Chapter

11 Measurement

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

My Favorite Animals

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Name _____

Am I Ready?

Multiply.

1. $12 \times 3 =$ _____
2. $36 \times 5 =$ _____
3. $1{,}760 \times 4 =$ _____
4. $6 \times 1{,}000 =$ _____
5. $15 \times 100 =$ _____
6. $947 \times 100 =$ _____

7. A musical was sold out for three straight shows. If 825 tickets were sold at each performance, how many tickets were sold in all?

_____

Divide.

8. $45 \div 3 =$ _____
9. $112 \div 16 =$ _____
10. $39 \div 4 =$ _____
11. $500 \div 100 =$ _____
12. $150 \div 10 =$ _____
13. $7{,}900 \div 100 =$ _____

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How Did I Do?

Shade the boxes to show the problems you answered correctly.

1	2	3	4	5	6	7	8	9	10	11	12	13	14

Name _____

MY Math Words

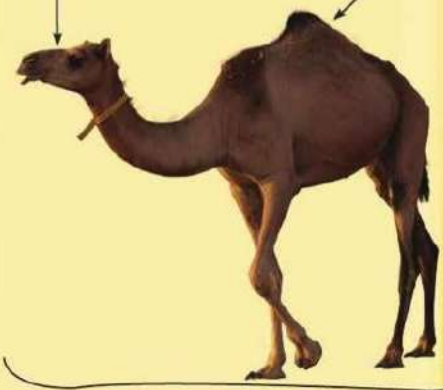
Review Vocabulary

capacity estimate length weight

Making Connections
Use the review vocabulary to tell what you would measure for each question. Then provide estimates for each category.

What is the approximate distance across a camel's snout? _____

About how much water does a camel's hump hold? _____



Provide estimates for each measure.

capacity _____

length _____

weight _____

About how heavy is an adult camel? _____

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MY Vocabulary Cards

Mathematical Practices

Lesson 11-7

gram (g)

5 g

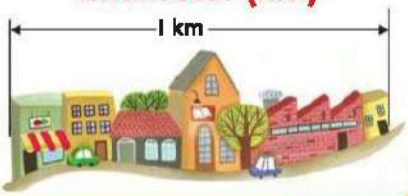
Lesson 11-7

kilogram (kg)

50 kg

Lesson 11-2

kilometer (km)



Lesson 11-2

length

Lesson 11-6

liter (L)

Lesson 11-5

mass

less mass

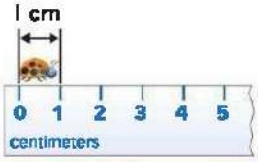
more mass

Lesson 11-2

capacity

Lesson 11-2

centimeter (cm)



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Ideas for Use

- Write a tally mark on each card every time you read the word in this chapter or use it in your writing. Challenge yourself to use at least 2 tally marks for each card.
- Work with a partner to name the part of speech of each word. Consult a dictionary to check your answers.

A metric unit for measuring mass.
1 g = 1,000 mg

Decide whether to use grams or kilograms to measure the mass of a cat. Explain.

A metric unit for measuring mass.
1 kg = 1,000 g

The prefix *kilo-* means "thousand." How does that help you understand the meaning of *kilogram?*

Distance measured between two points.

Give one metric example of a unit of measure for length.

A metric unit for measuring longer distances of length.

How many meters are in a kilometer? What part of the word tells you this?

The amount of matter in an object.

Write a sentence using the multiple-meaning word *mass* as an adjective.

A metric unit for measuring volume or capacity.
1 L = 1,000 mL

What are two examples of items that might be measured in liters?

A metric unit for measuring length.
100 cm = 1 m

Centi- means "hundred" or "hundredth." How does this help you understand the meaning of *centimeter?*

The amount a container can hold.

Give an example of a unit of capacity.

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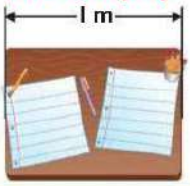
MY Vocabulary Cards

Mathematical Practices

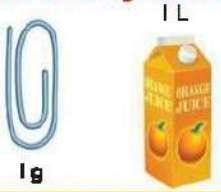
Lesson 11-2

meter (m)



Lesson 11-3

metric system



Lesson 11-5

milligram (mg)

1 mg

Lesson 11-6

milliliter (mL)

250 mL

Lesson 11-6

millimeter (mm)

1 mm

Lesson 11-8

fair share

Ideas for Use

- Develop categories for the words. Sort them by category. Ask another student to guess each category.
- Draw or write examples for each card. Be sure your examples are different from what is shown on each card.

A decimal system of measurement. Includes units such as meter, gram, and liter.

Use the dictionary to define *system* as it is used in metric *system*.

A metric unit used to measure length.
1 m = 100 cm

What are two other words in this chapter that include the root word *meter*?

A metric unit used for measuring capacity.
1,000 mL = 1 L

How are the words *milliliter* and *millimeter* related?

A metric unit for measuring mass.
1,000 mg = 1 g

The prefix *milli-* means "thousand." How can this help you remember the meaning of *milligram*?

An amount divided equally.

Give a real-life example of a time you might need to find a fair share.

A metric unit used for measuring length.
1,000 mm = 1 m

What is another word that begins with the prefix *milli-*? What does it mean?

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Name _____

Display Measurement Data on a Line Plot

Lesson 1

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

Math in My World

Example 1

Six friends shared several 30 cm long submarine sandwiches. The table shows the amount each friend ate. Make a line plot of the lengths in the table.

Sandwich Lengths (30 cm)		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$

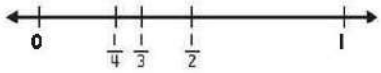
1 Count the number of times each fraction appears in the table.

$\frac{1}{4}$ appears _____ times.

$\frac{1}{3}$ appears _____ times.

$\frac{1}{2}$ appears _____ time.

2 Place the correct number of Xs above each fraction on the number line.



3 Add a title to the line plot.

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You can find the **fair share**, or the amount each friend would receive if the sandwiches were divided equally. First add the measurements to find the whole. Then divide the whole by the number of measurements.

Example 2

Find the fair share using the line plot from Example 1.

