review

Choose the correct word(s) to complete each sentence.

composite solid figure	cubic unit
formula	rectangular prism
unit cube	volume

1. A **composite solid figure** is a solid figure that is made up of two or more solids. (Lesson 2–4)

2. The space occupied by a 3-dimensional figure, or solid figure, is called **volume**. (Lesson 2–1)

3. A cube with edge lengths of one unit is called a **unit cube**. (Lesson 2–1)

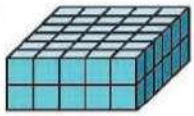
4. A **cubic unit** is a unit for measuring volume. (Lesson 2–2)

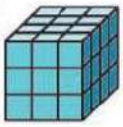
5. A **formula** is an equation that describes the relationship between two or more quantities. (Lesson 2–3)

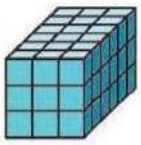
6. A 3-dimensional figure with six rectangular faces is called a **rectangular prism**. (Lesson 2–1)

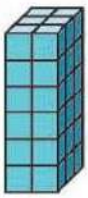
Review

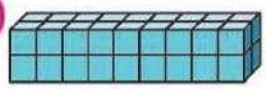
7. Which rectangular prisms have a volume of 36 cubic units? Select all that apply. (Lesson 2–3)

A. 

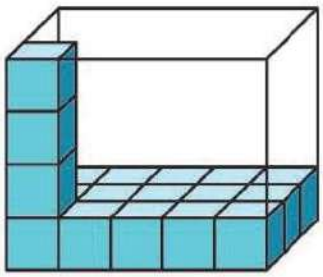
B. 

C. 

D. 

E. 

8. The figure shows a rectangular prism partially filled with unit cubes. (Lesson 2–2)

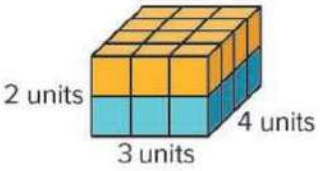


What is the volume of the rectangular prism?

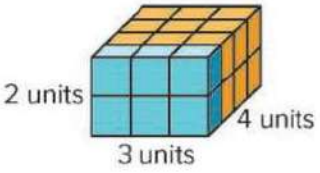
60 cubic units

9. Which equation represents the different ways to find the volume of these figures? (Lesson 2–3)

Prism A:



Prism B:



A. $(4 \times 3) \times 2 = 4 \times (3 \times 2)$

B. $(3 \times 4) \times 2 = (4 \times 3) + 2$

C. $3 \times (4 \times 2) = (3 \times 4) \times (3 \times 2)$

D. $3 \times (4 + 2) = (3 \times 4) + (3 \times 2)$

10. A rectangular pool is 42 feet long, 15 feet wide, and 4 feet high. It is filled with water to a depth of 3 feet. What is the volume of the water in the pool? (Lesson 2–5)

A. 4,410 cubic feet

B. 2,520 cubic feet

C. 630 cubic feet

D. 1,890 cubic feet

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11. The volume of a rectangular prism is 48 cubic inches. Which could be the dimensions of the prism? Select all that apply. (Lesson 2–3)

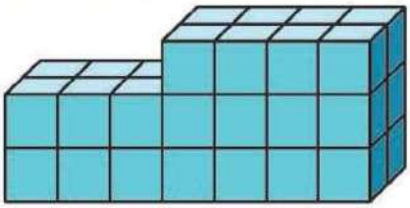
A. length = 24 inches
width = 1 inch
height = 2 inches

B. length = 6 inches
width = 6 inches
height = 4 inches

C. length = 16 inches
width = 16 inches
height = 16 inches

D. length = 12 inches
width = 2 inches
height = 2 inches

12. What is the volume of this figure? (Lesson 2–4)



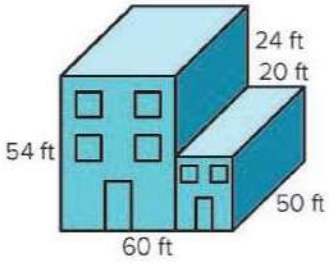
A. 32 cubic units

B. 38 cubic units

C. 34 cubic units

D. 36 cubic units

13. The figure shows the plans for a warehouse.



What will be the volume of the warehouse? (Lesson 2–4)

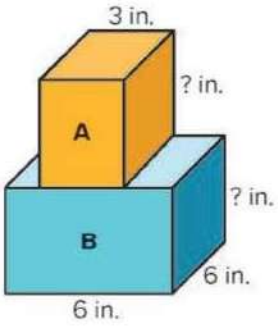
A. 72,000 cubic feet

B. 210,000 cubic feet

C. 138,000 cubic feet

D. 162,000 cubic feet

14. The combined volume of the two boxes shown is 270 cubic inches. Box A and Box B have the same width and height. Box B has twice the volume of Box A. (Lesson 2–4)



Fill in the height and volume of each box.

	Height (in.)	Volume (cubic in.)
Box A	5	90
Box B	5	180

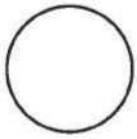
Unit 2

Unit 2 Assessment, Form A

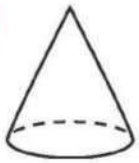
Name _____

1. Which of these figures has volume? Choose all that apply.

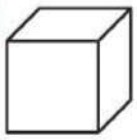
A.



B.



C.



D.

2. For which situation would you measure using unit cubes?

A. the amount of floor space covered by a carpet

B. the distance between two classrooms

C. the amount of wall space taken up by a window

D. the amount of space inside a box

3. Mya is filling a jumping pit with foam blocks. The area of the bottom of the pit is 168 square feet. If the height of the jumping pit is 4 feet, what is the volume of the pit?

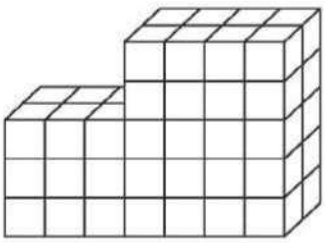
A. 172 cubic feet

B. 672 cubic feet

C. 1,344 cubic feet

D. 2,688 cubic feet

4. What is the volume of the figure?



A. 54 cubic units

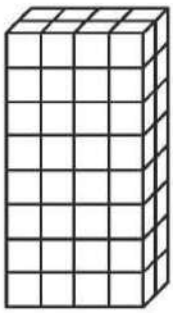
B. 56 cubic units

C. 58 cubic units

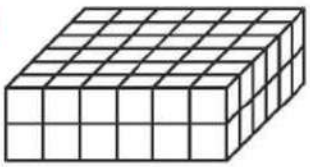
D. 60 cubic units

5. Which rectangular prisms have a volume of 72 cubic units? Choose all that apply.

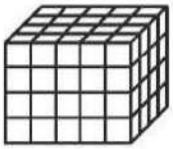
A.



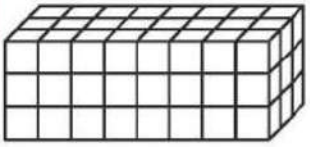
B.



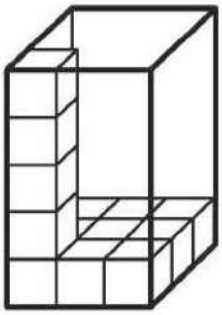
C.



D.



6. Seth partially fills a rectangular prism with unit cubes, as shown.



The volume of the rectangular prism is **45** cubic units.

7. The volume of a rectangular prism is 80 cubic inches. Which could be the dimensions of the prism? Choose all that apply.

A. length = 40 inches, width = 15 inches, height = 25 inches

B. length = 8 inches, width = 5 inches, height = 2 inches

C. length = 10 inches, width = 2 inches, height = 4 inches

D. length = 30 inches, width = 20 inches, height = 30 inches

E. length = 20 inches, width = 4 inches, height = 1 inch

Unit 2 Assessment, Form A (continued)

Name _____

8. Lydia's school box is 10 inches long, 8 inches wide, and 4 inches high. What is the volume of the school box?

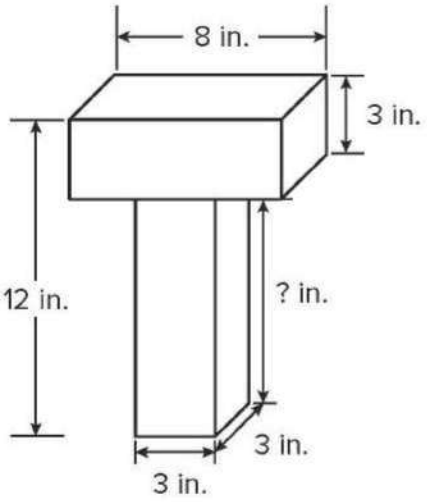
A. 22 cubic inches

B. 24 cubic inches

C. 320 cubic inches

D. 480 cubic inches

9. What is the volume of the T?



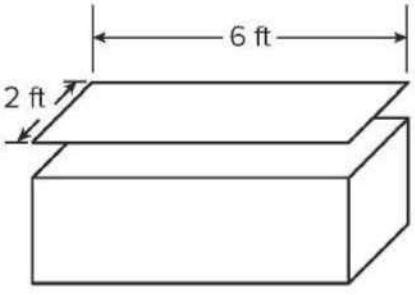
A. 288 cubic inches

B. 153 cubic inches

C. 105 cubic inches

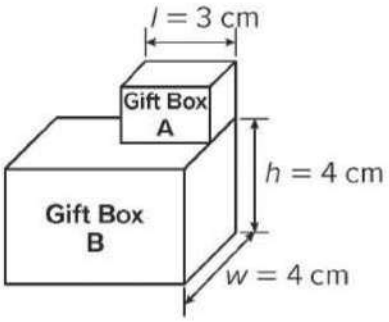
D. 288 cubic inches

10. A toy chest has a volume of 48 cubic feet. How tall is the toy chest?



The toy chest is 4 feet tall

11. The two gift boxes have a combined volume of 108 cubic centimeters. The dimensions of Gift Box A are half the dimensions of Gift Box B.



Which statement about the gift boxes is true?

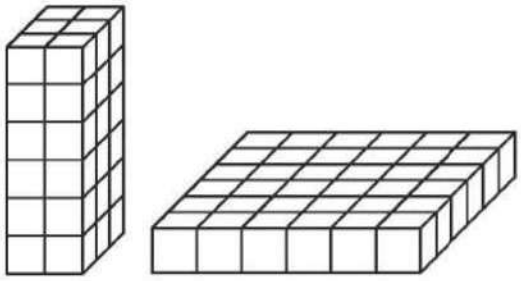
A. The volume of Gift Box A is 7 cubic cm, and the volume of Gift Box B is 14 cubic cm.

B. The volume of Gift Box A is 12 cubic cm, and the volume of Gift Box B is 64 cubic cm.

C. The volume of Gift Box A is 12 cubic cm, and the volume of Gift Box B is 96 cubic cm.

D. The volume of Gift Box A is 36 cubic cm, and the volume of Gift Box B is 72 cubic cm.

12. Janelle and Robert each build a figure using centimeter cubes.



Janelle's figure

Robert's figure

Janelle says that her figure has greater volume than Robert's figure because it is taller. Is Janelle correct? Explain.

No. Both figures have the same volume. Sample answer: Janelle's figure is 2 × 6 × 3 = 36 cubic cm. Robert's figure is 6 × 6 × 1 = 36 cubic cm. Even though Janelle's figure is taller, it has the same volume as Robert's figure.

Learn

What are some ways to describe the relationship between the values of the digits in the number shown?

thousands	hundreds	tens	ones
7	7	7	7

You can describe the relationship between the place-value positions.

One Way Relate 7,000 to 700.

thousands	hundreds	tens	ones
7	7	7	7

$7{,}000 = 10 \times 700$

Each 7 is ten times the value of the 7 to the right.

Another Way Relate 700 to 7,000.

thousands	hundreds	tens	ones
7	7	7	7

700 is $\frac{1}{10}$ of 7,000.

Each 7 is $\frac{1}{10}$ the value of the 7 to the left.

Math is... Structure

What ideas have we learned before that were helpful in understanding this relationship?

A digit represents 10 times as much as it represents in the place to the right. It also represents $\frac{1}{10}$ the value of what it represents in the place to its left.

Work Together

What are two different ways to describe the relationship between the values of each digit 4 in 449,035?

Sample answer: 400,000 is 10 times 40,000; 40,000 is $\frac{1}{10}$ of 400,000

On My Own

MATH REPLAY | GO ONLINE

Name _____

Use the place-value chart to complete the sentence.

1. The value of the 6 in the hundreds place is **10** times the value of the 6 in the **tens** place.

hundred thousands	ten thousands	thousands	hundreds	tens	ones
	3	2	5	6	5
	7	3	6	1	0

Complete the sentences to describe the relationship between the values of each digit 4 and each digit 9 in the number 447,699.

2. The value of the digit 4 in the ten thousands place is **$\frac{1}{10}$** the value of the digit 4 in the **hundred thousands** place.
3. The value of the digit 9 in the **tens** place is 10 times the value of the digit 9 in the **ones** place.

Is each statement *true* or *false*?

4. The digit 3 in 5,630, is 10 times the value of the digit 3 in 342.
   false
5. The digit 3 in 5,630, is $\frac{1}{10}$ the value of the digit 3 in 342.
   true
6. The digit 3 in 5,630, is 10 times the value of the 3 in 13.
   true
7. The digit 3 in 5,630, is $\frac{1}{10}$ the value of the digit 3 in 13.
   false

8. On Tuesday, 600 people attended a play at the Children's Theatre. The same play had 6,000 attendees on Saturday.

   When you compare 600 attendees to 6,000 attendees, 600 is **$\frac{1}{10}$** as much as 6,000.

9. How does the value of the 2 in the hundred thousands place relate to the value of the 2 in the ten thousands place?

hundred thousands	ten thousands	thousands	hundreds	tens	ones
2	2	9	0	3	5

Sample answer: 200,000 is 10 times the value of 20,000.

10. How does the value of the 7 in the thousands place relate to the value of the 7 in the ten thousands place?

hundred thousands	ten thousands	thousands	hundreds	tens	ones
4	7	7	3	0	0

Sample answer: 7,000 is $\frac{1}{10}$ the value of 70,000.

11. **STEM Connection** Studies show that the first observation of Halley's comet was in 466 B.C. What are two different ways to describe the relationship between the digits 6 in 466?

Sample answer: 60 is 10 times 6; 6 is $\frac{1}{10}$ of 60.

12. **Extend Your Thinking** Write a number so that the digit 5 has a value of 5,000 and is $\frac{1}{10}$ the value of the digit in the ten thousands place.

Sample answer: 855,482

Reflect

How did I think like a mathematician today?

Answers may vary.

Math is... Mindset

How did you show confidence that you were successful today?

Learn

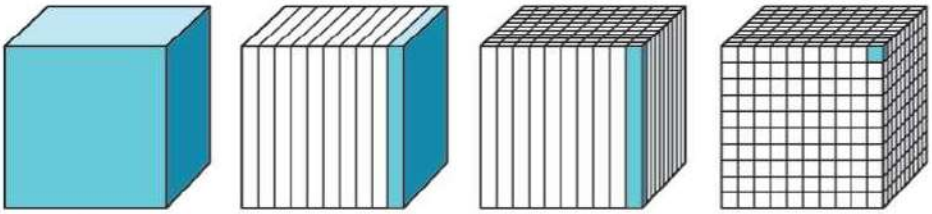
Keagan thinks that the value of each digit 1 is the same.

ones	tenths	hundredths	thousandths
1	1	1	1

How can you help Keagan make sense of this number?

Use a representation to show the value of each digit 1.

ones | tenths | hundredths | **thousandths**



1 | $\frac{1}{10}$ or 0.1 | $\frac{1}{100}$ or 0.01 | $\frac{1}{1{,}000}$ or 0.001

The value of the digit 1 depends on its position in the number.

Math is... Patterns

How is the name of the position related to the fractional part of the whole?

A digit in one place in a decimal number represents 10 times as much as it represents in the place to its right. It also represents $\frac{1}{10}$ the value of what it represents in the place to its left.

Work Together

What are two different ways to describe the relationship between the 0.8 and 0.08?

Sample answer: 0.8 is ten times 0.08; 0.08 is $\frac{1}{10}$ of 0.8

On My Own

MATH REPLAY | GO ONLINE

Name _____

1. Which of the following statements is *true*?
   - A. 0.009 is ten times 0.09
   - B. 0.09 is ten times 0.009
   - C. 0.09 is $\frac{1}{10}$ of 0.009
   - D. 9 is $\frac{1}{10}$ of 0.9

2. Which of the following statements is *true*?
   - A. 0.003 is $\frac{1}{10}$ of 0.03
   - B. 0.03 is $\frac{1}{10}$ of 0.003
   - C. 0.3 is ten times 0.003
   - D. 3 is ten times 0.03

Marcella has $5.00, Niko has $0.50, and Benjamin has $0.05. Use this information to complete each sentence.

3. Benjamin has $\frac{1}{10}$ of the money Niko has.
4. Marcella has 10 times the money Niko has.

Complete each sentence.

5. $9.00 is 10 times $0.90.
6. $0.90 is $\frac{1}{10}$ of $9.00.

7. What are two different ways to describe the relationship between the values of each digit 4 in 3.244?

   Sample answer: 0.04 is ten times 0.004; 0.004 is $\frac{1}{10}$ of 0.04

8. What are two different ways to describe the relationship between the values of each digit 2 in 2.257?

   Sample answer: 2 is ten times 0.2; 0.2 is $\frac{1}{10}$ of 2

9. **Error Analysis** Toby writes the number 23.2 and says that the value of the digit 2 in the tens place is 10 times the value of the digit 2 in the tenths place. How do you respond to him?

Sample answer: I do not agree. 20 is not 10 times 0.2; 20 is 10 times 2; the value of the tens place is 10 times the value of the ones place.

10. For which numbers is the value of the digit 8 ten times the value of the digit 8 in the number 4.984?

(A.) 3.814 (B.) 5.820

C. 6.982 D. 8.492

11. **STEM Connection** The world's biggest submarine can sail at a speed of about 25.5 miles per hour on the surface. How can you describe the relationship between 5 and 0.5?

Sample answer: 5 is ten times 0.5; 0.5 is $\frac{1}{10}$ of 5

12. **Extend Your Thinking** Using only the digits 1, 4, and 5, write a number so that the value of the digit 5 is ten times the value of the digit 5 in the number 1.45. Write another number so that the value of the digit 4 is $\frac{1}{10}$ the value of the digit 4 in 1.45.

Sample answer: 1.54

Reflect

How is the relationship between the values of digits in a decimal the same as the relationship between the values of digits in a whole number?

Answers may vary.

Math is... Mindset

How have you felt calm when you felt angry?

Learn

How can you read the mass of the strawberries?

You can use a place-value chart to help you identify the value of each digit.

Decimal numbers can be written in expanded form.

tens	ones	tenths	hundredths	thousandths
3	4	6	1	8

$30 + 4 + 0.6 + 0.01 + 0.008$

$30 + 4 + \frac{6}{10} + \frac{1}{100} + \frac{8}{1{,}000}$

Standard form uses digits and a decimal point.

34.618

The word form helps you read decimal numbers.

tens	ones	tenths	hundredths	thousandths
3	4	6	1	8

thirty-four and six hundred eighteen thousandths

Math is... Precision

Why is it important to include *and* when reading a decimal number?

Reading and writing decimal numbers follows the same patterns as reading and writing whole numbers.

Work Together

Carly wrote 0.83 in expanded form using multiplication. Is her work correct? Explain your reasoning.

$8 \times \frac{1}{10} + 3 \times \frac{1}{100}$

Yes Check students' explanations.

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the word form of the decimal?

1. 8.2 **eight and two tenths**
2. 8.02 **eight and two hundredths**
3. 0.82 **eighty-two hundredths**
4. 0.082 **eighty-two thousandths**

What is the standard form of the decimal?

5. 0.9 + 0.03 + 0.007 **0.937**
6. 20 + 0.7 + 0.08 + 0.006 **20.786**
7. 5 + 0.01 + 0.009 **5.019**
8. $7 + \frac{4}{10} + \frac{5}{1{,}000}$ **7.405**

What is each decimal in standard form?
What is each decimal in expanded form?

9. ninety-three and six thousandths
   93.006; 90 + 3 + 0.006
10. three and eight hundred forty-six thousandths
    3.846; 3 + 0.8 + 0.04 + 0.006
11. two hundred twelve and fifteen thousandths
    212.015; 200 + 10 + 2 + 0.01 + 0.005
12. seven hundred fifty-one thousandths
    0.751; 0.7 + 0.05 + 0.001

13. **STEM Connection** The Andromeda galaxy is 2.537 million light years from Earth. How can you write this decimal number in expanded form and in word form?

$2 + 0.5 + 0.03 + 0.007$; two and five hundred thirty-seven thousandths

14. Kole wrote the decimal 34.821 in word form as *thirty-four eight hundred twenty-one thousandths*. Is he correct? Explain why or why not.

No; Sample answer: Kole forgot to add "and" after thirty-four.

15. **Extend Your Thinking** Write the word forms of 321,578 and 321.578. What is the same? Explain why those similarities exist.

Sample answer: Both have three hundred twenty-one because both have the digits 321 in either the thousands period or ones period; both have five hundred seventy-eight because both have the digits 578 in either the ones period or in the decimal positions.

Reflect

How is place value used when writing decimal numbers in expanded form?

Answers may vary.

Math is... Mindset

How have you been an active listener today?

Learn

Which bag weighs more?

3.281 kg 3.095 kg

Compare the digits in each place starting with the greatest place-value position.

ones	tenths	hundredths	thousandths
3	2	8	1
3	0	9	5

Both numbers have 3 ones.

2 tenths > 0 tenths

Math is... Thinking

Why was it not necessary to compare the hundredths place?

3.281 > 3.095. So, the purple bag weighs more than the red bag.

You can compare decimals the same way you compare multi-digit numbers.

Work Together

Compare the weights of these bags.

ones	tenths	hundredths	thousandths
3	2	8	1
3	9		

3.281 < 3.9

3.281 kg 3.9 kg

On My Own

MATH REPLAY | GO ONLINE

Name _____

Write >, <, or = in each ◯ to make a true comparison. You can use a place-value chart to help.

1. 7.790 < 8.7
2. 1.021 < 1.095
3. 6.55 > 5.66
4. 9.9 > 0.99
5. 3.41 = 3.41
6. 2.563 < 2.573

For exercises 7–9, use the cost of each school supply.

7. Do the pencils or the highlighters cost more?

   highlighters

8. Write a comparison statement for the cost of the pens and the pencils.

   Sample answer: 1.15 < 1.47

9. Which school supply is the most expensive? Which school supply is the least expensive? Explain how you know.

   Highlighters are the most expensive; Pens are the least expensive; Sample answer: 9 tenths is greater than 4 tenths and greater than 1 tenth.

10. **Error Analysis** An astronomer calculated that a comet traveled 192.40 kilometers. The astronomer wrote 192.4 kilometers on a chart. How do you respond to the astronomer?

Sample answer: I agree with the astronomer because 192.40 = 192.4.

11. Write a comparison statement that compares the speed of a quarter horse to the speed of a lion.

Sample answer: 88.5 > 80.5

88.5 km per hour

80.5 km per hour

12. Which of the following comparisons are *true*?

A. $0.773 > 1.773$

B. $101.020 = 101.02$

C. $0.04 < 0.4$

D. $0.321 < 0.0123$

13. **Extend Your Thinking** Use the digits 5, 7, 8, and 9 to create the greatest possible decimal number.

9.875

Reflect

How is comparing decimals similar to comparing whole numbers?

Answers may vary.

Math is... Mindset

How has a different perspective helped you with your work today?

Learn

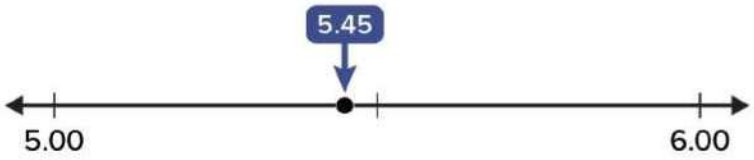
Maya and her sister want to buy a medium popcorn.

About how much money do they need?

You can round decimals to get a good estimate.

One Way Use a number line

Round to the ones.



The bag of popcorn costs about $5.00.

Math is... Precision

What do you notice about the estimate when rounding to lesser place value positions?

Another Way Use place value

to the ones	to the tenths
5.45	5.45
↓	↓
5.00	5.50

Rounding to the nearest tenths gives a better estimate.
Maya and her sister need about $5.50 to buy a medium popcorn.

You can round decimals using number lines or place value to make reasonable estimates. Think about how precise the estimate needs to be when deciding to which place you should round to.

Work Together

What is the weight of the pumpkin rounded to the nearest whole number? nearest tenth?

9 lb; 8.6 lb

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is each decimal rounded to the nearest whole number? You can use a number line or place value.

1. 78.39 **78**
2. 4.07 **4**
3. 12.7 **13**
4. 15.55 **16**

What is each decimal rounded to the nearest tenth? You can use a number line or place value.

5. 42.89 **42.9**
6. 3.65 **3.7**
7. 16.12 **16.1**
8. 98.17 **98.2**

9. Danica rounded a number to the nearest tenth to get 14.7. What number could she have rounded to get this answer?

   Sample answer: 14.65

10. Which statements are *true*?

    A. The decimal 43.678 rounded to the nearest tenth is 43.6.

    B. The decimal 43.678 rounded to the nearest tenth is 43.7.

    C. The decimal 43.678 rounded to the nearest hundredth is 43.68.

    D. The decimal 43.678 rounded to the nearest hundredth is 43.67.

11. The masses of five different dogs are shown. Round each mass to the nearest whole number.

23; 25; 27; 26; 27

12. STEM Connection The mass of the sun takes up about 99.86% of the mass of our solar system. What is 99.86 rounded to the nearest tenth?

99.9

13. Which of the following numbers are closer to 100? Which are closer to 99?

99.03 99.87 99.49 99.27 99.72

99.87, 99.72 are closer to 100; 99.03, 99.49, 99.27 are closer to 99

14. Extend Your Thinking The price of a container of orange juice, rounded to the nearest one is $3.00. Between what two amounts could the actual price be?

Between $2.50 and $3.49

Reflect

How is rounding decimals similar to rounding whole numbers?

Answers may vary.

Math is... Mindset

How has being flexible in your thinking helped you make good decisions?

Review

7. Which statement correctly compares values of the digit 8 in 284,560 and 128,773? (Lesson 3-1)

A. The value of the digit 8 in 284,560 is $\frac{1}{10}$ the value of the digit 8 in 128,773.

B. The value of the digit 8 in 284,560 is 10 times the value of the digit 8 in 128,773.

C. The value of the digit 8 in 284,560 is 10,000 times the value of the digit 8 in 128,773.

8. Complete the sentence. (Lesson 3-3)

In standard form, the number *thirty-six and eight hundred fourteen thousandths is written* as **36.814**

9. Determine whether each comparison is *true* or *false*. (Lesson 3-4)

	True	False
$0.49 < 0.5$	✓	
$0.304 > 0.333$		✓
$0.019 < 0.09$	✓	
$0.08 > 0.81$		✓
$0.111 < 0.11$		✓
$0.68 = 0.068$		✓

10. Complete each sentence. (Lesson 3-5)

0.737 rounded to the nearest hundredth is **0.74**.

0.737 rounded to the nearest tenth is **0.7**.

11. Do the numbers round to 8.1 when rounded to the nearest tenth? Choose *yes* or *no*. (Lesson 3-5)

	Yes	No
7.99		✓
8.162		✓
8.074	✓	
8.13	✓	
8.012		✓

12. The table show the lengths of the tracks at Valley High School and Eastside High School. (Lesson 3-4)

School	Length of Track (in meters)
Valley H.S.	398.25
Eastside H.S.	398.09

Write a comparison using >, <, or =. **Sample answer: 398.25 > 398.09**

MATH REPLAY | GO ONLINE

13. Which of the following statements is *true*? (Lesson 3-2)

A. 0.002 is 10 times 0.02

B. 0.02 is $\frac{1}{10}$ of 0.002

C. 0.02 is 10 times 0.002

D. 2 is $\frac{1}{10}$ of 0.2

14. Complete the sentence. (Lesson 3-2)

7 is **10 times** 0.7.

15. Complete the sentence. (Lesson 3-2)

0.05 is **$\frac{1}{10}$ of** 0.5.

16. Complete the expanded form of the number 8.207. (Lesson 3-3)

$8 + 2 \times$ **$\frac{1}{10}$** $+$ **7** $\times \frac{1}{1{,}000}$

17. Write the decimal number in standard form. (Lesson 3-3)

$3 \times \frac{1}{100} + 9 \times \frac{1}{1{,}000}$

0.039

18. Write 44.259 in word form. (Lesson 3-3)

forty-four and two hundred fifty-nine thousandths

19. List three different decimal numbers that, when rounded to the nearest tenth, round to 3.2. (Lesson 3-5)

Sample answer: 3.21; 3.219; 3.18

20. Show two different ways to write the expanded form of the number 3.48. (Lesson 3-3)

Sample answer:

$3 + 0.4 + 0.08$;

$3 + \frac{4}{10} + \frac{8}{100}$

Performance Task

There are eight planets in our solar system. Each planet orbits the sun at different speeds. Some planets have no moons and some planets have multiple moons!

PART A. The table shows length of time it takes Jupiter and Saturn to orbit the Sun in relation to Earth's orbit. Complete the table to show the word form and the expanded form of each speed.

Name	Orbit Speed (in Earth years)		
	Standard Form	Word Form	Expanded Form
Jupiter	11.86	eleven and eighty-six hundredths	$10 + 1 + 0.8 + 0.06$
Saturn	29.4	twenty-nine and four tenths	$20 + 9 + 0.4$

PART B. Jupiter has 67 confirmed moons. Each moon orbits at different speeds. One moon takes 259.22 Earth days to orbit Jupiter and another one takes 259.653 Earth days. Use >, <, or = to compare the orbit speeds. Explain your answer.

$259.22 < 259.653$; Sample answer: 0.6 is greater than 0.2

Reflect

Explain how place value helps you understand the relationship between decimal places.

Answers may vary.

Unit 3

Unit Assessment, Form A

Name _____

1. Which statement about the digits in the number 39,906 is true?

A. The value of the digit 9 in the thousands place is 10 times the value of the digit 9 in the hundreds place.

B. The value of the digit 9 in the thousands place is $\frac{1}{10}$ the value of the digit 9 in the hundreds place.

C. The value of the digit 9 in the thousands place is 100 times the value of the digit 9 in the hundreds place.

D. The value of the digit 9 in the thousands place has the same value as the digit 9 in the hundreds place.

2. How can you write the number in standard form?

In standard form, the number *nine hundred two and fifty-one thousandths* is written **902.051**.

3. Look at the digit 7 in the numbers given in the place-value chart.

hundred thousands	ten thousands	thousands	hundreds	tens	ones
7	9	7	2	6	4
	7	0	1	3	8

Which statement is true? Choose all that apply.

A. 70,000 is $\frac{1}{10}$ of 700,000

B. 7,000 is 10 times 700,000

C. 70,000 is $\frac{1}{10}$ of 7,000

D. 7,000 is $\frac{1}{10}$ of 70,000

E. 70,000 is 10 times 7,000

4. Use the place value chart to complete the statement.

hundreds	tens	ones	tenths	hundredths	thousandths
4	6	5	5	5	1

The value of the digit 5 in the tenths place is $\frac{1}{10}$ the value of the digit 5 in the _____ place.

A. ones **B.** tenths **C.** hundredths

5. Is each comparison *True* or *False*?

		True	False
a.	$0.12 < 0.2$	✓	
b.	$0.407 > 0.446$		✓
c.	$0.089 < 0.09$	✓	
d.	$0.61 > 0.06$	✓	
e.	$0.555 < 0.55$		✓
f.	$0.34 = 0.034$		✓

6. A centimeter is 0.01 meter. A millimeter is 0.001 meter.

How does the length of 1 centimeter compare to the length of 1 millimeter? Explain your answer.