1 Add the fractions to find the total amount of sandwiches eaten. Add the fractions with like denominators first.

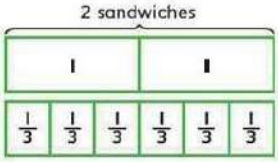
So, $\frac{1}{2} + 1 + \frac{1}{2}$ or _____ whole sandwiches were eaten.

2 Xs above $\frac{1}{4}$: $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$

3 Xs above $\frac{1}{3}$: $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$ or 1

1 X above $\frac{1}{2}$: $\frac{1}{2}$

2 Divide the total amount by the number of Xs on the line plot. To find 2 ÷ 6, you can draw a model.



Draw 2 rectangles to show 2 whole sandwiches.

Divide the entire amount into 6 equal pieces.

Each piece represents _____ of a sandwich. So, if the sandwiches were divided equally, each person would have eaten _____ of a sandwich.

Guided Practice

1. Make a line plot of the measurements in the table. Then find the fair share.

Amount of Juice (L)							
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$

fair share: _____

Talk MATH

Describe a situation in everyday life in which you would want to find a fair share.

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Name _____

Independent Practice

Make a line plot of the measurements in each table. Then find the fair share.

2.

Yarn Lengths (m)					
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{3}$
$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$

fair share: _____

3.

Iced Tea (L)								
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{2}$

fair share: _____

4.

Amount of Sliced Turkey (kg)							
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{7}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$

fair share: _____

5.

Distance Swam (km)				
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

fair share: _____

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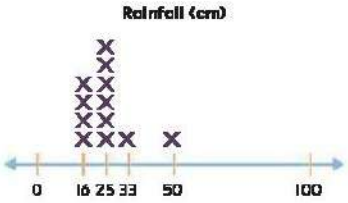
Problem Solving

For Exercises 6–7, use the line plot that shows the amount of rainfall over a twelve-month period in the city.



6. Mathematical Practices 4 **Model Math** Convert the rainfall amounts to meters and make a new line plot.

My Drawing!

7. What is the fair share, in meters, if the same amount of rain fell each month?

HOT Problems

8. Mathematical Practices 2 **Use Number Sense** A unit fraction is a fraction with a numerator of 1. What is the greatest unit fraction that you can plot on a number line between 0 and 1? Explain.

9. **Building on the Essential Question** How can I find the fair share of a set of measurements?

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Name _____

MY Homework

Lesson 1

Display Measurement Data on a Line Plot

Homework Helper

The zoo lists the weights of several animals in the table. Make a line plot of the weights in the table.

Animal Weights (T)				
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{2}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$

1 Count the number of times each fraction appears in the table.

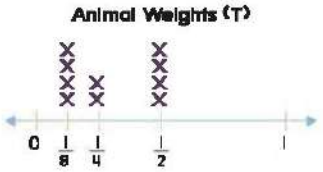
$\frac{1}{8}$ appears 4 times.

$\frac{1}{4}$ appears 2 times.

$\frac{1}{2}$ appears 4 times.

2 Place the correct number of Xs above each fraction on the number line.

3 Then, use the title from the table to add a title to the line plot.



Practice

Refer to the Homework Helper to answer Exercises 1 and 2.

1. Which weight(s) occurred the most often?

_____

2. Find the fair share.

_____

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Problem Solving

3. Make a line plot of the measurements in the table.

Amount of Cashews (kg)					
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$

4. Refer to the table in Exercise 3. What is the fair share, in kilograms, of the cashews?

5. Mathematical Practices 3 **Use Math Tools** Explain how you can mentally find the sum of the fractions in Exercise 3 without actually performing the calculations.

Vocabulary Check

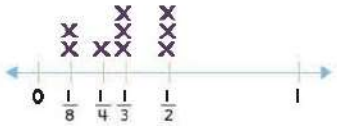
6. Fill in the correct circle that corresponds to the best answer. Which of the following could be used to find the amount each person would receive if it was divided equally?

Ⓐ fair share Ⓒ length

Ⓑ customary system Ⓓ weight

Test Practice

7. Which is the correct fair share for the measurements shown in the line plot?



Ⓐ $\frac{1}{6}$ km Ⓒ $\frac{1}{2}$ km

Ⓑ $\frac{1}{3}$ km Ⓓ $\frac{2}{3}$ km

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Name _____

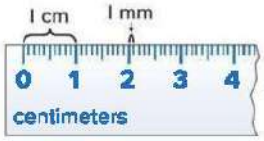
Hands On
Metric Rulers

Lesson 2

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

Use a ruler like the one shown to measure objects to the nearest centimeter or to the nearest millimeter.



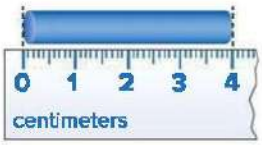
Centimeters and millimeters are units of length.

1 cm = 10 mm

Measure It

Find the length of the piece of chalk to the nearest centimeter.

1 Place the ruler against the piece of chalk. Line up the zero on the ruler with the end of the piece of chalk.



2 Find the centimeter mark that is closest to the other end.

Cut and use this centimeter ruler.

To the nearest centimeter, the length of the piece of chalk is _____ cm long.

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Try It

Find the length of the toy car to the nearest millimeter.

1. Place the ruler against one edge of the car. Line up the zero on the ruler with the end of the car.

2. Find the millimeter mark that is closest to the other end.

To the nearest millimeter, the toy car is _____ mm long.

Talk About It

1. Explain how you can tell the difference between the centimeter and millimeter marks when measuring an object with a metric ruler.

2. Is it easier to measure objects to the nearest centimeter or to the nearest millimeter? Explain.

3. **Mathematical Practices** 3 **Justify Conclusions** Should you measure the length across a coin to the nearest centimeter or millimeter? Explain your reasoning.

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Name _____

Practice It

Measure the length of each object to the nearest centimeter and millimeter.

4.

5.

Find the length of each object to the nearest centimeter and millimeter.

6. width of a book _____

7. length of a pencil _____

8. width of a calculator _____

9. length of a tape dispenser _____

Draw a line segment with each of the following lengths.

10. 6 cm

11. 27 mm

12. 5 cm

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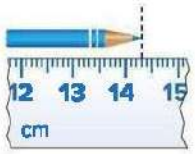
Apply It

13. Compare the units of length you would use to measure the following: the length of a bicycle and the width of a 10-fils coin. Explain your reasoning.

14. The length of a cell phone is 8 cm to the nearest centimeter and 81 mm to the nearest millimeter. Which measurement is more precise?

15. Mathematical Practices 3 **Find the Error** Rana used a ruler to measure a colored pencil. Rana said the pencil is 14.3 mm long. Find her mistake and correct it.



Write About It

16. Will I get a more precise measurement if I measure an object to the nearest centimeter or to the nearest millimeter? Explain your reasoning.

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Name _____

MY Homework

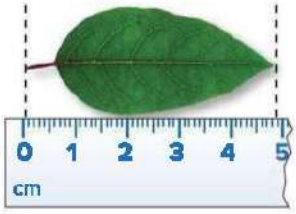
Lesson 2

Hands On: Metric Rulers

Homework Helper

Find the length of the leaf to the nearest centimeter and millimeter.

1. Place the ruler against one edge of the object. Line up the zero on the ruler with the end of the object.



2. Find the centimeter and millimeter mark that is closest to the other end.

To the nearest centimeter, the leaf is 5 cm long. To the nearest millimeter, it is 48 mm long.

Practice

Measure the length of each object to the nearest centimeter and millimeter.

1.

2.

_____ _____

Look and use this centimeter ruler.

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Find the length of each object to the nearest centimeter and millimeter.

3. length of a pen

4. length of a paper clip

Draw a line segment with each of the following lengths.

5. 7 cm

6. 105 mm

Problem Solving

Mathematical Practices 4

7. Be Precise The length of Mohammad's hamster is 114 mm to the nearest millimeter and 11 cm to the nearest centimeter. Which measurement is more precise?

8. Muna has a ruler that is marked in millimeters and a tape measure that is marked in centimeters. Which measuring tool will give Muna a more precise measurement?

9. Obaid measured the height of his glass to be 13 cm. Adnan measured the same glass and found that it measured 132 mm. Who used a more precise measurement?

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Name _____

Convert Metric Units of Length

Lesson 3

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

The **metric system** is a decimal system of measurement. To convert metric units, multiply or divide by powers of 10.

Math in My World

Example 1

One of the largest recorded pythons measured 7.3 m long. What is the length of the python in centimeters?

Convert 7.3 m to centimeters.

Since 1 m = 100 cm, multiply 7.3 by 100.

$$\begin{array}{r} 1\ 0\ 0 \\ \times\quad 7.\ 3 \\ \hline \square\square\square \end{array}$$

To multiply by 10, 100, or 1,000, use basic facts and count the number of zeros in the factors.

So, 7.3 m = _____ cm.

The python is _____ cm long.

Key Concept Metric Units of Length

1 **centimeter** (cm) = 10 **millimeters** (mm)

1 **meter** (m) = 100 cm or 1,000 mm

1 **kilometer** (km) = 1,000 m

1 mm	1 cm	1 m	1 km
thickness of a 10-fils coin	width of pinky finger	height of a doorknob	6 city blocks

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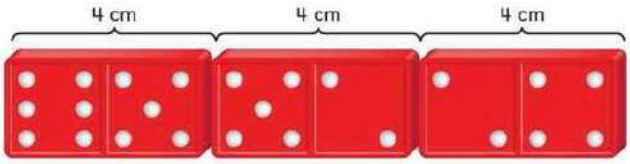
Example 2

Moza has 50 dominoes. Each domino is 4 cm long. She lines them up end to end as shown. How many meters long is the line of dominoes?



1 Find the length in centimeters.

50 × 4 cm = _____ cm

2 Convert _____ cm to meters.

Since 1 m = _____ cm,

divide _____ by _____.

_____ ÷ _____ = _____

So, _____ cm = _____ m.

The line of 50 dominoes is _____ m long.

Helpful Hint

To divide by 10, 100, or 1,000, cross out the same number of zeros in both the dividend and divisor.

Guided Practice

Complete.

1. 5 m = ■ cm

   5 × 100 = _____

   So, 5 m equals _____ cm.

2. 9,000 m = ■ km

   9,000 ÷ 1,000 = _____

   So, 9,000 m equals

   _____ km.

Talk MATH

How can you use mental math to convert 7.38 km to meters?

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Name _____

Independent Practice

Complete.

3. 700 cm = _____ m

4. 8,500 mm = _____ m

5. 15 km = _____ m

6. 73,000 m = _____ km

7. 2.71 m = _____ mm

8. 9.2 m = _____ cm

9. 17.5 mm = _____ cm

10. 0.509 km = _____ m

Complete. Use <, >, or = to make a true statement.

11. 30 cm ◯ 300 mm

12. 4.8 km ◯ 4,800 m

13. 25 mm ◯ 3 cm

14. 9 km ◯ 8,500 m

15. 1.5 m ◯ 145 cm

16. 17 m ◯ 116 cm

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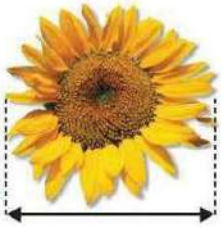
Problem Solving

17. Measure the distance across the sunflower to the nearest centimeter. How many centimeters shorter than 1 m is the width of the sunflower?



18. **Mathematical Practices** 1 **Check for Reasonableness** Which is the most reasonable estimate for the depth of a lake: 6 mm, 6 cm, or 6 m? Explain.

19. A spider is 6 mm long. What fractional part of 1 cm is 6 mm?

HOT Problems

20. **Mathematical Practices** 3 **Which One Doesn't Belong?** Circle the measure that does not belong with the other three. Explain your reasoning.

5,500 km	5.5 m	550 cm	5,500 mm

21. **Building on the Essential Question** Compare and contrast converting customary units of length and converting metric units of length.

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Name _____

MY Homework

Lesson 3
Convert Metric Units of Length

Homework Helper

The average length of a great white shark is about 4 m. What is the average length in centimeters?

Convert 4 m to centimeters.

Since 1 m = 100 cm, multiply 4 by 100.

$4 \times 100 = 400$

So, 4 m = 400 cm.

The average length of the great white shark is about 400 cm.

Practice

Complete.