1 centimeter is 10 times the length of 1 millimeter; Sample answer: The digit 1 in 0.01 is ten times the value of the digit 1 in 0.001. So 1 centimeter is 10 times the length of 1 millimeter.

7. What is the expanded form of 405.072?

A. $40 + 5 + \frac{7}{100} + \frac{2}{1{,}000}$

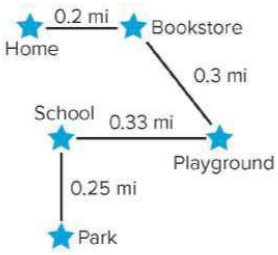
B. $40 + 5 + \frac{7}{10} + \frac{2}{100}$

C. $400 + 5 + \frac{7}{10} + \frac{2}{100}$

D. $400 + 5 + \frac{7}{100} + \frac{2}{1{,}000}$

Learn

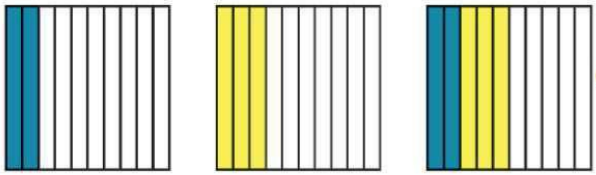
Deja drew a map showing the distances she walked.



How can you determine how far Deja walks from home to the bookstore, then to the playground? How can you determine how far she walks from the playground to the school, then to the park?

Deja walks from home to the bookstore, then to the playground.

0.2 + 0.3 = 0.5

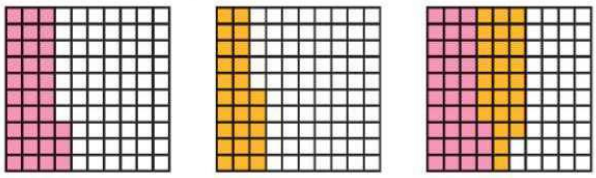


Decimal grids can help you solve the equation.

Deja walked 0.5 mile.

Deja walks from the playground to school, then to the park.

0.33 + 0.25 = 0.58



Deja walked 0.58 mile.

You can use decimal grids to help solve addition equations involving decimals.

Math is... Choosing Tools

How are decimal grids helpful in determing the sum of two decimals?

Work Together

René bought potatoes and turnips. How much do the potatoes and turnips weigh? Use decimal grids to solve.

1.2 kg

0.9 kg

0.3 kg

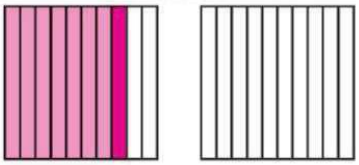
On My Own

MATH REPLAY | GO ONLINE

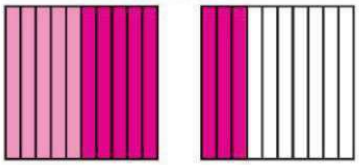
Name _____

What is the sum? Use the decimal grids. Sample shading shown.

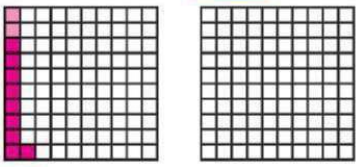
1. 0.7 + 0.1 = 0.8



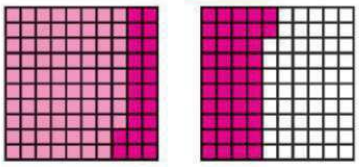
2. 0.5 + 0.8 = 1.3



3. 0.02 + 0.09 = 0.11



4. 0.78 + 0.64 = 1.42

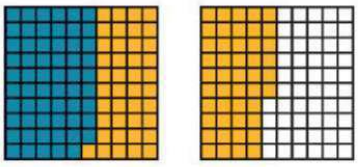


What is the sum? Use decimal grids to show the sum.

5. 0.2 + 0.7 = 0.9
6. 0.5 + 0.6 = 1.1
7. 0.08 + 0.06 = 0.14
8. 0.79 + 0.84 = 1.63
9. 0.32 + 0.88 = 1.2
10. 0.46 + 0.29 = 0.75

11. Write the addition equation represented by the decimal grids.

0.59 + 0.87 = 1.46



12. STEM Connection A veterinarian mixes 1.2 milliliters of medicine with 1.5 milliliters of water. How many milliliters are in the mixture? Use decimals grids to solve. **2.7 mL**

13. Extend Your Thinking Write a word problem that could be solved using this decimal grid. Then, solve the problem.

Sample answer: George ran 0.2 mile on Monday, 0.4 mile on Tuesday, and 0.3 mile on Wednesday. How much did he run over those three days? He ran 0.9 mile.

Reflect

How did using decimal grids help you add decimals?

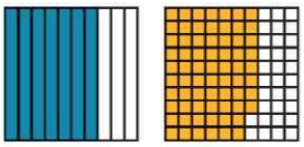
Answers may vary.

Math is... Mindset

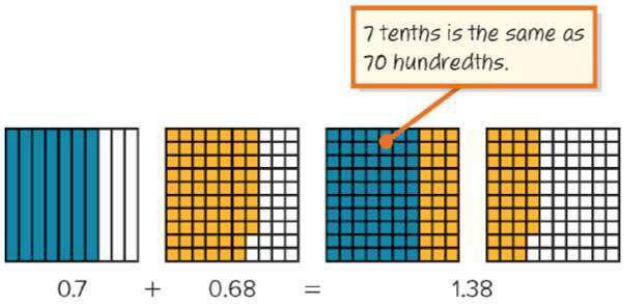
How have your feelings changed about learning math?

Learn

How can you determine the sum of 0.7 + 0.68?



You can use decimal grids to help you determine the sum.



Sometimes you need to represent tenths as hundredths to help solve addition equations involving decimals.

Math is... Structure

How is adding decimals similar to adding whole numbers?

Work Together

What is the total weight of the chocolate bits and raisins? Use a decimal grid to solve.

1.19 lb

Ingredient	Weight (lb)
Chocolate bits	0.6
Raisins	0.59

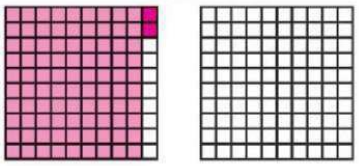
On My Own

MATH REPLAY | GO ONLINE

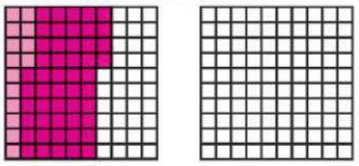
Name _____

What is the sum? Use the decimal grids to solve.

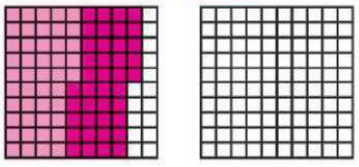
1. $0.9 + 0.02 = \underline{0.92}$



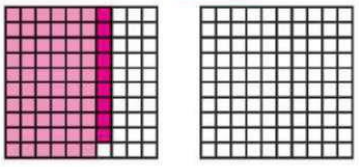
2. $0.14 + 0.5 = \underline{0.64}$



3. $0.45 + 0.4 = \underline{0.85}$



4. $0.6 + 0.09 = \underline{0.69}$



What is the sum? Use decimal grids to solve.

5. $0.7 + 0.18 = \underline{0.88}$

6. $0.86 + 0.5 = \underline{1.36}$

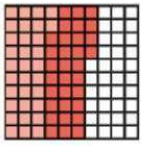
7. $0.44 + 0.6 = \underline{1.04}$

8. $0.1 + 0.89 = \underline{0.99}$

9. Adrian jumped 0.25 meter down a sidewalk. He jumped again and went an additional 0.3 meter. What is the total distance that Adrian jumped? Show your work. **0.55 m**

10. Vi bought 1.4 pounds of pecans and 0.79 pound of almonds. What is the total weight of the nuts Vi bought? **2.19 lb**

11. Error Analysis Abe represented the expression 0.32 + 0.4 on this decimal grid. How do you respond to Abe? **Sample answer: This model correctly shows 0.32, but shows 0.32 added instead of 0.4. Abe should shade 8 additional squares.**



12. Extend Your Thinking Sage has a fitness goal of traveling 1.6 miles each day. She bikes 0.3 mile. She then runs another 1.2 miles. Then, she swims 0.25 mile. Did Sage reach her goal? Explain how you can use a decimal grid to find your answer.

Yes; Sample answer: by using 10 × 10 number grids and shading 30 squares, 120 squares, and 25 squares, I saw that Sage traveled 1.75 miles, which is more than 1.6 miles.

Reflect

How do you think like a mathematician when adding decimals?

Answers may vary.

Math is... Mindset

How have you connected with your classmates?

Learn

How can you determine the total cost of the helicopter and robot?

$17.31

$12.45

Math is... Modeling

What equation can you use to represent the problem?

You can use partial sums to determine the total cost.

One Way Decompose by place value.

$17.31 + 12.45 = c$

$10 + 7 + 0.3 + 0.01 \quad 10 + 2 + 0.4 + 0.05$

$10 + 10 = 20$
$7 + 2 = 9$
$0.3 + 0.4 = 0.7$
$0.01 + 0.05 = 0.06$

Find partial sums

Add partial sums to find the sum

$20 + 9 + 0.7 + 0.06 = 29.76$

Another Way Decompose into whole numbers and decimals.

$17.31 + 12.45 = c$

$17 + 0.31 \quad 12 + 0.45$

$17 + 12 = 29$
$0.31 + 0.45 = 0.76$

Find partial sums

Add partial sums to find the sum

$29 + 0.76 = 29.76$

We can decompose decimals different ways to find partial sums.

Work Together

Michael drove 23.06 kilometers on Saturday and 16.38 kilometers on Sunday. What is the total distance he drove during the two days?

39.44 km

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the sum? Use partial sums to solve.

1. 2.57 + 8.4
   = 2 + 0.5 + 0.07 + 8 + 0.4
   = **10.97**

2. 6.9 + 0.31
   = 6 + 0.9 + 0.3 + 0.01
   = **7.21**

3. 35.12 + 64.73 = **99.85**

4. 70.34 + 21.52 = **91.86**

5. 14.53 + 11.2 = **25.73**

6. 104.75 + 21.9 = **126.65**

7. Mattis earns $22.50 shoveling snow. Later, he finds $0.82 in his backpack. How much money does he have now? **$23.32**

8. Josh's suitcase weighs 13.4 pounds. Karen's suitcase weighs 21.63 pounds. What is the total weight of the two suitcases?
   35.03 lb

9. Kim's goal was to run at least 10 miles this week to train for her cross-country race. On Tuesday she ran 3.57 miles, and on Wednesday she ran 6.48 miles. Did Kim reach her goal? Explain.
   Yes. Sample answer: She ran 10.05 miles.

10. STEM Connection A veterinarian records the amounts of medication she dispenses over the course of three days. How many milliliters of medication does she dispense? Show your work.

	Amount (in milliliters)
Friday	32.5
Saturday	46.25
Sunday	27.1

105.85 mL; 32 + 46 + 20 + 7 + 0.5 + 0.2 + 0.1 + 0.05 = 105.85

11. Harry adds the two decimals, 80.51 and 43.97. He states that the sum cannot be greater than 125. Do you agree? Why or why not?

I agree; Sample answer: If you round each decimal to the nearest whole number, the sum is 125; which is greater than the actual sum because both estimations were rounded up.

12. Error Analysis Scott adds 54.37 + 19.28 by writing 50 + 10 + 4 + 9 + 0.3 + 0.2 + 0.07 + 0.03 + 0.05. Is Scott's work correct? Why or why not?

Yes, his work is correct. Sample answer: Scott decomposed the addends by place value. He also decomposed 0.08 into the sum of 0.03 + 0.05 so that 0.03 could be added to 0.07 to make 0.1.

13. Extend Your Thinking How can you use addition properties to solve this equation efficiently?

$0.19 + 0.5 + 0.81 = x$

Sample answer: Rewrite the sum as 0.19 + 0.81 + 0.5. Add the first two numbers: 0.19 + 0.81 = 1. Then, add the third number: 1 + 0.5 = 1.5.

Reflect

Describe two ways to decompose decimals to find partial sums.

Answers may vary.

Math is... Mindset

How have you recognized and understood how others are feeling?

Learn

The table shows the decimals represented by different colors on a decimal grid.

How can you determine how much more is shaded red than green? Yellow than purple?

Color	Decimal
Red	0.4
Green	0.2
Yellow	0.36
Purple	0.04

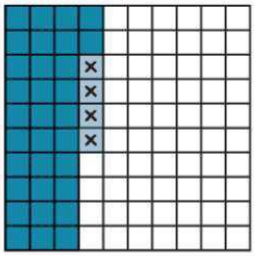
Use a number line to find how much more is shaded red than green.

$0.4 - 0.2 = r$

There is 0.2 more shaded red than green.

Use a decimal grid to find how much more is shaded yellow than purple.

$0.36 - 0.04 = y$



Math is... Precision

How is each quantity shown on the decimal grid?

There is 0.32 more shaded yellow than purple.

You can use a number line or decimal grid to subtract decimals.

Work Together

How much greater is the mass of an emu egg than a chicken egg? Explain. **0.56 kg; 62 squares of a decimal grid are shaded, then 6 of the shaded squares are marked with an x, leaving 56 shaded squares.**

Chicken egg 0.06 kg

Emu egg 0.62 kg

On My Own

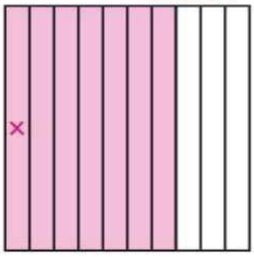
MATH REPLAY | GO ONLINE

Name _____

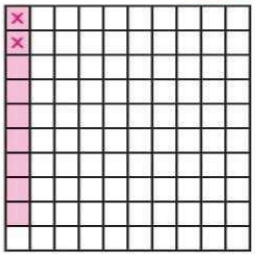
What is the difference? Use the decimal grid to solve.

Sample shading shown.

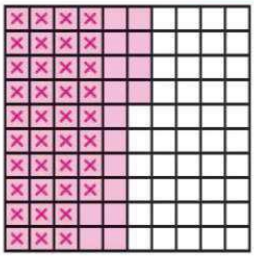
1. $0.7 - 0.1 =$ **0.6**



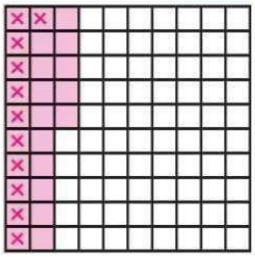
2. $0.09 - 0.02 =$ **0.07**



3. $0.54 - 0.38 =$ **0.16**



4. $0.25 - 0.11 =$ **0.14**



What is the difference? Use a number line to solve.

5. $0.7 - 0.2 =$ **0.5**

6. $0.6 - 0.4 =$ **0.2**

7. Malik has $0.85. He bought a pencil for $0.50. Does he have enough money left to buy a folder for $0.30? Explain.

Yes. Sample answer: Malik has $0.35 left, so he can buy the folder.

8. STEM Connection An ocean engineer is comparing the weight of two different screws. The first screw weighs 0.18 gram. The second screw weighs 0.25 gram. How much more does the second screw weigh? **0.07 g**

9. Kameron ran 0.76 kilometer on Monday. She ran 0.42 kilometer on Tuesday. How much farther did Kameron run on Monday than Tuesday? **0.34 km**

10. Henry found a seashell that has a mass of 0.55 kilogram. Kale found a seashell that has a mass 0.34 kilogram less than Henry's seashell. What is the mass of Kale's seashell? **0.21 kg**

11. Griffin and Lucy are growing sunflowers. Griffin's sunflower is 0.19 meter taller than Lucy's sunflower. Griffin's sunflower is 0.98 meter tall. How tall is Lucy's sunflower? **0.79 m**

12. Extend Your Thinking Explain how using models to find 2.35 − 1.08 is similar to using models to find 235 − 108.

Sample answer: To model 2.35 − 1.08, you shade the same numbers of squares and take away the same number of squares as when you model 235 − 108.

Reflect

How do decimal grids and number lines help you subtract decimals?

Answers will vary.