1. 300 cm = _____ m
2. 500 mm = _____ cm
3. 1.7 km = _____ cm
4. 2 km = _____ m
5. 6 cm = _____ mm
6. 238 cm = _____ m
7. 2,400 mm = _____ m
8. 175 mm = _____ m

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Problem Solving

9. When completed, a tunnel will be 1,500 m long. What is this length in kilometers?

_____

10. **Mathematical Practices** 2 **Use Number Sense** The depth of a swimming pool is 8.5 m. What is half of the depth in millimeters?

_____

Vocabulary Check

Choose the correct word(s) that completes each sentence.

millimeter	**centimeter**	**meter**
kilometer	**metric system**	

11. The _____ is an appropriate unit to measure the length of a ladybug.

12. The _____ is an appropriate unit to measure the distance between two cities.

13. The _____ is a decimal system of measurement.

Test Practice

14. Noura is reading a book. The book's thickness is 31 mm. Which is the correct thickness in centimeters?

Ⓐ 3.001 cm

Ⓑ 3.01 cm

Ⓒ 3.1 cm

Ⓓ 3.11 cm

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Check My Progress

Vocabulary Check

Choose the correct word(s) that completes each sentence.

centimeter	kilometer
meter	millimeter

1. The _____ is an appropriate unit to measure the height of an oak tree.
2. The _____ is an appropriate unit to measure the length of a small insect.

Concept Check

Compare. Use >, <, or = to make a true statement.

3. 7 m ◯ 650 cm
4. 5 cm ◯ 44 mm
5. 45 cm ◯ 450 mm
6. 4.5 km ◯ 5,000 m

Complete.

7. 7 m = _____ km
8. 17 cm = _____ mm
9. 2,200 mm = _____ m
10. 835 cm = _____ m
11. 88,000 m = _____ km
12. 49.3 mm = _____ cm

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13. Make a line plot of the measurements in the table. Then find the fair share.

Board Lengths (m)				
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

fair share: _____

Problem Solving

14. Which is the most reasonable estimate for the height of a two-story house: 15 cm, 15 m, or 15 km? Explain.

15. Hana measured the capacity of the punch bowl. Her first measurement was 2 L. Her second measurement was 2,100 mL. Compare the two measurements. Use >, <, or = to make a true statement.

16. Hasan has 7 L of hot chocolate to give to his classmates. How many of Hasan's classmates can have one cup of hot chocolate?

Test Practice

17. The depth of a lake is 1,400 m. What is the depth in kilometers?

Ⓐ 0.14 km

Ⓑ 1.4 km

Ⓒ 14 km

Ⓓ 140 km

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Name .....

Hands On

Estimate and Measure Metric Mass

Lesson 4

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

The **mass** of an object is the amount of matter it has.
A **gram** is a metric unit of measurement of mass.

Measure It

1 Estimate the mass of each object in grams. Record your results in the table.

Object	Mass (g)	
	Estimate	Actual
Scissors		
Pencil		
Stapler		
Calculator		

2 Measure the mass of each object.

Place the scissors on one side of a balance. Set gram weights on the other side until the sides are level. Record the actual mass. Repeat this step for the other objects.

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Try It

A **kilogram** is also a metric unit of measurement of mass. One kilogram is equal to 1,000 g. Use this to complete the table below.

Kilograms	Grams
1	1,000
2	
3	
4	
5	

Look for a pattern in the table.

How many grams are in 6 kg? _____

How many grams are in 9 kg? _____

Talk About It

1. Order the four objects you weighed in the first activity from greatest to least mass.

2. Mathematical Practices 6 **Explain to a Friend** Use the mass of the objects you found to estimate the mass of two other objects in your classroom. Then find the mass of the objects. Were your estimates close?

3. Could a larger object have less mass than a smaller object? Explain.

4. Explain how you can use mental math in order to convert kilograms to grams.

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Name _____

Practice It

5. Identify three objects in your classroom that you can use the balance to find their masses. Estimate each object's mass. Then find the mass of each object and record the exact mass in the table.

	Mass (g)	
Object	**Estimate**	**Actual**

Compare. Use >, <, or = to make a true statement.

6. 1,500 g ◯ 1 kg

7. 3,000 g ◯ 3 kg

8. 4,000 g ◯ 3 kg

9. 3,700 g ◯ 4 kg

10. 5 kg ◯ 6,000 g

11. 3.5 kg ◯ 3,000 g

12. 2.5 kg ◯ 2,500 g

13. 3.25 kg ◯ 3,300 g

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Apply It

14. Ahmed and Ali measured the mass of the same chinchilla. Ahmed measured the chinchilla as 1 kg. Ali measured the chinchilla as 945 g. Circle the more precise measurement.

945 g 1 kg

15. Hessa measured the mass of her books. She measured the mass as 2 kg. Her second measurement was 2,050 g. Use >, <, or = to make a true statement.

2 kg ◯ 2,050 g

16. Mathematical Practices 6 **Be Precise** If you are measuring the mass of a container of salt, would grams or kilograms give you a more precise measurement? Explain.

17. Mathematical Practices 3 **Draw a Conclusion** Compare and contrast grams and kilograms.

My Work!

Write About It

18. How can I convert grams to kilograms without measuring?

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Name _____

MY Homework

Lesson 4

Hands On: Estimate and Measure Metric Mass

Homework Helper

One kilogram is equal to 1,000 g. Use this information to complete the table. How many grams are in 6 kg?

For every increase of one kilogram, increase the number of grams by 1,000.

Kilograms	Grams	
1	1,000	+ 1,000
2	2,000	+ 1,000
3	3,000	+ 1,000
4	4,000	+ 1,000
5	5,000	+ 1,000
6	6,000	

So, 6 kg are equal to 6,000 g.

Practice

Compare. Use >, <, or = to make a true statement.

1. 2,300 g ◯ 2 kg

2. 4,840 g ◯ 5 kg

3. 4 kg ◯ 4,150 g

4. 1.75 kg ◯ 1,750 g

Vocabulary Check

5. Fill in the blank with the correct word to complete the sentence below.

   The _____ of an object is the amount of matter it has.

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Problem Solving

6. Tarek and Ali measured the masses of their cell phones. Tarek measured his cell phone using kilograms. Ali measured his cell phone using grams. Which measure would be more appropriate to measure a cell phone?

Mathematical Practices 6

7. **Be Precise** Fahd has a ten-year old cat, Shadow. Is Shadow's mass more likely to be 6 kg or 6 g? Explain.

8. Nasser measured the mass of his luggage. His luggage mass was 21,530 g. The airline will only allow luggage that has a mass under 23 kg. Will Nasser be allowed to fly with his luggage? Explain.

9. Hala measured the mass of her new kitten. Her first measurement was 2,350 g. Her second measurement was 2.3 kg. Circle the measurement that is more precise.

2,350 g 2.3 kg

10. Yousif measured the mass of his iguana. His first measurement was 4,100 g. His second measurement was 4 kg. Compare the two measurements. Use >, <, or = to make a true statement.

My Work!

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Name _____

Convert Metric Units of Mass

Lesson 5

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

Mass is a measure of the amount of matter an object has.

Math in My World

Example 1

A white-tailed deer has a mass of 136 kg. What is the mass of the deer in grams?

Convert 136 kg to grams.

Since 1 kg = 1,000 g, multiply 136 by 1,000.

So, 136 kg = _____ g.

The mass of the white-tailed deer is _____ g.

1,000
× 136
136,000

Check Use division to check your answer.

_____ ÷ 1,000 = 136

Key Concept Metric Units of Mass

1 **gram** (g) = 1,000 **milligrams** (mg) 1 **kilogram** (kg) = 1,000 g

1 mg
a bread crumb

1 g
a paper clip

1 kg
a loaf of bread

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Example 2

Convert 1,500 g to kilograms.

Since you are converting a smaller unit to a larger unit, divide.

$$\begin{array}{r} \square\,\text{R}\,\square\square\square \\ 1{,}000\overline{)1{,}500} \\ -\square\square\square\square \\ \hline \square\square\square \end{array}$$

The remainder _____ means there are _____ g left over.

The decimal part of a kilogram is _____.

So, 1,500 g = _____ kg _____ g or _____ kg.

Guided Practice

Complete.

1. 5,000 mg = ■ g

   5,000 ÷ 1,000 = _____

   So, 5,000 mg equals

   _____ g.

2. 5 kg = ■ g

   5 × 1,000 = _____

   So, 5 kg equals

   _____ g.

3. 4,000 g = ■ kg

   4,000 ÷ 1,000 = _____

   So, 4,000 g equals

   _____ kg.

4. 9 g = ■ mg

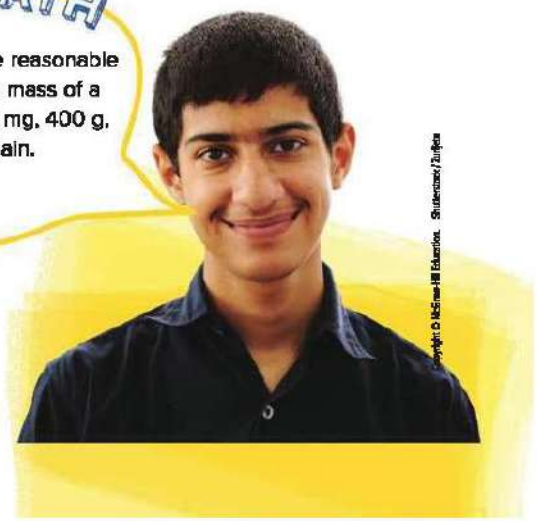
   9 × 1,000 = _____

   So, 9 g equals

   _____ mg.

Talk MATH

Which is a more reasonable estimate for the mass of a basketball: 400 mg, 400 g, or 400 kg? Explain.



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Name _____

Independent Practice

Complete.

5. 2,000 mg = _____ g

6. 80 g = _____ mg

7. 0.75 kg = _____ mg

8. 6 kg = _____ g

9. 3,100 g = _____ kg

10. 0.05 kg = _____ mg

11. 4.07 g = _____ mg

12. 9 kg = _____ g

Compare. Use <, >, or = to make a true statement.

13. 2,300 mg ◯ 2 g

14. 3 kg ◯ 3,000 g

15. 4.5 kg ◯ 4,050 g

16. 4,120 mg ◯ 4.12 g

17. 75 g ◯ 800 mg

18. 814 g ◯ 8.14 kg

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Problem Solving

Use the **table shown for Exercises 19–21.**

Macaws	
Species	**Mass (grams)**
Blue and Gold	800
Green-winged	900
Red-footed	525
Yellow-collared	250

19. How many yellow-collared macaws would have a combined mass of 1 kg?

20. Mathematical Practices 6 **Explain to a Friend** Is the combined mass of two red-footed macaws and three blue and gold macaws closer to 3 kg or 4 kg? Explain.

21. Which macaw has a mass closest to 1 kg?

HOT Problems

22. Mathematical Practices 2 **Use Number Sense** One pound is approximately equal to 0.5 kg. About how many kilograms is 3 pounds?

23. **Building on the Essential Question** How is converting metric units of mass different from converting customary units of weight?

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Name _____

MY Homework

Lesson 5
Convert Metric Units of Mass

Homework Helper

Mr. Mansour bakes muffins that have a mass of about 50,000 mg. What is the mass in grams?

Convert 50,000 mg to grams.

Since 1,000 mg = 1 g, divide 50,000 by 1,000.

So, 50,000 mg = 50 g.

The muffins have a mass of about 50 g.

Practice

Complete.

1. 7,000 mg = _____ g

2. 4.7 kg = _____ g

3. 18,500 g = _____ kg

4. 8.3 kg = _____ g

5. 22 g = _____ mg

6. 135,000 mg = _____ kg

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Problem Solving

7. One highlighter has a mass of 11 g. Another highlighter has a mass of 10,800 mg. Which highlighter has the greater mass?

8. **Mathematical Practices** 6 **Be Precise** One computer has a mass of 0.8 kg and another has a mass of 800 g. Compare the masses of the computers. Use >, <, or = to make a true statement.

Vocabulary Check

Fill in the correct circle that corresponds to the best answer.