Math is... Mindset

How has working as a team helped you achieve your goal?

Learn

The table shows different lengths of insects.

How can you find how much longer the ant is than the aphid? The beetle than the ladybug?

Insect	Length (cm)
Beetle	0.7
Ant	0.64
Ladybug	0.43
Aphid	0.3

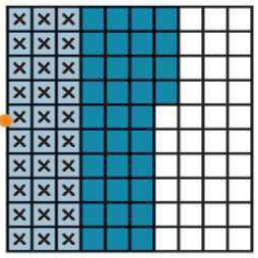
You can use subtraction to find the differences in lengths.

Find how much longer the ant is than the aphid.

$0.64 - 0.3 = 0.34$

The ant is 0.34 centimeter longer than the aphid.

0.3 is the same as 0.30.



Math is... Perseverance

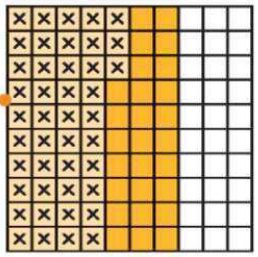
How can you use addition to check that the answer is correct?

Find how much longer the beetle is than the ladybug.

$0.7 - 0.43 = 0.27$

The beetle is 0.27 centimeter longer than the ladybug.

0.7 is the same as 0.70.



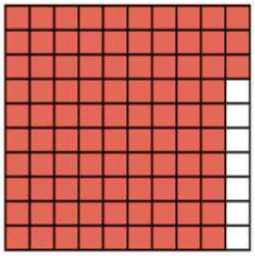
Sometimes you need to convert tenths to hundredths to help solve subtraction equations involving decimals.

Work Together

Marcus is using a decimal grid to solve $0.93 - 0.6 = r$.

How can he show subtracting 0.6?
Explain your reasoning.

He can draw an X on 60 of the shaded squares. Sample explanation: 0.6 is the same as 0.60.



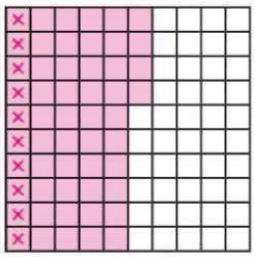
On My Own

MATH REPLAY | GO ONLINE

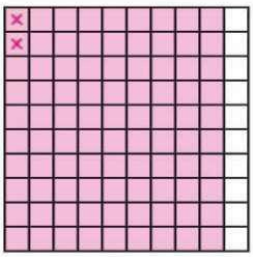
Name _____

What is the difference? Use the decimal grids to solve.

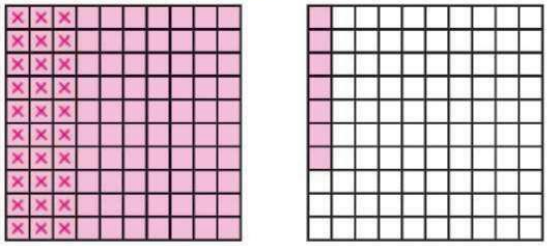
1. 0.54 − 0.1 = **0.44**



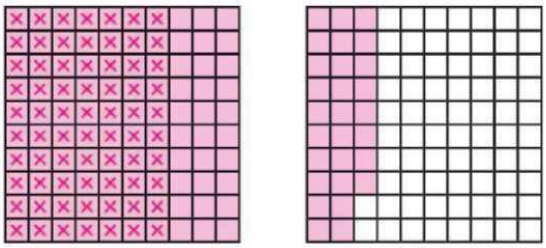
2. 0.9 − 0.02 = **0.88**



3. 1.07 − 0.3 = **0.77**



4. 1.28 − 0.7 = **0.58**



What is the difference? Use decimal grids to solve.

5. 2.3 − 0.27 = **2.03**

6. 2.7 − 1.68 = **1.02**

7. 1.74 − 0.8 = **0.94**

8. 2.25 − 1.8 = **0.45**

9. STEM Connection A veterinarian records the amounts of medicine given to three dogs. How much more medicine did the rottweiler receive than the chihuahua? **5.85 mL**

Dog Breed	Amount
Rottweiler	12.75 mL
Labrador	10.82 mL
Chihuahua	6.9 mL

10. Jana bought 1.66 pounds of roast beef and 0.8 pound of turkey at the deli. How much more roast beef than turkey did Jana buy?

0.86 lb

11. Error Analysis Harry subtracts 0.3 from 0.88. He states that the difference cannot be greater than 0.5. Do you agree? Why or why not? **No. The difference will be greater than 0.5. Sample answer: 0.8 − 0.3 = 0.5 and 0.88 is greater than 0.8.**

12. Extend Your Thinking Write two different expressions that have a difference of 0.4. Use hundredths in at least one of the expressions.

Sample answers: 0.9 − 0.5 and 1.63 − 1.23

Reflect

How did decimal grids help you subtract decimals with different numbers of decimal places?

Answers may vary.

Math is... Mindset

How have you known when there is a problem?

Learn

How can you determine how much more precipitation Olympia, Washington receives than Salem, Oregon?

One Way Decompose by place value to subtract.

$23.89 - 19.29 = p$

$23.89 - 10 = 13.89$
$13.89 - 9 = 4.89$
$4.89 - 0.2 = 4.69$
$4.69 - 0.09 = \mathbf{4.60}$

Math is... Choosing Tools
Is the calculated answer reasonable? How do you know?

Another Way Count on a number line to subtract.

$19.29 + p = 23.89$

$19.29 + \mathbf{4.6} = 23.89$

On average, Olympia receives 4.6 inches more precipitation than Salem.

You can use the same strategies to subtract decimals as you did to subtract whole numbers.

Work Together

Find the difference and explain your strategy.

$57 - 32.64$

24.36; Check students' strategies.

On My Own

MATH REPLAY GO ONLINE

Name _____

Decompose by place value to find the difference.

1. 8.57 − 2.4

8.57 − 2 = 6.57

6.57 − 0.4 = 6.17

8.57 − 2.4 = 6.17

2. 7.73 − 5.1

7.73 − 5 = 2.73

2.73 − 0.1 = 2.63

7.73 − 5.1 = 2.63

Count on to find the difference. Check students' work.

3. 6.31 − 0.9 = 5.41

4. 64.19 − 35.75 = 28.44

What is the difference? Show your work.

5. 36.33 − 32.29 = 4.04

6. 48.56 − 18.21 = 30.35

7. 17.10 − 6.02 = 11.08

8. 25.50 − 11.49 = 14.01

9. STEM Connection A veterinarian weighed a dog at a checkup. Its weight was 22.47 kilograms. When the dog came back for another checkup, it weighed 19.62 kilograms. How much weight did the dog lose? Show your work.

2.85 kg

10. Casey lives on the east side of town and is 25.9 kilometers from the hockey arena. Terry lives on the west side of town and is 18.75 kilometers from the hockey arena. How much farther away from the hockey arena does Casey live than Terry? **7.15 km**

11. Find a pattern in this list of numbers. Then, list the next three numbers in the pattern.

0.73, 0.66, 0.59, **0.52**, **0.45**, **0.38**

12. Extend Your Thinking Natalie said that the difference between 30.8 and 3.8 is 2.7. Explain to Natalie how you know that this statement is not reasonable and what a reasonable answer would be. **Sample answer: I rounded each number to the nearest whole number and subtracted. $31 - 4 = 27$. Then, I knew the answer should be around 27, not 2.7.**

Reflect

How did you decide which strategy to use?

Answers may vary.

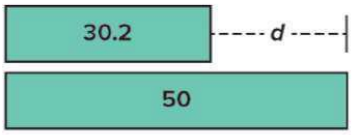
Math is... Mindset

How have you identified your strengths in math?

Learn

Rose is participating in a 50-kilometer bike-a-thon. She stops to eat at a rest stop after 30.2 kilometers. How much farther does Rose have to go?

You can use a bar diagram to represent the problem.



You can write a subtraction equation or an addition equation with unknown addend to solve.

$50 - 30.2 = d$ $30.2 + d = 50$

You can use different strategies to solve.

Decompose by place value.

$50 - 30 = 20$

$20 - 0.2 = 19.8$

$d = 19.8$

Count on to subtract.

$30.2 + 0.8 = 31$

$31 + 9 = 40$

$40 + 10 = 50$

$d = 19.8$

Rose has 19.8 kilometers to go.

Math is... Choosing Tools

Explain why you find one strategy more efficient than another.

You can use different strategies to add or subtract decimals. Select the strategy that is most efficient based on the quantities in the problem.

Work Together

Jack downloaded two games that cost $4.99 each. Find the total cost, not including tax, using two different strategies.

$9.98; Check students' work.

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the sum or difference? Explain how you determined which strategy to use. Check students' explanations.

1. $2.19 + 3.8 =$ 5.99
2. $5.6 - 3.24 =$ 2.36
3. $1.35 + 0.45 =$ 1.8
4. $5.12 - 1.4 =$ 3.72
5. $1.3 - 0.8 =$ 0.5
6. $32.74 - 2.89 =$ 29.85

7. Carlos' luggage weighs 15.6 pounds. Emily's luggage weighs 19.25 pounds. What is the total weight of their luggage? Which strategy did you use to solve?

34.85 lb; Check students' explanations.

8. Amy drove 13.4 miles on Monday and 11.25 miles on Tuesday. How much farther did she drive on Monday than on Tuesday? Which strategy did you use to solve?

2.15 mi; Check students' explanations.

جزى الله خيرا من قام بحل هذا الكتاب

Ch 5

Learn

At Week 1, Dean had 10 pennies Each week after, Dean increased the number of pennies by 10 times the previous week.

During which week will Dean have 1,000,000 pennies?

You can organize the information in a table to help determine the solution.

Math is... Patterns

What patterns do you notice in the table?

Week	Multiplication Expression	Number of Pennies Added each Week
1	10	10
2	10 × 10	100
3	10 × 10 × 10	1,000
4	10 × 10 × 10 × 10	10,000
5	10 × 10 × 10 × 10 × 10	100,000
6	10 × 10 × 10 × 10 × 10 × 10	1,000,000

A **power of 10** is the product of 10 multiplied by itself a number of times.

Dean will have 1,000,000 pennies in Week 6.

You can write a power of 10 as a multplication expression with factors of 10.

You can also write a power of 10 in **exponential form** using a **base** and an **exponent**.

$\underbrace{10 \times 10}_{\text{2 factors}} = 10^{2}$ ← exponent

↑ base

Work Together

Write 10^8 as a multiplication expression. Then, find the product.

$10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 100{,}000{,}000$

On My Own

MATH REPLAY | GO ONLINE

Name _____

Write the exponential form as a multiplication expression.

1. 10^4 $10 \times 10 \times 10 \times 10$
2. 10^2 10×10
3. 10^3 $10 \times 10 \times 10$
4. 10^6 $10 \times 10 \times 10 \times 10 \times 10 \times 10$

Write the exponential form.

5. $10 \times 10 \times 10 =$ 10^3
6. $10 \times 10 \times 10 \times 10 \times 10 =$ 10^5
7. $10 \times 10 \times 10 \times 10 =$ 10^4
8. $10 \times 10 =$ 10^2

Write the exponential form of each power of 10.

9. $10 =$ 10^1
10. $1{,}000 =$ 10^3
11. $100 =$ 10^2
12. $10{,}000 =$ 10^4

13. Rachel finds the value of 10^5 as shown. Do you agree with her solution? Tell why.

$10^5 = 10 \times 5 = 50$ **Sample answer: I disagree with her solution. She needs to multiply 10 by 10 five times or $10 \times 10 \times 10 \times 10 \times 10$, which equals 100,000.**

14. **STEM Connection** Grace reviewed 10^6 lines of a computer program. How many lines did she review? Write the product. **1,000,000**

On My Own

MATH REPLAY | GO ONLINE

Name _____

Write the exponential form as a multiplication expression.

1. 10^4 $10 \times 10 \times 10 \times 10$
2. 10^2 10×10
3. 10^3 $10 \times 10 \times 10$
4. 10^6 $10 \times 10 \times 10 \times 10 \times 10 \times 10$

Write the exponential form.

5. $10 \times 10 \times 10 =$ 10^3
6. $10 \times 10 \times 10 \times 10 \times 10 =$ 10^5
7. $10 \times 10 \times 10 \times 10 =$ 10^4
8. $10 \times 10 =$ 10^2

Write the exponential form of each power of 10.

9. $10 =$ 10^1
10. $1{,}000 =$ 10^3
11. $100 =$ 10^2
12. $10{,}000 =$ 10^4

13. Rachel finds the value of 10^5 as shown. Do you agree with her solution? Tell why.

$10^5 = 10 \times 5 = 50$ **Sample answer: I disagree with her solution. She needs to multiply 10 by 10 five times or $10 \times 10 \times 10 \times 10 \times 10$, which equals 100,000.**

14. **STEM Connection** Grace reviewed 10^6 lines of a computer program. How many lines did she review? Write the product. **1,000,000**

15. Trevor's personal walking goal is shown on his activity tracker.

A. How can you help Trevor write this goal using an exponent?

Sample answer: He can write 10,000 using a base of 10 and an exponent of 4 (10^4).

B. How can you help Trevor write this goal as a product of 10s?

Sample answer: He can multiply 10 by itself 4 times ($10 \times 10 \times 10 \times 10$).

16. Jenny's father gives her $10. Her grandfather offers to give her ten times the value her father gave her. Her grandmother offers her a choice of either ten times the value her grandfather offered or $500. Which of her grandmother's offers should Jenny choose? Explain. **Sample answer: Jenny should choose her grandmother's offer of ten times the amount her grandfather offered, or $1,000 ($10 \times 10 \times 10$). This is greater than her grandfather's offer of $100 and the offer of $500.**

17. Extend Your Thinking Consider the inequality shown.

$$10 \times 10 \times 10 \times 10 < b < 10^6$$

What is the value of b? Explain.

$b = 100{,}000$; $10^4 < b < 10^6$

Reflect

What patterns did you notice when writing different forms of powers of 10?

Answers will vary.

Math is... Mindset

How have you told your classmates about your math story?

Learn

The distances from these planets to the Sun are shown as multiplication expressions.

How can you determine the value of these expressions?

Mercury
about 36×10^6 mi

Neptune
about 3×10^9 mi

First, determine the distance from Mercury to the Sun. Look for pattterns when multiplying by a power of 10.

$36 \times 10^6 = 36 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

$= 36 \times 1{,}000{,}000$

$= 36{,}000{,}000$

The exponent is the same as the number of zeros in the product.

The distance from Mercury to the Sun is about **36,000,000 miles.**

You can use patterns to determine the distance from Neptune to the Sun.

$3 \times 10^9 = 3 \times 1{,}000{,}000{,}000$

$= 3{,}000{,}000{,}000$

The distance from Neptune to the Sun is about 3,000,000,000 miles.

Math is... Structure

Why does the place of the digits in a number shift each time you multiply by 10?

When multiplying by powers of 10, there is a pattern in the number of zeros in the product in relationship to the exponent.

Work Together

Find the value of each expression. Explain how you used patterns to help you.

32×10^2 **3,200** 32×10^3 **32,000** 32×10^4 **320,000**

Sample answer: I moved the digits to the left the same number of places as the exponent.

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the product? Use patterns to solve.

1. $12 \times 10 =$ 120
   $12 \times 100 =$ 1,200
   $12 \times 1{,}000 =$ 12,000

2. $24 \times 1{,}000 =$ 24,000
   $24 \times 10{,}000 =$ 240,000
   $24 \times 100{,}000 =$ 2,400,000

3. $33 \times 10^2 =$ 3,300
   $33 \times 10^3 =$ 33,000
   $33 \times 10^4 =$ 330,000

4. $57 \times 10^4 =$ 570,000
   $57 \times 10^5 =$ 5,700,000
   $57 \times 10^6 =$ 57,000,000

What is the product?

5. 23×10^3 23,000

6. 581×10^2 58,100

7. 60×10^4 600,000

8. 103×10^2 10,300

What is the unknown factor?