9. Which of the following is not a common unit of measurement for the metric system?

   Ⓐ milligram Ⓒ gram
   Ⓑ kilogram Ⓓ ounce

10. Which operation is necessary to convert a larger unit to a smaller unit?

   Ⓕ addition Ⓗ multiplication
   Ⓖ subtraction Ⓘ division

Test Practice

11. For a science experiment, Huda measured a piece of metal that has a mass of 3,500 g. What is the mass of the metal in kilograms?

   Ⓐ 0.35 kg Ⓒ 35 kg
   Ⓑ 3.5 kg Ⓓ 350 kg

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Name _____

Convert Metric Units of Capacity

Lesson 6

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

In the metric system, the common units of capacity are liter and milliliter.

Math in My World

Example 1

A dripping faucet wastes about 90 L of water every week. How many milliliters of water is this?

Convert 90 L to milliliters.

Since 1 L = 1,000 mL, multiply 90 by 1,000.

$$\begin{array}{r} 1{,}000 \\ \times \quad 90 \\ \hline 90{,}000 \end{array}$$

So, 90 L = _____ mL.

The dripping faucet wastes _____ mL of water.

Key Concept Metric Units of Capacity

1 liter (L) = 1,000 milliliters (mL)

1 mL
amount of liquid in an eyedropper

1 L
a medium-sized sports drink

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Example 2

A container of orange juice holds 580 mL. How many liters is 580 mL?

Since 1 L = _____ mL, divide 580 by _____.

580 ÷ _____ = _____ ← Move the decimal point 3 places to the left.

So, 580 mL = _____ L.

The container holds _____ L of orange juice.

Guided Practice

Complete.

1. 6 L = ■ mL

   6 × 1,000 = _____

   So, 6 L equals _____ mL.

2. 4 L = ■ mL

   4 × 1,000 = _____

   So, 4 L equals _____ mL.

3. 7,000 mL = ■ L

   7,000 ÷ 1,000 = _____

   So, 7,000 mL equals _____ L.

4. 42 mL = ■ L

   42 ÷ 1,000 = _____

   So, 42 mL equals _____ L.

Talk MATH

Which unit would you use to measure the capacity of a glass of milk: milliliter or liter? Explain.

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Name _____

Independent Practice

Complete.

5. 70 L = _____ mL

6. 10 mL = _____ L

7. 1.2 L = _____ mL

8. 3,500 mL = _____ L

9. 4 L = _____ mL

10. 230 mL = _____ L

11. 6.21 L = _____ mL

12. 5,000 mL = _____ L

Compare. Use <, >, or = to make a true statement.

13. 2 L ◯ 1,000 mL

14. 390 mL ◯ 0.39 L

15. 82 L ◯ 825 mL

16. 834 mL ◯ 8.34 L

17. 0.34 L ◯ 430 mL

18. 87 mL ◯ 0.087 L

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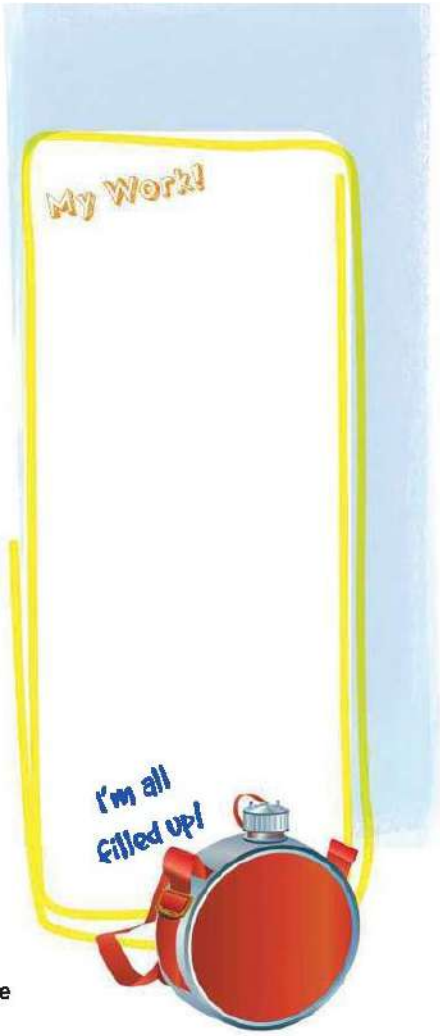
Problem Solving

19. The Nail Shop purchases nail polish in 13 mL bottles. Find the total capacity, in liters, of 1,000 bottles.

20. Alia measures the water in a container to be 2,732 mL. Ghaya measures the water in the same container to be 3 L. Circle the greater measurement.

2,732 mL 3 L

21. **Mathematical Practices** 1 **Check for Reasonableness** To prepare for his camping trip, Rashid filled his canteen with water. Is 15,000 mL or 1,500 mL a more reasonable estimate for the amount of water in the canteen? Explain.



HOT Problems

22. **Mathematical Practices** 2 **Reason** Name three items that have a capacity greater than 10 L.

23. **Building on the Essential Question** Why is it important to be able to convert metric units of capacity?

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Name _____

MY Homework

Lesson 6
Convert Metric Units of Capacity

Homework Helper

A cough syrup bottle contains 120 mL of cough syrup. How many liters is 120 mL?

Since 1 L = 1,000 mL, divide 120 by 1,000.

120 ÷ 1,000 = 0.12 ← Move the decimal point 3 places to the left.

So, 120 mL = 0.12 L.

The bottle holds 0.12 L of cough syrup.

Practice

Complete.

1. 6 L = _____ mL

2. 13 L = _____ mL

3. 54,000 mL = _____ L

4. 23,500 mL = _____ L

5. 11,000 mL = _____ L

6. 0.201 L = _____ mL

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Problem Solving

7. Yesterday, Abeer drank the liquids shown in the table. How many liters of liquids did she drink in all?

Liquid	Amount
Juice	210 mL
Milk	480 mL
Water	1.2 L

8. One serving of punch is 250 mL. Will ten servings fit in a 2 L bowl? Explain.

9. Mathematical Practices 1 **Make Sense of Problems** Reham received a measles immunization at Dr. Sally's office. The vaccine was measured in cubic centimeters. A cubic centimeter has the same capacity as a milliliter. If the immunization was 3.5 cm^3, how many milliliters was it?

Vocabulary Check

Fill in the blank with the correct word(s) that completes each sentence.