9. $571 \times$ 10 $= 5{,}710$

10. $43 \times$ 100,000 $= 4{,}300{,}000$

11. $6 \times$ 1,000 $= 6{,}000$

12. $28 \times$ 10,000 $= 280{,}000$

13. How can you describe the relationship between the equations shown?

$6 \times 10^5 = 600{,}000$
$6 \times 10^7 = 60{,}000{,}000$
$6 \times 10^9 = 6{,}000{,}000{,}000$

Sample answer: Each time the exponent increases by 2, the digits in the first factor shift 2 more places to the left.

14. Error Analysis Carol says the equation that she wrote is correct. How do you respond to her?

$80 \times 10{,}000 = 80{,}000$

Sample answer: Carol's equation is incorrect. She only multiplied $8 \times 10{,}000$, not $80 \times 10{,}000$. The correct product is 800,000.

15. Which equations are *true*? Circle all that apply.

A. $6 \times 100 = 6 \times 10 \times 10 \times 10$

B. $10{,}000 \times 4 = 10 \times 10 \times 10 \times 10 \times 4$

C. $15 \times 10^3 = 1{,}500$

D. $70 \times 10 \times 10 = 7{,}000$

16. Extend Your Thinking Find the unknown factor that is a whole number. Explain your thinking.

$$? \times 10^5 = 56{,}300{,}000$$

$563 \times 10^5 = 56{,}300{,}000$; Sample answer: Because multiplying by powers of ten shifts the digits of the factor to the left, you can work backwards and move the digits in the product to the right the same number of places as the power of ten.

Reflect

What patterns did you notice when multiplying by powers of 10?

Answers may vary.

Math is... Mindset

How have you avoided getting distracted?

Lesson **5-2**

Exit Ticket

Name _____

1. What is the product of the equation? Use a pattern to find the value.

   $36 \times 10 =$ **360**
   $36 \times 100 =$ **3,600**
   $36 \times 1{,}000 =$ **36,000**

2. Which is equivalent to 24×10^4?

   A. 240
   B. 24,000
   C. 240,000
   D. 2,400,000

3. Which is equivalent to 98×10?

   A. 98
   B. 980
   C. 9,800
   D. 980,000

4. Which power of 10 completes the equation?

   $43 \times$ **100** $= 4{,}300$

5. Which exponential form completes the equation?

   $27 \times$ **10^5** $= 2{,}700{,}000$

Reflect On Your Learning

I'm confused. — I'm still learning. — I understand. — I can teach someone else.

Learn

On Saturday, 432 people go to the theater.

About how much money does the theater collect on Saturday?

You can use strategies you know to determine a reasonable estimate.

One Way Compatible numbers

432×13

$400 \times 15 = 4 \times 100 \times 15$
$= 4 \times 15 \times 100$
$= 6{,}000$

The theater collects about $6,000.

Another Way Rounded factors

432×13

$430 \times 10 = 4{,}300$

The theater collects about $4,300.

Math is... Choosing Tools

What can and can't an estimated product tell you?

A reasonable estimate is between $4,300 and $6,000.

You can use these estimates to determine that the calculated solution of $5,616 is a reasonable answer.

Estimated products can help you determine whether calculations are reasonable.

Work Together

Estimate the product of 879×36. **36,000**

Which strategy did you use? Explain why.

Sample answer: 36,000; Check students' responses.

On My Own

MATH REPLAY | GO ONLINE

Name _____

Estimate the product. Sample answers are shown.

1. 643 × 18
   600 × 20 = 12,000
2. 325 × 62
   300 × 70 = 21,000
3. 438 × 27
   400 × 30 = 12,000
4. 572 × 49
   600 × 50 = 30,000

5. On a school trip, 54 students went to a museum. Each ticket cost $23. About how much did all students spend on tickets?
   Sample answer: 50 × 20 = $1000
6. The town library has 478 shelves. Each shelf holds 38 books. About how many books does the library have?
   Sample answer: 500 × 40 = 20,000
7. A vendor at a fair is selling her paintings for $23 each. Over the course of the fair, 339 people purchase her paintings. About how much did the vendor earn over the course of the fair?
   Sample answer: 300 × 20 = $6,000
8. The fifth graders sold 405 baked goods at the bake sale. About how much did the fifth graders earn?
   Sample answer:
   10 × 400 = $4,000

9. **Error Analysis** Han estimates that the product of 492 and 32 will be 1,200. How do you respond to Han?
   Sample answer: I do not agree with Han. Using compatible numbers, 500 × 30 gives an estimate of 15,000.

10. Which equation represents a reasonable estimate for 658 × 19? Explain. **Check students' explanations.**

A. 700 × 10 = 7,000

B. 650 × 20 = 13,000

C. 600 × 10 = 6,000

11. If you estimate the product of 246 × 38, will the estimate be greater using rounded numbers or compatible numbers? Why?

Compatible; the factors using compatible numbers would be 250 × 50, and rounded numbers would be 200 × 40.

12. **Extend Your Thinking** A recycling club has a goal of collecting 8,000 plastic bottles. Each of the 26 students in the club collected 72 bottles a day for 5 days. About how many bottles did they collect at the end of 5 days? Did they meet their goal?

Sample answer: The club collected about 10,000 bottles, so they likely met their goal.

Reflect

How can you use estimates to determine whether a calculated product is reasonable?

Answers may vary.

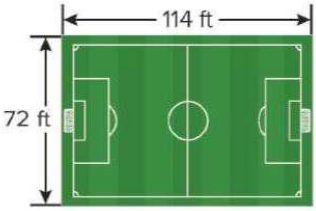
Math is... Mindset

How have you made sense of a situation?

Learn

How can you determine the area of the youth soccer field?

You can use an area model to solve 72 × 114 = A.



Decompose the factors by place value.

	100	+ 10	+ 4
70			
+ 2			

Determine partial products.

	100	+ 10	+ 4
70	7,000	700	280
+ 2	200	20	8

Math is... Modeling

How does an area model help you understand multiplication?

Add the partial products to determine the product.

7,000 + 700 + 280 + 200 + 20 + 8 = 8,208

The area of the soccer field is 8,208 square feet.

You can use area models to multiply multi-digit factors.

Work Together

Use an area model and partial products to determine the product of 304 × 68. **20,672**

On My Own

MATH REPLAY GO ONLINE

Name _____

Complete the area model. Then solve to find the product.

1.

	100	+ 50	+ 4
30	3,000	1,500	120
+ 6	600	300	24

5,544

2.

	400	+ 20	+ 1
50	20,000	1,000	50
+ 2	800	40	2

21,892

What is the product? Use area models to solve.

3. $15 \times 24 =$ 360

	24
15	

4. $28 \times 132 =$ 3,696

	132
28	

5. $33 \times 78 =$ 2,574

6. $72 \times 225 =$ 16,200

Write the multiplication equation based on the area model. Then solve to find the product.

7.

	200	+ 10	+ 8
20			
+ 8			

$218 \times 28 = 6{,}104$

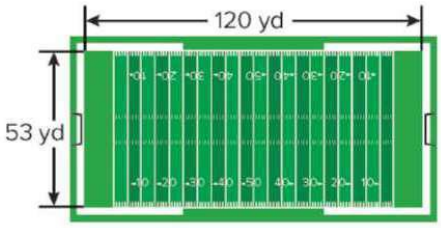
8.

	400	+ 10	+ 6
60			
+ 3			

$416 \times 63 = 26{,}208$

9. What is the area of the football field?

6,360 square yards



10. A school collected 128 boxes of canned food. Each box has 45 cans. How many cans of food did the school collect?

5,760 cans of food

11. STEM Connection Owen has 14 sketchbooks that each contain 128 sketches of insects. How many sketches of insects does Owen have in all?

1,792 sketches

12. Extend Your Thinking How could you use an area model to determine the product of 452 × 273? Explain.

You can divide the area model into 9 spaces instead of 6 to determine 452 × 273 = 123,396.

Reflect

How did I think like a mathematician to multiply multi-digit factors?

Answers may vary.

Math is... Mindset

How have you shown that you understand your partner's point of view?

Learn

A stadium has 164 rows of seats.

How many seats are in the stadium?

You can use partial products to solve the problem.

Decompose the factors by place value.

$164 = 100 + 60 + 4$

$82 = 80 + 2$

Determine the partial products.

$$\begin{array}{rl} & 164 \\ \times & 82 \\ \hline & 8{,}000 \leftarrow 80 \times 100 \\ & 4{,}800 \leftarrow 80 \times 60 \\ & 320 \leftarrow 80 \times 4 \\ & 200 \leftarrow 2 \times 100 \\ & 120 \leftarrow 2 \times 60 \\ + & 8 \leftarrow 2 \times 4 \\ \hline & 13{,}448 \end{array}$$

Multiply 80 by 100, 60, and 4.

Multiply 2 by 100, 60, and 4.

Add the partial products.

There are 13,448 seats in the stadium.

Math is... Generalizations

How does the area model help you understand how this strategy works?

Partial products is another multiplication strategy you can use to multiply multi-digit whole numbers.

Work Together

What is the product? Use partial products to solve.
Show 142 × 63 vertically.

8,946

On My Own

MATH REPLAY | GO ONLINE

Name _____

Find the unknown partial products. Then find the product.

1.
$$\begin{array}{r} 325 \\ \times\ 73 \\ \hline 21{,}000 \\ 1{,}400 \\ 350 \\ 900 \\ 60 \\ +\ 15 \\ \hline 23{,}725 \end{array}$$

2.
$$\begin{array}{r} 104 \\ \times\ 28 \\ \hline 32 \\ 800 \\ 80 \\ +2{,}000 \\ \hline 2{,}912 \end{array}$$

What is the product? Use partial products to solve.

3. $17 \times 86 = 1{,}462$

4. $24 \times 129 = 3{,}096$

5. $36 \times 93 = 3{,}348$

6. $222 \times 58 = 12{,}876$

7. A sporting goods store sold 24 mountain bikes. How much money did they make selling bikes? **$5,976**

8. The store also sold 12 mountain bike and scooter packages each for $367. How much money did they make? **$4,404**

9. At a school fundraiser, 327 donors give $25 each. How much money does the school collect? **$8,175**

10. A store has 60 boxes of shirts with 152 shirts in each box. How many shirts are there in all? **9,120 shirts**

11. **Error Analysis** Raya used partial products to find the product of 128 × 17. What can you say about Raya's work?

Sample answer: She found 7 tens for 7 × 0 instead of 0 tens.

$$\begin{array}{r} 208 \\ \times \quad 17 \\ \hline 2{,}000 \\ 100 \\ 80 \\ 1{,}400 \\ 70 \\ +\quad 56 \\ \hline 3{,}706 \end{array}$$

12. **Extend Your Thinking** Solve using partial products. Explain your answer.

384 × 725 **278,400; Check students' explanations.**

Reflect

How can you use partial products to find the product of multi-digit factors?

Answers may vary.

Math is... Mindset

What steps did you take to focus on your work today?

Learn

The distance from Los Angeles to New York City is 7 times as far as from Los Angeles to Phoenix.

How can you determine the distance from Los Angeles to New York City?

You can multiply using an **algorithm**.

Step 1 Multiply the ones.

$7 \times 3 = 21$

Regroup 21 as 2 tens and 1 one.

$$\begin{array}{r} {\scriptstyle 2} \\ 413 \\ \times \quad 7 \\ \hline 1 \end{array}$$

Show 2 tens.

Show 1 one.

Step 2 Multiply the tens.

$7 \times 10 = 70$

Add the 2 tens from Step 1.

$70 + 20 = 90$

$$\begin{array}{r} {\scriptstyle 2} \\ 413 \\ \times \quad 7 \\ \hline 91 \end{array}$$

Show 9 tens.

Step 3 Multiply the hundreds.

$7 \times 400 = 2{,}800$

The distance from Los Angeles to New York City is 2,891 miles.

$$\begin{array}{r} {\scriptstyle 2} \\ 413 \\ \times \quad 7 \\ \hline 2{,}891 \end{array}$$

Show 28 hundreds.

Math is... Generalizations

How are the partial products strategy and this algorithm related?

Work Together

Find the product using an algorithm.

$$\begin{array}{r} 3{,}021 \\ \times \quad 4 \\ \hline 12{,}084 \end{array}$$

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the product?

1. $\begin{array}{r} 327 \\ \times\ 6 \\ \hline 1{,}962 \end{array}$

2. $\begin{array}{r} 543 \\ \times\ 8 \\ \hline 4{,}344 \end{array}$

3. $\begin{array}{r} 1{,}931 \\ \times\ 5 \\ \hline 9{,}655 \end{array}$

4. $\begin{array}{r} 3{,}462 \\ \times\ 4 \\ \hline 13{,}848 \end{array}$

What is the product? Choose the correct answer.

5. $188 \times 7 = s$
   - A. $s = 1{,}300$
   - (B.) $s = 1{,}316$
   - C. $s = 1{,}388$
   - D. $s = 1{,}406$

6. $237 \times 9 = v$
   - A. $v = 2{,}033$
   - B. $v = 2{,}163$
   - C. $v = 2{,}153$
   - (D.) $v = 2{,}133$

7. $2{,}623 \times 2 = y$
   - (A.) $y = 5{,}246$
   - B. $y = 4{,}246$
   - C. $y = 5{,}126$
   - D. $y = 5{,}616$

8. $5{,}246 \times 3 = r$
   - A. $r = 15{,}882$
   - B. $r = 16{,}838$
   - C. $r = 16{,}612$
   - (D.) $r = 15{,}738$

9. **STEM Connection** Hiro knows that Lake Michigan is 922 feet deep. He knows that the Atlantic Ocean is 28 times as deep. How deep is the Atlantic Ocean?

25,816 feet

10. Joey earns $355 a week mowing lawns. How much money does he earn in 6 weeks? **$2,130**

11. The pedometer shows the number of steps Maria walks each day. How many steps did she walk after 7 days? **64,050 steps**

12. On a road trip, Emily and her family listen to 3 podcasts. Each one is 45 minutes long. For how many seconds do they listen to podcasts? **8,100**

13. **Extend Your Thinking** Explain why it is important to follow each step of the algorithm when multiplying.

The calculation will not be correct if one of the steps is left out.

Reflect

How are partial products and an algorithm for multiplication related?

Answers may vary.

Math is... Mindset

How have you been part of the classroom community?

Learn

Last weekend, a store sold 549 T-shirts.

How can you determine how much money a store made from selling T-shirts last weekend?

You can use an algorithm to solve the problem.

Step 1 Multiply 549 × 6.

$$\begin{array}{r} {\scriptstyle 2\ 5}\\ 549\\ \times\ 26\\ \hline 3{,}294 \end{array}$$

Math is... Generalizations

How might using this algorithm be different when multiplying two 3-digit numbers?

Step 2 Multiply 549 × 20.

$$\begin{array}{r} {\scriptstyle 1}\\ 549\\ \times\ 26\\ \hline 3{,}294\\ 10{,}980 \end{array}$$

Step 3 Add partial products.

$$\begin{array}{r} 549\\ \times\ 26\\ \hline 3{,}294\\ +10{,}980\\ \hline 14{,}274 \end{array}$$

The store made $14,274 from selling T-shirts last weekend.

An algorithm can be a more efficient way to multiply.

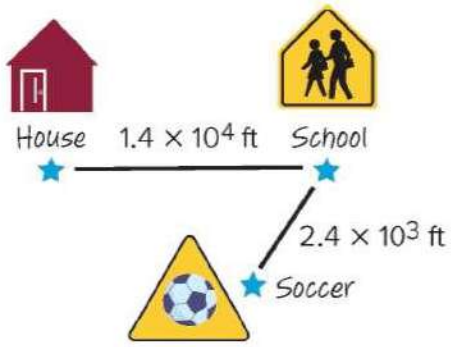
Work Together

What is the product?

$$\begin{array}{r} 2{,}165\\ \times\ 34\\ \hline 73{,}610 \end{array}$$

Learn

Tamara walks from her house to school, then to the soccer field. The distances are shown using multiplication expressions.



How can you determine the value of these expressions?

First, determine the distance from house to school.

Look for patterns when multiplying a decimal by a power of 10.

$1.4 \times 10^1 = 1.4 \times 10 \quad = 14$

$1.4 \times 10^2 = 1.4 \times 100 \quad = 140$

$1.4 \times 10^3 = 1.4 \times 1{,}000 \quad = 1{,}400$

$1.4 \times 10^4 = 1.4 \times 10{,}000 = 14{,}000$

The exponent is the same as the number of places the digits shift to the left.

The distance from house to school is 14,000 feet.

Math is... Structure

How is multiplying decimals and whole numbers by 10 similar?

You can use patterns to determine the distance from school to soccer.

$2.4 \times 10^3 = 2.4 \times 1{,}000$

$= 2{,}400$

The distance from school to soccer is 2,400 feet.

When multiplying decimals by powers of 10, the exponent tells you the number of places the digits shift. Because the exponent is a positive number, the digits shift to the left.

Work Together

What is the value of each expression?

Explain how you used patterns to help you.

1.4×10^2

1.4×10^3

1.4×10^4

Sample answer: 140; 1,400; 14,000; I shifted the digits to the right the same number of places as the exponent.

On My Own

MATH REPLAY | GO ONLINE

Name _____

Write the multiplication expression using factors of 10. Then, find the value.

1. 3.6×10^2

   $3.6 \times 10 \times 10$; 360

2. 7.2×10^3

   $7.2 \times 10 \times 10 \times 10$; 7,200

3. 4.8×10^4

   $4.8 \times 10 \times 10 \times 10 \times 10$; 48,000

4. 1.9×10^2

   $1.9 \times 10 \times 10$; 190

5. Ashley rides the train to visit her grandmother. She lives 1.2×10^2 miles away from her grandmother. How many miles does she travel?

   $1.2 \times 10^2 = 1.2 \times 100 = 120$; 120 mi

6. Juan walks 4.7×10^3 meters from his house to the museum. Mary walks 9.3×10^2 meters from her house to the museum. Who walks farther, Juan or Mary? How do you know?

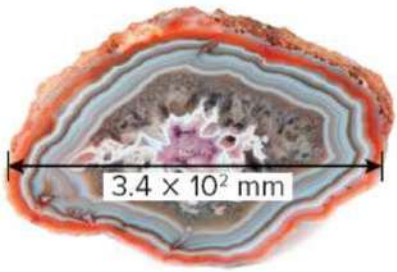
   Sample answer: Juan: $4.7 \times 10^3 = 4.7 \times 1000 = 4{,}700$
   Mary: $9.3 \times 10^2 = 9.3 \times 100 = 930$; Juan walks farther.

7. **Error Analysis** Sasha multiplied the decimals as shown. How can you help Sasha understand the patterns in multiplying decimals by powers of 10?

   $3.5 \times 10^2 = 3{,}500$
   $3.5 \times 10^3 = 35{,}000$
   $3.5 \times 10^4 = 350{,}000$

   Sample answer: Sasha added zeros using the exponents, rather than shifting the digits based on the exponent. So, $3.5 \times 10^2 = 350$.

8. STEM Connection A geologist measures the width of the geode at its widest point. How can the geologist determine the value of the expression?



Sample answer: multiply the decimal by the power of 10. $3.4 \times 10^2 = 340$ mm

What is the product? Use patterns to help you solve.

9. $6.5 \times 10^2 =$ **650**
$6.5 \times 10^3 =$ **6,500**
$6.5 \times 10^4 =$ **65,000**

10. $1.2 \times 10^1 =$ **12**
$1.2 \times 10^2 =$ **120**
$1.2 \times 10^3 =$ **1,200**

11. $3.9 \times 10^3 =$ **3,900**
$3.9 \times 10^4 =$ **39,000**
$3.9 \times 10^5 =$ **390,000**

12. $7.7 \times 10^2 =$ **770**
$7.7 \times 10^3 =$ **7,700**
$7.7 \times 10^4 =$ **77,000**

13. Extend Your Thinking How are these two expressions related?

15.3×10^2 1.53×10^3

Sample answer: Both expressions are equal to 1,530. The exponents differ by 1 and so does the number of digits to the left of the decimal point.

Reflect

How can you explain what it means to multiply a decimal by a power of 10?

Answers may vary.

Math is... Mindset

How did you show you understand how others are feeling?

Lesson **6-1**

Exit Ticket

Name _____

1. Which of these are equivalent to 7.4×10^3? Choose all that apply.

   A. $7.4 \times 10 \times 3$

   B. $7.4 \times 10 \times 10 \times 10$

   C. 7,400

   D. 74,000

2. What is the value of 3.4×10^2? Write the multiplication using factors of 10.

   $3.4 \times 10 \times 10$; 340

3. Knowing that $6.5 \times 10^2 = 650$, what is 6.5×10^4?

   A. 650

   B. 6,500

   C. 65,000

   D. 650,000

4. According to his step-counter, Juan has walked 8.3×10^2 steps in the last hour. How many steps did Juan walk during the hour?

   A. 83 steps

   B. 830 steps

   C. 8,300 steps

   D. 83,000 steps

Reflect On Your Learning

I'm confused. — I'm still learning. — I understand. — I can teach someone else.

Learn

Sadie will buy 7.8 gallons of regular gasoline to fill up her car.

What are some ways to estimate the total cost?

You can round or use a range to estimate products of decimals.

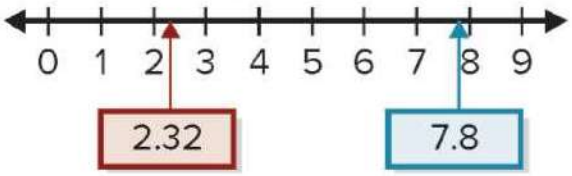
One Way Estimate by rounding.

7.8 rounds to 8. 2.32 rounds to 2.

$2 \times 8 = 16$

Sadie will pay about $16 for gas.

Another Way Estimate using a **range.**



$2 \times 7 = 14$ $3 \times 8 = 24$

A reasonable estimate is between $14 and $24.

Sadie calculated that the total cost is $18.10. This is reasonable because it is within the range of $14 to $24 and close to $16.

Math is... Choosing Tools

Why is a range helpful when estimating?

You can use rounding or finding a range to estimate. You can use an estimate to assess the reasonableness of an answer.

Work Together

Is this answer reasonable? Explain your thinking.

$5 \times 27.8 \stackrel{?}{=} 1{,}390$

No; Sample answer: A reasonable estimate for the product is between 125 and 150.

On My Own

Name _____

Estimate each product by rounding. Show your work.

1. $5.73 \times 3.16 = ?$
   about 18
2. $6.23 \times 3.87 = ?$
   about 24
3. $13.6 \times 9.82 = ?$
   about 140
4. $40.55 \times 7.89 = ?$
   about 328
5. $19.91 \times 28.75 = ?$
   about 580
6. $24.09 \times 12.57 = ?$
   about 312

Estimate each product by finding a range. Show your work.

7. $4.93 \times 7.88 = ?$
   $4 \times 7 = 28$; $5 \times 8 = 40$; between 28 and 40
8. $3.29 \times 3.81 = ?$
   $3 \times 3 = 9$; $4 \times 4 = 16$; between 9 and 16
9. $7.77 \times 10.8 = ?$
   $7 \times 10 = 70$; $8 \times 11 = 88$; between 70 and 88
10. $4.1 \times 13.5 = ?$
    $4 \times 13 = 52$; $5 \times 14 = 70$; between 52 and 70
11. $20.11 \times 9.96 = ?$
    $20 \times 9 = 180$; $21 \times 10 = 210$; between 180 and 210
12. $16.12 \times 3.55 = ?$
    $16 \times 3 = 48$; $17 \times 4 = 68$; between 48 and 68

13. Bryce is buying 4.3 kilograms of apples. The store charges $1.79 per kilogram for apples. About how much will the apples cost? Explain which estimation strategy you used.

    Sample answer: about $8; I rounded each decimal to the nearest whole number to estimate.

14. Anna has $40 to spend on downloading music. If each song costs $1.29, does she have enough money to download 16 songs? Explain how you can use estimation to solve.

Yes. Sample answer: 1.29 is between 1 and 2; 16 × 2 = 32; So 16 songs will cost less than $40.

15. Is the product reasonable? Explain.

$5.86 \times 9.3 \stackrel{?}{=} 64.5$

No. Sample answer: 5.86 is between 5 and 6; 9.3 is between 9 and 10; 6 × 10 = 60; the product must be less than 60

16. STEM Connection Maya has 3.8 liters of a solution. She needs 4.3 times more than she already has. About how many liters of the solution does she need?

Sample answer: 4 × 4 = 16; Maya needs about 16 liters of the solution.

17. Write two expressions that could be used to find a range of reasonable estimates for the product 10.25 × 5.89.

Sample answer: 10 × 5 and 11 × 6

18. Extend Your Thinking Write two multiplication expressions so that when the product is estimated by rounding, the estimates are the same. **Sample answer: 3.2 × 5.6 and 2.8 × 6**

Reflect

Why is estimating products of decimals helpful?

Answers will vary.

Math is... Mindset

What did you do to build a positive relationship with a classmate?

Lesson **6-2**

Exit Ticket

Name _____

1. What is the estimate for the product? Use rounding.

51.2 × 4.2

about 200

11.8 × 75.5

about 912

2. Which of these are reasonable estimates? Choose all that apply.

A. 5.3 × 3.1 is about 15.

B. 6.8 × 4.13 is about 28.

C. 9.4 × 75.2 is about 750.

D. 15.2 × 6.9 is about 105.

E. 14.9 × 28.4 is about 392.

3. The distance around the park is 3.95 kilometers. Angus rides his bike around the park 6.5 times. About how many kilometers does Angus ride his bike?

about 28 kilometers

4. Write two expressions that could be used to find a range of reasonable estimates for the product 62.51 × 3.53.

Sample answer: 62 × 3 and 63 × 4

Reflect On Your Learning

I'm confused. — I'm still learning. — I understand. — I can teach someone else.

Learn

Jonah will make 5 turkey sandwiches. He will use 0.04 pound of lettuce for each sandwich. Lettuce costs $0.90 per pound.

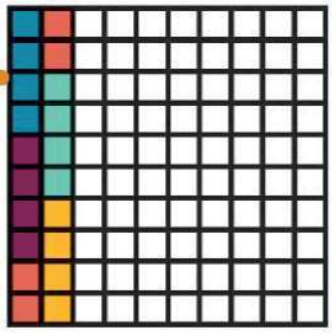
How can you determine the cost of lettuce for all 5 sandwiches?

You can use decimal grids to help you solve the problem.

Find the total amount of lettuce, p.

$5 \times 0.04 = p$

Show 5 groups of 0.04.



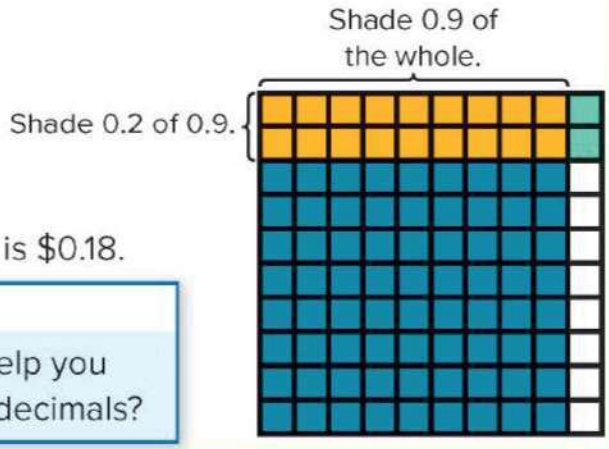
There are 20 hundredths of the whole shaded.

Jonah needs 0.2 pound of lettuce to make all 5 sandwiches.

Find the total cost, c.

$0.2 \times 0.9 = c$

There are 18 hundredths of the whole shaded.



The cost of lettuce for 5 sandwiches is $0.18.

Math is... Modeling

How do decimal grids help you understand multiplying decimals?

Representations are a helpful tool when solving multiplication problems involving decimals.

Work Together

Rin needs 0.3 cup of flour per serving to make bread. Rin wants to make 4 servings. How many cups of flour does he need?

1.2 cups; $4 \times 0.3 = 1.2$

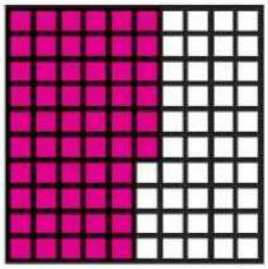
On My Own

MATH REPLAY | GO ONLINE

Name _____

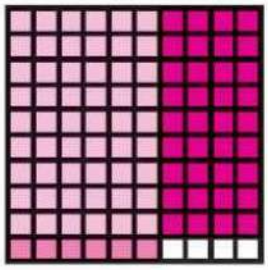
Write an equation and use a decimal grid to help you solve.

1. Laura pours 0.08 liter of milk into her tea each day. How much milk does Laura use in her tea in one week?



Sample answer: $7 \times 0.08 = 0.56$; Laura uses 0.56 liter of milk in one week.

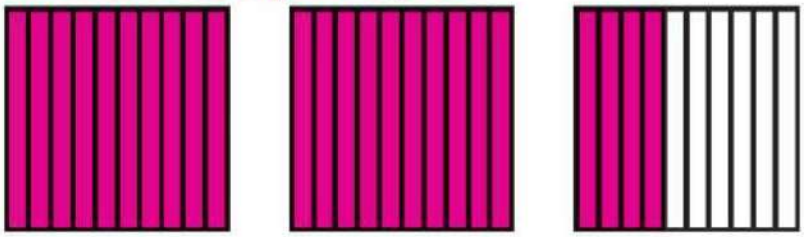
2. Jason buys 0.9 pound of cabbage. The grocery store charges $0.60 per pound. How much will Jason pay for the cabbage?



Sample answer: $0.9 \times 0.6 = 0.54$; Jason will pay $0.54 for the cabbage.

3. Tonya cuts 0.4 meter of ribbon for each gift she wraps. She wraps 6 gifts. How much ribbon does Tonya use?

Sample answer: $0.4 \times 6 = 2.4$; Tonya uses 2.4 meters of ribbon to wrap the gifts.



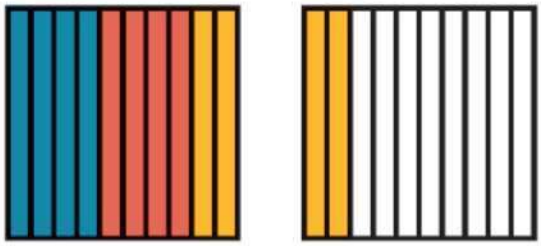
4. **STEM Connection** A rock has a mass of 2.4 kilograms. Maya estimates that the amount of granite in the rock is 0.3 of the full mass of the rock. How much granite is in the rock?

Sample answer: $2.4 \times 0.3 = 0.72$; Maya's rock has 0.72 kilogram of granite.

What is the product? Use a representation to solve.

5. $8 \times 0.2 =$ **1.6**
6. $0.3 \times 0.9 =$ **0.27**
7. $0.12 \times 7 =$ **0.84**
8. $0.4 \times 0.8 =$ **0.32**
9. $5 \times 1.5 =$ **7.5**
10. $0.6 \times 0.6 =$ **0.36**

11. Write an equation to show the product represented by the decimal grids. **Sample answer: $3 \times 0.4 = 1.2$ or $0.4 \times 3 = 1.2$**



12. **Extend Your Thinking** Kristina buys 2 yards of fabric for $2.90 per yard. Her friend Norman wants to buy 0.4 yard of fabric from her. How much does Kristina pay for the fabric? How much will Norman pay Kristina for the fabric?

$2 \times 2.9 = 5.8$; Kristina pays $5.80 for the fabric.
$2.9 \times 0.4 = 1.16$; Norman will pay $1.16.

Reflect

How is multiplying decimals similar to multiplying whole numbers?

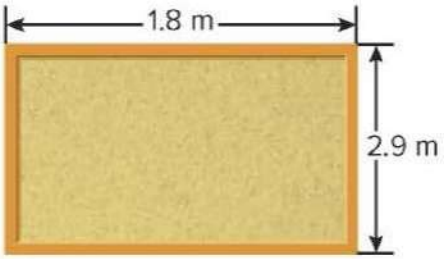
Answers may vary.

Math is... Mindset

What made you feel confident about your work today?