10. The _____ is an appropriate unit to measure the capacity of a hand sanitizer bottle.

11. The _____ is an appropriate unit to measure the capacity of the water in a fountain.

Test Practice

12. A soup bowl can hold about 400 mL of soup. A restaurant has 8 L of vegetable soup. How many bowls of soup can they serve?

Ⓐ 500 bowls Ⓒ 50 bowls

Ⓑ 200 bowls Ⓓ 20 bowls

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Name _____

Problem-Solving Investigation

STRATEGY: Use Logical Reasoning

Lesson 7

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

Learn the Strategy

Three friends each measured the height of several trees. Their heights are 4 m 10 cm, 4 m 9 cm, and 4 m 7 cm. Use the clues to determine the height, in cm, of each tree.

- **Ahmed's tree is taller than Omar's tree.**
- **Mohammed's tree is 3 cm taller than the shortest tree.**
- **Ahmed's tree is 409 cm tall.**

1 Understand

What facts do you know?

The clues that are listed above.

What do you need to find?

The _____ of each tree

2 Plan

I can use logical reasoning to find the height of each tree.

3 Solve

Convert the measurements to centimeters to compare.

$4 \times 100 + 10 = 400 + 10 =$ _____ cm Mohammed's tree is _____ cm tall.

$4 \times 100 + 9 = 400 + 9 =$ _____ cm Ahmed's tree is _____ cm tall.

$4 \times 100 + 7 = 400 + 7 =$ _____ cm Omar's tree is _____ cm tall.

4 Check

Is my answer reasonable?

Since all of the answers match the clues, the solution is reasonable.

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Practice the Strategy

Three cats are sitting in a line. Rocky is not last. Coco is in front of the tallest cat. Marley is sitting directly behind Rocky. List the cats in order from first to last.

1 Understand

What facts do you know?

What do you need to find?

2 Plan

3 Solve

4 Check

Is my answer reasonable?

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Name

Apply the Strategy

Solve each problem by using logical reasoning.

1. An after-school club is building a clubhouse that has a rectangular floor that is 8 m by 6 m. What is the total floor area, in square centimeters, of the clubhouse?

2. There is a red, a green, and a yellow bulletin board hanging in the hallway. All of the bulletin boards are rectangular with a height of 4 m. Their lengths are 6 m, 5 m, and 3 m. The red bulletin board has the largest area and the yellow one has the smallest area. What is the area of the green bulletin board?

3. **Mathematical Practices** 8 **Look for a Pattern** If the pattern below continues, how many coins will be in the fifth figure?

Figure 1 Figure 2 Figure 3

4. A cafeteria table has an area of 21 m^2. If three tables are pushed together, what is the combined area of the tables?

5. Ali has AED 1.25 in 10-fils coins, 5-fils coins, and 1-fils coins. He has twice as many 10-fils coins as 1-fils coins, and the number of 5-fils coins is one less than the number of 1-fils coins. How many 10-fils coins, 5-fils coins, and 1-fils coins does he have?

My Work!

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Review the Strategies

Use any strategy to solve each problem.

- Use logical reasoning.
- Draw a diagram.
- Look for a pattern.
- Solve a simpler problem.

6. Rana has 2 times the number of games as Fawzia. Fawzia has 4 more games than Hessa. If Hessa has 9 games, how many games are there among the 3 friends?

7. When Hessa goes mountain climbing, she rests 5 minutes for every 15 minutes that she climbs. If Hessa's combined time is 2 hours, how many minutes does she rest?

8. There are 8 adults for every 7 students on a field trip. If there are 56 adults on the trip, how many people are on the trip?

9. There are 4 more girls in Mrs. Mona's class than Mr. Ahmed's class. Five girls moved from Mrs. Mona's class to Mr. Ahmed's class. Now there are twice as many girls in Mr. Ahmed's class as there are in Mrs. Mona's. How many girls were in Mr. Ahmed's class to begin with?

10. A storage room measures 48 cm by 60 cm. What is the total area, in square meters, of the closet?

11. **Mathematical Practices** 1 **Make Sense of Problems** Five friends go to a batting cage. Rana bats after Hessa and before Khadija. Reham bats after Rana and before Khadija and Sally. Khadija always bats immediately after Reham. Who bats last?

My Work!

Batter up!

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Name _____

MY Homework

Lesson 7

Problem Solving: Use Logical Reasoning

Homework Helper

A family has three hamsters. Tiger is 8 years old, which is 2 years older than Max. Max is 3 years older than Patches. List the hamsters from oldest to youngest.

1 Understand

What facts do you know?

Tiger is 8 years old.

Tiger is 2 years older than Max, and Max is 3 years older than Patches.

What do you need to find?

the ages of the hamsters from oldest to youngest

2 Plan

Use logical reasoning to find the age of each hamster.

Make a table to help organize the information.

3 Solve

Place an "X" in each box that cannot be true.

You know that Tiger is 8 years old.

Subtract 2 from Tiger's age to find Max's age. Max is 6 years old.

Subtract 3 from Max's age to find Patches' age. Patches is 3 years old.

	oldest	2nd oldest	youngest
Tiger	yes	X	X
Max	X	yes	X
Patches	X	X	yes

So, Tiger is the oldest, Max is the next oldest, and the youngest is Patches.

4 Check

Is my answer reasonable?

Since all of the answers match the clues, the solution is reasonable.

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Problem Solving

Solve each problem by using logical reasoning.

1. **Mathematical Practices** 5 **Use Math Tools**
Mr. Mohammed's fifth grade class sold containers of popcorn and peanuts. If each day they sold 25 fewer containers of peanuts than popcorn, how many containers of popcorn and peanuts did they sell in all? Complete the table and solve.

	Day 1	Day 2	Day 3	Day 4
Popcorn	225	200	150	300
Peanuts				

2. A shelter house has a floor area of 400 m^2. If three identical shelter houses are built, what is the combined floor area of the shelter houses?

3. Shaima has AED 1.10. She has three times as many 5- fils coins as 1-fils coins, and the number of 10-fils coins is two less than the number of 1-fils coins. How many 10-fils coins, 5-fils coins, and 1-fils coins does she have?

4. Fawzia is 4 years older than her brother Eiman. Eiman is 2 years older than their sister Asma. Asma is 10 years younger than their brother Ahmed. If Ahmed is 17 years old, how old is Fawzia?