Learn

How can you find the area of the board?



You can use the equation $1.8 \times 2.9 = A$ to represent the problem.

You can use an area model to help you solve the equation.

Decompose each factor and find partial products.

Decompose by place value.

	2	+	0.9
1	$2 \times 1 = 2$		$0.9 \times 1 = 0.9$
+			
0.8	$2 \times 0.8 = 1.6$		$0.9 \times 0.8 = 0.72$

Find partial products by finding the area of each rectangle.

Add partial products.

$2 + 0.9 + 1.6 + 0.72 = 5.22$

The area of the board is 5.22 square meters.

Math is... Modeling

How are the area models for decimals and whole numbers similar?

One multiplication strategy for multiplying decimals is to use an area model to determine partial products, which are then added to determine the product.

Work Together

A teacher bought 18 rulers. What was the total cost of the rulers? Use an area model to solve.

$15.30; Check students' work.

On My Own

MATH REPLAY | GO ONLINE

Name _____

What is the product? Use an area model to solve.

1. $32 \times 1.5 =$ **48**
2. $14 \times 2.3 =$ **32.2**
3. $7.1 \times 8 =$ **56.8**
4. $6.2 \times 1.5 =$ **9.3**
5. $9.6 \times 5.5 =$ **52.8**
6. $1.9 \times 2.4 =$ **4.56**

7. A tent repair shop charges $9.50 for every 1 meter of stitching repaired on a tent. Michael brings in his tent for repairs. It needs 1.2 meters of stitching. How much will the repairs cost him?

Sample answer:
$9.5 \times 1.2 = ?$
$9 + 1.8 + 0.5 + 0.1 = 11.4$
The repairs will cost Michael $11.40

8. **Error Analysis** Evelyn used an area model to multiply 7.4×1.2 as shown. How do you respond to her work?

	1	+	2
7	$7 \times 1 = 7$		$7 \times 2 = 14$
+			
4	$4 \times 1 = 4$		$4 \times 2 = 8$

$7 + 14 + 4 + 8 = 33$

Sample answer: I disagree with Evelyn's work. I would write the value of each digit when setting up the area model (1 + 0.2, 7 + 0.4). Then multiply to find the partial products. 7 + 1.4 + 0.4 + 0.08 = 8.88

9. The Mountaintop Ski Shop sold 15 pairs of ski gloves last week. How much did the ski shop make selling gloves last week?

15 × 8.5 = ?; The ski shop made $127.50 selling ski gloves last week.

10. Olive's van can travel 16.4 miles per gallon of gas. Her tank has 8.3 gallons of gas in it. How many miles can Olive travel with the gas in her tank?

16.4 × 8.3 = ?; Olive can travel 136.12 miles.

11. **Extend Your Thinking** Write and solve a real-world multiplication problem with at least one decimal factor. Use an area model to help you solve.

Sample answer: Evelyn used 0.32 kg of flour in each of the 5 loaves of bread she made. How much flour did Evelyn use? 0.32 × 5 = 1.6. Evelyn used 1.6 kg of flour.

Reflect

How can you use partial products and an area model to find the product of two decimal factors?

Answers may vary.

Math is... Mindset

What helped you focus when you felt frustrated?

Learn

How can you use the solution from one equation to solve the other two equations?

$48 \times 26 = m$ $48 \times 2.6 = n$ $48 \times 0.26 = p$

You know $48 \times 26 = 1{,}248$. You can use place value to help you understand the relationship between the equations.

$48 \times 26 = 1{,}248$

$48 \times 2.6 = 124.8$

2.6 is $\frac{1}{10}$ of 26.

124.8 is $\frac{1}{10}$ of 1,248.

$48 \times 26 = 1{,}248$

$48 \times 0.26 = 12.48$

0.26 is $\frac{1}{100}$ of 26.

12.48 is $\frac{1}{100}$ of 1,248.

If the digits in one factor move places to the right, the digits in the product move the same number of places to the right.

Math is... Generalizations

How can you use the patterns in the calculations to efficiently multiply decimals?

You can use patterns to make generalizations about multiplying decimals.

Work Together

How can you use the solution for the first equation to solve the others?

$72 \times 24 = ?$

$7.2 \times 24 = ?$

$0.72 \times 24 = ?$

$72 \times 2.4 = ?$

$72 \times 0.24 = ?$

Sample answer: I can compare the digits of the factors and move the digits in the product the same number of places.

On My Own

MATH REPLAY | GO ONLINE

Name _____

Complete each sentence.

1. 3.8 is $\frac{1}{10}$ of 38.

   So, 3.8 × 25 is $\frac{1}{10}$ of the product 38 × 25.

2. 0.45 is $\frac{1}{100}$ of 45.

   So, 0.45 × 16 is $\frac{1}{100}$ of the product 45 × 16.

3. 7.8 is $\frac{1}{10}$ of 78 and 9.2 is $\frac{1}{10}$ of 92.

   So, 7.8 × 9.2 is $\frac{1}{100}$ of the product 78 × 92.

What is the product? Use patterns to solve.

4. 45 × 17 = 765
   45 × 1.7 = 76.5
   45 × 0.17 = 7.65

5. 32 × 14 = 448
   32 × 1.4 = 44.8
   3.2 × 1.4 = 4.48

6. 16 × 89 = 1,424
   16 × 8.9 = 142.4
   16 × 0.89 = 14.24

7. 61 × 22 = 1,342
   6.1 × 22 = 134.2
   6.1 × 2.2 = 13.42

8. 96 × 55 = 5,280
   96 × 5.5 = 528
   9.6 × 5.5 = 52.8

9. 19 × 42 = 798
   1.9 × 42 = 79.8
   1.9 × 4.2 = 7.98

10. 67 × 34 = 2,278
    67 × 3.4 = 227.8
    6.7 × 3.4 = 22.78

11. 82 × 67 = 5,494
    82 × 6.7 = 549.4
    8.2 × 6.7 = 54.94

12. **Error Analysis** Clarissa states that since 5.5 is $\frac{1}{10}$ of 55 and 3.7 is $\frac{1}{10}$ of 37, 5.5×3.7 is $\frac{1}{10}$ of 55×37. How do you respond to Clarissa? **Sample answer: I don't agree. Clarissa needs to use the place value relationship from *both* factors.**

$$5.5 \times 3.7 = \frac{1}{10} \times 55 \times \frac{1}{10} \times 37 = 20.35$$

13. **Extend Your Thinking** Kyle's paper has been smudged and any decimals in the factors have been lost. Can you help explain to Kyle how to determine where decimals could go?

$340 \times 13 = 4.42$

Sample answer: Kyle can use place value patterns to determine where to place the decimals. Since the digits in 4.42 are 3 places to the right of the digits in $340 \times 13 = 4{,}420$, the decimal or decimals in the factors need to move the digits a total of 3 places to the right. (Examples: 3.40×1.3, 0.340×13, 34.0×0.13, 340×0.013)

14. Loni's house has a rectangular window with a height of 1.5 meters and a width of 0.8 meter. What is the area of the window? **1.2 square m**

15. A car averages 32.6 miles per gallon of gasoline. How many miles can the car travel on 4.5 gallons of gasoline? **146.7 mi**

16. Dale bought 3 apples that cost \$0.49 each. He also bought 1.8 pounds of grapes that cost \$0.90 per pound. How much did Dale spend for the apples and grapes? **\$3.09**

Reflect

What patterns did you notice when multiplying decimals?

Answers may vary.

Math is... Mindset

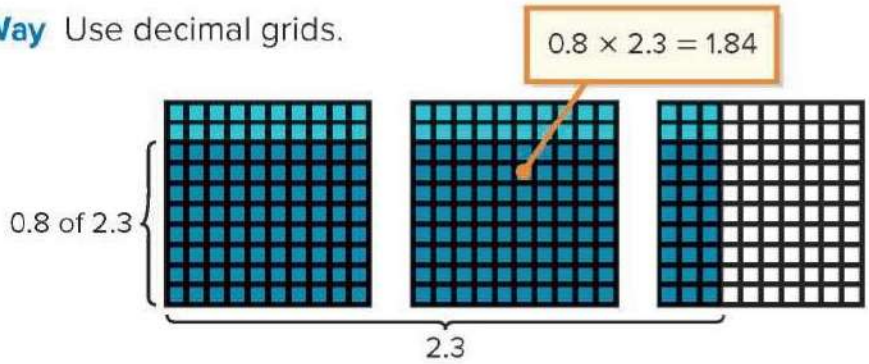
What helped you make good decisions today?

Learn

Amy rides her bike 2.3 miles to school each day. Jason rides his bike 0.8 of that distance.

How far does Jason ride his bike to school each day?

One Way Use decimal grids.



Jason rides his bike 1.84 miles to school each day.

Another Way Use partial products.

$0.8 \times 2.3 = 0.8 \times (2 + 0.3)$ — Decompose 2.3 by place value.

$= 0.8 \times 2 + 0.8 \times 0.3$

$= 1.6 + 0.24$ — Add partial products.

$= 1.84$

Jason rides his bike 1.84 miles to school each day.

Math is... Exploring

Why is it useful to know more than one strategy to solve a problem?

You can use any strategy to multiply decimals. Look at the factors to determine the most efficient strategy.

Work Together Check students' explanations.

An area model can be used to solve 3.6×2.5.

What other strategy can you use to solve this problem?

	2	+	0.5
3	$3 \times 2 = 6$		$3 \times 0.5 = 1.5$
+			
0.6	$0.6 \times 2 = 1.2$		$0.6 \times 0.5 = 0.30$

On My Own

MATH REPLAY | GO ONLINE

Name _____

Check students' explanations.

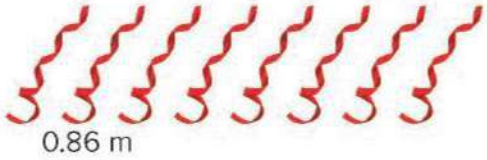
What is the product? Explain the strategy you used to solve.

1. $2.9 \times 0.7 = d$
   2.03

2. $5.6 \times 3.2 = b$
   17.92

3. Each bottle holds the same amount. How much water can these bottles hold? **5.25 L**

4. Rebecca cut these ribbons to the same length. How much ribbon did Rebecca use in all? **6.88 m**



5. Experts recommend that people have 4.7 grams of potassium per day. Last week Marcus averaged 0.9 times as much potassium as the recommendation. How much potassium did Marcus average each day last week? **4.23 g**

6. A pitcher has a capacity of 3.9 liters. A cooler has a capacity 9.2 times greater. What is the capacity of the cooler? **35.88 L**

Solve. Explain the strategy used to solve.

7. Kara has a bag of apples. Each apple weighs 0.4 pound on average. There are 17 apples in her bag. What is the total weight of her apples?

   6.8 pounds; Sample explanation: $10 \times 0.4 = 4$, $7 \times 0.4 = 2.8$, $4 + 2.8 = 6.8$

8. Julio's doctor told him that he should eat 0.7 gram of protein per day for every kilogram of body mass. Julio measures 58 kilograms now. How much protein should Julio eat?

40.6 grams; $50 \times 0.7 = 35$, $8 \times 0.7 = 5.6$, $35 + 5.6 = 40.6$

9. Anita rode her bicycle 7.8 miles on Monday and 3.1 times as far on Tuesday. How far did she ride her bicycle on Tuesday?

24.18 miles; $7 \times 3 = 21$, $7 \times 0.1 = 0.7$, $0.8 \times 3 = 2.4$, $0.8 \times 0.1 = 0.08$, $21 + 0.7 + 2.4 + 0.08 = 24.18$

10. **STEM Connection** Maya has 1 liter of a solution that contains 0.13 liter of an active ingredient. How much of the active ingredient is in 2.8 liters of the solution? How can you use an area model to show this product?

0.364 liters; I can use an area model to show the 4 partial products and then add the partial products

11. Jared buys 3.5 pounds of potatoes. The store charges $0.80 per pound of potatoes. How much does Jared pay for the potatoes? Explain how you solved the problem.

$2.80; Sample explanation: I used decimal grids to show the factors as 35 columns and 8 rows in 4 grids, and the product as the area 2.8.

12. **Extend Your Thinking** How many decimal places do you think are in the product of $1.2 \times 1.43 \times 0.3$? What strategy did you use to make your prediction? Multiply to check your prediction.

Sample answer: 4 decimal places; I used place-value patterns to make my prediction; calculated solution is 0.5148

Reflect

How did I think like a mathematician when explaining how to multiply decimals?

Answers may vary.

Math is... Mindset

How did you show others that you value their ideas?

Learn

There are 12,000 nickels.

How can you find the number of rolls of nickels?

Patterns can help you solve the problem.

$12{,}000 \div 40 = n$

You can use a basic fact and patterns to help you solve the equation.

basic fact → $12 \div 4 = 3$

$120 \div 40 = 3$

Both the dividend and divisor are 10 times as much, so quotient is the same.

When only the dividend is 10 times as much, the quotient is also 10 times as much.

$120 \div 40 = 3$

$1{,}200 \div 40 = 30$

$12{,}000 \div 40 = 300$

As the number of zeros in the dividend increases, the number of zeros in the quotient also increases.

There are 300 rolls of nickels.

Math is... Structure

How can you use place value to explain this pattern?

You can use patterns in the number of zeros to help you divide by a multiple of 10.

Work Together

What is the quotient? How can you use a basic fact and patterns to solve?

$300 \div 50 =$ **6**

$3{,}000 \div 50 =$ **60**

$30{,}000 \div 50 =$ **600**

Sample explanation: The basic fact is $30 \div 5 = 6$. For $300 \div 50 = 6$, because both the dividend and divisor are 10 times as much, the quotient is the same. For the last two steps, when zeros are added to only the dividend, the quotient also increases by the same number of zeros.

On My Own

Name _____

Use a basic fact and patterns to solve.

1. $15 \div \underline{3} = 5$

   $150 \div 30 = \underline{5}$

   $\underline{1{,}500} \div 30 = 50$

   $15{,}000 \div \underline{30} = \underline{500}$

2. $32 \div 8 = \underline{4}$

   $\underline{320} \div 80 = \underline{4}$

   $3{,}200 \div \underline{80} = \underline{40}$

   $\underline{32{,}000} \div \underline{80} = \underline{400}$

3. $20{,}000 \div 40 = \underline{500}$

4. $15{,}000 \div 30 = \underline{500}$

5. $18{,}000 \div 60 = \underline{300}$

6. $16{,}000 \div 80 = \underline{200}$

7. $8{,}000 \div 40 = \underline{200}$

8. $25{,}000 \div 50 = \underline{500}$

9. $32{,}000 \div 80 = \underline{400}$

10. $9{,}000 \div 30 = \underline{300}$

11. There are 24,000 quarters in rolls of 40 quarters each. How many rolls of quarters are there?

600 rolls of quarters

12. **Error Analysis** Drew wants to solve 12,000 ÷ 20 by starting with this basic fact: 12 ÷ 2 = 6. Drew then uses patterns to find a quotient of 60. Is Drew correct? If not, what mistake did he make? **No, quotient is 600; Sample answer: He likely multiplied the divisor by 10 one time too many and solved 12,000 ÷ 200 instead of 12,000 ÷ 20.**

13. **STEM Connection** A building has 20 floors. The building has a total floor area of 40,000 square feet. What is the area of each floor? Explain.

2,000 square ft; Sample answer: divide the total area by the number of floors

14. **Extend Your Thinking** Write a basic fact. Use place value patterns to multiply the dividend by 10 and the divisor by 10. How do the quotients compare?

Sample answer: 16 ÷ 4 = 4; 160 ÷ 40 = 4; The quotients are the same because the dividend and divisor were both multiplied by the same amount.

Reflect

How does using place-value patterns and basic facts help you divide whole numbers by multiples of 10?

Answers may vary.

Math is... Mindset

How have your strengths in other areas helped you in math?

Lesson **7-1**

Exit Ticket

Name _____

1. Knowing that $24 \div 6 = 4$, which quotient is true? Choose all that apply.

   A. $240 \div 6 = 4$

   B. $240 \div 60 = 4$

   C. $2{,}400 \div 60 = 4$

   D. $2{,}400 \div 60 = 40$

   E. $24{,}000 \div 60 = 40$

   F. $24{,}000 \div 60 = 400$

2. What is the quotient for $20{,}000 \div 50$?

   A. 4

   B. 40

   C. 400

   D. 4,000

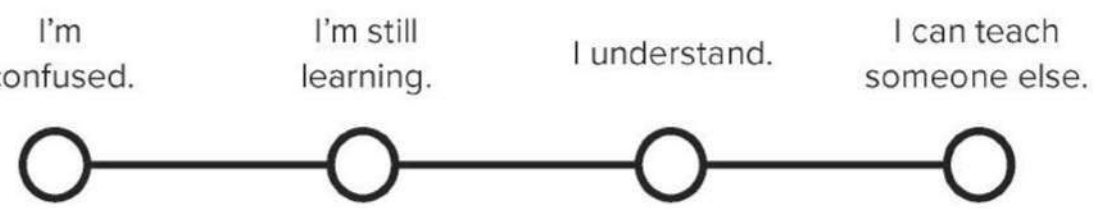
3. There are 45,000 dimes in rolls of 50. How many rolls of dimes are there?

   900 rolls of dimes

4. A company has 3,600 square feet of space to use for 40 offices. What is the area of each office?

   90 square feet

Reflect On Your Learning



Learn

A school collected 3,000 bottles of water to be packed into boxes.

What are some ways to estimate the number of boxes needed?

You can use different strategies to estimate quotients.

One Way Use rounded numbers.

$3{,}000 \div 24 = n$

$3{,}000 \div 20 = 150$

The school will need about 150 boxes.

Another Way Use compatible numbers.

$3{,}000 \div 24 = n$

$3{,}000 \div 30 = 100$

The school will need about 100 boxes.

$3{,}000 \div 24 = 125$ ← calculated quotient

The calculated quotient is reasonable because it is close to the estimated quotients.

Math is... Choosing Tools

Why might you estimate a quotient more than one way?

Estimated quotients can help you determine whether calculations are reasonable.

Work Together

Estimate the quotient of 4,000 ÷ 16 two different ways.

Sample answer: 4,000 ÷ 20 = 200; 4,000 ÷ 10 = 400

On My Own

MATH REPLAY | GO ONLINE

Name _____

Estimate the quotient. Sample answers given.

1. 2,400 ÷ 34 **80**

2. 3,500 ÷ 65 **50**

3. 1,800 ÷ 92 **20**

4. 4,800 ÷ 86 **60**

5. 6,390 ÷ 31 **200**

6. 4,988 ÷ 19 **250**

7. 809 ÷ 10 **80**

8. 9,598 ÷ 11 **950**

9. **Error Analysis** Cho writes this equation. Is her calculation reasonable? Explain.

9,025 ÷ 25 = 3,610

No. Sample answer: an estimated quotient is 300 so 3,610 is not reasonable.

10. A quarterback throws the football for a total of 3,189 yards in 16 games. About how many yards did he throw in each game?

Sample answer: about 200 yd

11. Owen took 7,027 pictures over the course of a year. About how many pictures did Owen take each month?

Sample answer: about 500 pictures

12. Extend Your Thinking Which of these equations is *not* a reasonable estimate for 533 ÷ 57? Explain your reasoning.

540 ÷ 60 = 9 500 ÷ 50 = 10 420 ÷ 60 = 7

420 ÷ 60 = 7; Sample answer: 420 and 60 are compatible numbers, but 420 is not close to the actual dividend.

Reflect

How can you use estimates to determine if calculations are reasonable?

Answers may vary.

Math is... Mindset

What helped you be motivated to do your best work?

Learn

A café owner orders 350 tea bags.

How many boxes of tea will the cafe owner receive?

You can use the relationship between multiplication and division to determine the solution.

A division equation can represent the problem.
$350 \div 25 = t$

A multiplication equation with an unknown factor can also represent the problem.
$t \times 25 = 350$

One Way

$4 \times 25 = 100$
$4 \times 25 = 100$
$4 \times 25 = 100$
$2 \times 25 = 50$

$4 + 4 + 4 + 2 = 14$

$14 \times 25 = 350$
$350 \div 25 = 14$

$$\begin{array}{r} 350 \\ -100 \\ \hline 250 \\ -100 \\ \hline 150 \\ -100 \\ \hline 50 \\ -50 \\ \hline 0 \end{array}$$

Another Way

$10 \times 25 = 250$
$4 \times 25 = 100$

$10 + 4 = 14$

$14 \times 25 = 350$
$350 \div 25 = 14$

$$\begin{array}{r} 350 \\ -250 \\ \hline 100 \\ -100 \\ \hline 0 \end{array}$$

You can think about how many groups of the divisor can be made from the dividend to solve division problems.

Math is... Generalizations

Will this strategy work for all division situations? Why or why not?

Work Together

Use multiplication to solve for d. Show your work.

$1{,}650 \div 22 = d$

$d = 75$; Check students' work.

On My Own

MATH REPLAY | GO ONLINE

Name _____

1. How many groups of 23 can you make from 184? **8**

2. How many groups of 14 can you make from 700? **50**

3. How many groups of 12 can you make from 192? **16**

4. How many groups of 18 can you make from 720? **40**

Solve for the unknown.

5. $396 \div 12 = n$

   $n \times 12 = 396$

   $n = 33$

6. $448 \div 16 = s$

   $s \times 16 = 448$

   $s = 28$

7. $312 \div 52 = m$

   $m \times 52 = 312$

   $m = 6$

8. $533 \div 41 = a$

   $a \times 41 = 533$

   $a = 13$

9. The fifth-grade class is setting up for a performance. They need to set up enough chairs for 280 people. The chairs are set up in rows of 35. How many rows will they have?

   8 rows

10. Merrick wants to organize his trading cards into a binder. He can fit 18 cards in each plastic sheet in the binder. He has 1,440 cards. How many plastic sheets will he need?

    80 plastic sheets

11. **STEM Connection** Maya sorts her rock collection into three main types of rocks: igneous, metamorphic, or sedimentary. She has 126 rocks and has equal numbers of each type of rock. How many rocks will she have in each group? **42 rocks**

12. A charity has 6,650 volunteers and 7 different chapters in 7 different cities. All of the chapters have the same number of volunteers. How many volunteers are in each chapter?

$6{,}650 \div 7 = s$; $7 \times s = 6{,}650$; 950 volunteers

13. **Extend Your Thinking** Why does thinking of a division equation in terms of multiplication help you solve the division equation?

Sample answer: When you know common multiplication equations/facts, such as $25 \times 4 = 100$, it can be more efficient to find how many groups of the divisor are in the dividend by using multiplication and subtracting from the dividend.

Reflect

How can using the relationship between multiplication and division help you determine the quotient of multi-digit whole numbers?

Answers may vary.

Math is... Mindset

How did you contribute to your group today?

Learn

The Parthenon, in Athens, Greece has an area of 2,139 square meters.

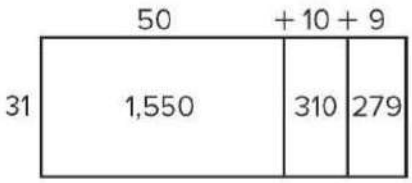
What is the length of the Parthenon?

An area model can help to determine the solution.

You can use an area model to represent division with 2-digit divisors.

$2{,}139 \div 31 = l$

Represent each partial quotient in the area model.



Partial Quotients

$$\begin{array}{r} 2{,}139 \\ -1{,}550 \\ \hline 589 \\ -310 \\ \hline 279 \\ -279 \\ \hline 0 \end{array}$$

Add the partial quotients to determine the quotient.

$50 + 10 + 9 = 69$

$2{,}139 \div 31 = 69$

The length of the Parthenon is 69 meters.

Math is... Generalization

How is an area model for multiplication different from one for division?

You can use an area model to represent division with 2-digit divisors.

Work Together

A rectangle has an area of 888 square feet. The width of the rectangle is 24 feet. What is the length?

Use an area model to solve.

Check students' models; 37 ft

On My Own

Name _____

What is the quotient? Use an area model and partial quotients to solve.

Check students' models.

1. 575 ÷ 25 = 23

2. 656 ÷ 41 = 16

3. 2,006 ÷ 34 = 59

4. 7,626 ÷ 93 = 82

5. **STEM Connection** Grace is helping to develop a computer game. The game uses 1,764 blocks to build 28 structures. How many blocks does each structure require? 63 blocks

6. The floor in a large classroom has an area of 1,184 square feet and is 32 feet wide. How long is the classroom? 37 ft

7. A county is rectangular in shape. It has an area of 322 square miles and is 23 miles long (east to west). How wide (north to south) is the county? 14 mi

8. The footprint of a new office building is a rectangle 17 meters wide with an area of 391 square meters. How long is the building? 23 m

9. A parking lot is a rectangle 74 feet long with an area of 4,884 square feet. How wide is the parking lot? 66 ft

10. What is the quotient of 3,724 ÷ 49?

A. 70

B. 73

C. 76

D. 80

11. Mr. Ramirez drove 1,798 miles on the highway over a few days. He had a constant speed of 58 miles per hour. How long did he drive?

31 hours

12. Traci earns $13 per hour working at a store. How many hours does she need to work to afford a new $611 smart phone?

47 hours

13. Extend Your Thinking Over 18 days, a fifth-grade class of 21 students collected 4,914 cans. Each student collected the same number of cans each day. How many cans did the class collect per day? How many did each student collect per day? Show your work.

Sample answer: Divide to find that 4,914 ÷ 18 = 273. Then divide to find 273 ÷ 21 = 13. The class collected 273 cans per day. Each student collected 13 cans per day.

Reflect

How can you represent division involving 2-digit divisors? Explain.

Answers may vary.

Math is... Mindset

How have you responsibly built a safe classroom culture?

Learn

An adult bison weighs 1,752 pounds, which is 24 times the weight of a bison calf.

How much does the bison calf weigh?

You can use partial quotients to solve division equations.

A bar diagram can represent the problem.

$1{,}752 \div 24 = l$.

Math is... Connections

What is another way to show multiplicative comparison?

Use partial quotients to solve.

$$
\begin{array}{r|l}
24\overline{)1{,}752} & \\
-1{,}200 & 50 \\
\hline
552 & \\
-480 & 20 \\
\hline
72 & \\
-72 & 3 \\
\hline
0 & 73
\end{array}
$$

$1{,}752 \div 24 = 73$

The bison calf weighs 73 pounds.

Work Together

What is the quotient of $2{,}356 \div 38$? Use the partial quotients strategy to help you solve the problem.

38	
$50 \times 38 = 1{,}900$	50
$10 \times 38 = 380$	10
$2 \times 38 = 76$	2
	62

$$
\begin{array}{r|l}
38\overline{)2{,}356} & \\
-1{,}900 & 50 \\
\hline
456 & \\
-380 & 10 \\
\hline
76 & \\
-76 & 2 \\
\hline
0 & 62
\end{array}
$$

On My Own

Name _____

What is the quotient? Use partial quotients to solve.

1. 819 ÷ 39 = 21

2. 988 ÷ 26 = 38

3. 1,215 ÷ 27 = 45

4. 3,432 ÷ 66 = 52

5. **STEM Connection** An astronomer is studying two comets. Comet A has an orbit that is 187 years. Comet A has an orbit that is 17 times as long as the Comet B. How long is the orbit of the Comet B?

11 years

6. Miguel has taken 3,196 photographs in the last 47 days. Miguel took the same number of photographs each day. How many photographs per day has he taken?

68 photographs

7. One hiker completed the Appalachian Trail in only 55 days. The trail is about 3,520 kilometers. How many kilometers per day did she hike if she hiked the same distance each day?

64 kilometers a day

8. What partial quotients could you use to find the quotient of 3,276 ÷ 52? **Sample answer: 2,600 ÷ 52 = 50, 520 ÷ 52 = 10, and 176 ÷ 52 = 3. The quotient is 63.**

9. **Extend Your Thinking** Over 11 weeks last summer, Emily earned $4,004. She earned $14 per hour. Emily worked the same number of hours each week. How much did she earn each week? How many hours per week did Emily work? Show your work. **Sample answer: Divide to find that 4,004 ÷ 11 = 364. Then divide to find 364 ÷ 14 = 26. Emily worked 26 hours per week.**

Reflect

How does using the partial quotients strategy help you divide?

Answers may vary.

Math is... Mindset

How have your behaviors shown respect towards someone?

Learn

Rahim will fill bags with tortillas. He has bags that hold 12 tortillas and bags that hold 16 tortillas.

Which size bag should he use if he wants no tortillas left over?

276 tortillas

If Rahim uses the bags that hold 16 tortillas,

$276 \div 16 = b$.

$$\begin{array}{r|l} 16\overline{)276} & \\ -160 & 10 \\ \hline 116 & \\ -112 & 7 \\ \hline 4 & 17 \end{array}$$

The remainder is 4.

He will have 4 tortillas left over.

Math is... Reasonableness

How can you check your solution when there is a remainder?

If Rahim uses the bags that hold 12 tortillas,

$276 \div 12 = t$.

$$\begin{array}{r|l} 12\overline{)276} & \\ -240 & 20 \\ \hline 36 & \\ -36 & 3 \\ \hline 0 & 23 \end{array}$$

The remainder is 0.

He will have no tortillas left over.

Rahim should use bags of 12 tortillas.

You can use partial quotients to divide. Sometimes the quotient has a remainder.

Work Together

What is the quotient?

$89\overline{)1{,}250}$

14 R4

On My Own

Name _____

What is the quotient?

1. $754 \div 13 =$ **58**

2. $1{,}426 \div 46 =$ **31**

3. $975 \div 64 =$ **15 R15**

4. $2{,}246 \div 27 =$ **83 R5**

5. **Error Analysis** Is this division correct? If not, explain the error and find the correct quotient.

$$\begin{array}{r|l} 84\overline{)3,115} & \\ -2,520 & 30 \\ \hline 595 & \\ -504 & 6 \\ \hline 91 & 36 \end{array}$$

The remainder is greater than the divisor, so the division cannot be correct. The quotient should be 37 R7.

6. Lily's town is hosting a race. She bought 1,525 water cups to pass out to the runners. She wants to distribute the cups equally to 14 water stations. When she finishes, how many are remaining? **13 cups**

7. One bridge in Maryland is 6,946 meters long. It is 46 times as long as another nearby bridge. How long is the shorter bridge? Explain. **The shorter bridge is 151 meters long. Divide 6,946 by 46 using the partial quotients strategy to find the length of the shorter bridge.**

8. Amir has a collection of 936 trading cards. He wants to put them in boxes with 25 trading cards in each box. How many boxes will Amir fill? How many trading cards will be left over?

37 boxes with 11 left over

9. **Extend Your Thinking** A florist has 476 carnations. She wants to put the same number of carnations in each vase with no carnations left over. Should she put 14 or 18 carnations in each vase? Explain your answer. **14; Divide 476 by 14 and 476 by 18. When you divide 476 by 18, there are 8 carnations left over and 26 full vases. When you divide 476 by 14, there are no carnations left over and 34 full vases.**

Reflect

How can you tell if there is a remainder when dividing using a partial quotients strategy?

Answers may vary.

Math is... Mindset

How have your actions helped you achieve your day's goal?

Learn

Javier and his family have $1,059 to pay for their vacation hotel.

Will they be able to stay at the hotel for 12 nights?

A division equation can represent the problem.

Math is... Planning

What are some different ways you know to determine a quotient?

$1{,}059 \div 95 = h$

One strategy is to use partial quotients.

$$\begin{array}{r|l} 95\overline{)\,1{,}059} & \\ -\,950 & 10 \\ \hline 109 & \\ -\;\;95 & 1 \\ \hline 14 & 11 \end{array}$$

The remainder is 14.

The quotient is 11.

Javier and his family can stay at the hotel for 11 nights only. They will have $14 left.

Sometimes it is necessary to interpret the remainder to solve problems.

Work Together

There are 1,658 people attending a play.

Each row at the theater has 75 seats.

How many rows will they need to seat everyone? Will all the rows have the same number of seats?

23 rows; Sample answer: Not all the rows will have the same number of seats because the equation has a remainder of 2.