5. A rectangular garden measures 15 m by 30 m. What is the total area, in square meters, of three gardens of this size?

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Review

Chapter 11
Measurement

Vocabulary Check

Fill in the circle next to the best answer.

1. The **capacity** of a container is which of the following?

   Ⓐ the elapsed time
   Ⓑ the customary unit
   Ⓒ the metric unit
   Ⓓ the amount that it can hold

2. Metric units of **mass** are measured in which of the following?

   Ⓐ meters and centimeters
   Ⓑ kilograms and grams
   Ⓒ minutes and hours
   Ⓓ days and weeks

3. When you **convert** from meter to centimeters, you are doing which of the following?

   Ⓐ changing the measurement unit
   Ⓑ determining capacity
   Ⓒ determining mass
   Ⓓ determining volume

4. When finding the **mass** of an object, you determine which of the following?

   Ⓐ the quantity of matter in the object
   Ⓑ its weight
   Ⓒ its height
   Ⓓ its length

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Concept Check

Complete.

5. 84 cm = _____ m

6. 9 m = _____ cm

7. 7,920 m = _____ km

8. 64,000 g = _____ kg

9. 7.5 kg = _____ g

10. 62 kg = _____ g

11. 7 L = _____ mL

12. 12 mL = _____ L

13. 72 L = _____ mL

14. 120 mm = _____ cm

15. Make a line plot of the measurements in the table. Then find the fair share.

Amount of Sports Drink (L)
$\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{2}$

fair share: _____

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Name _____

Problem Solving

16. Fawzia has 25-fils coins, 10-fils coins, and 5-fils coins in her purse. She has 3 fewer 5-fils coins than 10-fils coins, but she has 2 more 5-fils coins than 25-fils coins. If Fawzia has 2 25-fils coins, how much money does she have?

17. A detergent bottle holds 700 mL. Find the capacity in liters.

18. When Hamad flew from New York City to Atlanta, the pilot announced that they were flying at 10,000 m. How many kilometers is this? Write as a mixed number.

19. Sindiyya measured the mass of 100 sheets of paper as 1,500 g. How many kilograms is this?

Test Practice

21. Suha is using special paint for her artwork. The art supply store charges AED 15 per liter of paint. Suha needs 1 L of blue paint, 3 L of green paint, 1.4 L of orange paint, and $\frac{1}{2}$ L of yellow paint. How much will she pay?

Ⓐ AED 60 Ⓒ AED 80

Ⓑ AED 75 Ⓓ AED 90

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Reflect

Chapter 11

Answering the ESSENTIAL QUESTION

Use what you learned about measurement to complete the graphic organizer below.

ESSENTIAL QUESTION

How can I use measurement conversions to solve real-world problems?

Metric System

Vocabulary

Conversions

Now reflect on the ESSENTIAL QUESTION. Write your answer below.

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Chapter

12 Data

ESSENTIAL QUESTION

How can I measure data and display it visually?

Data In Our World

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Name _____

Am I Ready?

Order each set of numbers from least to greatest.

1. 3, 16, 2, 9, 13 _____

2. 18, 11, 22, 19, 14 _____

3. 36, 45, 40, 21, 39, 60 _____

4. 87, 30, 55, 15, 12, 71, 77 _____

5. 1.4, 0.5, 3.2, 1.8, 2.6 _____

6. 3.18, 3.08, 3.2, 3.96, 3.05, 3.68 _____

7. The table shows the costs of sandwiches. Order the costs from least to greatest. _____

Cost of Sandwiches			
AED 5.99	AED 8.50	AED 12.95	AED 9.95
AED 8.95	AED 9.05	AED 14.99	AED 6.75

Divide.

8. 46 ÷ 2 = _____
9. 52 ÷ 2 = _____
10. 86 ÷ 2 = _____
11. 65 ÷ 5 = _____
12. 162 ÷ 3 = _____
13. 76 ÷ 4 = _____
14. 138 ÷ 6 = _____
15. 282 ÷ 3 = _____
16. 296 ÷ 8 = _____

The pictograph shows the number of books each student checked out of the library.

17. How many books did Wafa check out of the library? _____

18. How many books did Huda check out of the library? _____

19. How many books were checked out by the three students? _____

Number of Books

Wafa	📖 📖
Mazen	📖 📖 📖 📖
Huda	📖 📖 ▯
📖 = 2 books	

How Did I Do?

Shade the boxes to show the problems you answered correctly.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

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Name _____

MY Math Words

Review Vocabulary

greater than (>) less than (<) equal to (=)

Making Connections

Compare the numbers in each row. Use the review vocabulary to compare the two numbers in each row using >, <, or =.

Greater Than, Less Than, or Equal To

71		75
10.2		12.1
19		18
122.1		121.2
97.5		97.5

Describe how you used place value to complete the chart.

_____

_____

_____

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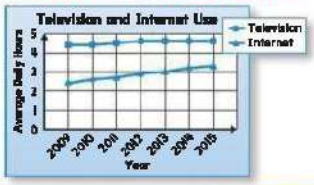
MY Vocabulary Cards

Mathematical Practices

data

Time, x	Temperature (°C), y
9 A.M.	30
10 A.M.	32
11 A.M.	36
12 P.M.	44
1 P.M.	46

double line graph

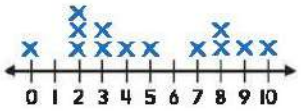


frequency table

Items Sold at School Store		
Item	Tally	Frequency
Eraser	𝍸	5
Bottle of glue		
Pencil	𝍸 III	8
Scissors	I	1

line graph

line plot



mean

ages of students: 12, 10, 13, 14, 11

$$\frac{\text{sum of data} = 60}{\text{number of values} = 5}$$

mean = 12

median

4, 5, 6, 6, 7
The median is 6.

mode

7, 4, 7, 10, 7, and 2
The mode is 7.

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Directions:
Ideas for Use

- Have students think of words that rhyme with some of the words.
- Arrange the cards in alphabetical order.
- Tell students to create riddles for each word. Ask them to work with a friend to guess the word for each word card.

A graph used to display two different sets of data using a common scale.

Give an example of when you would use a double line graph.

Numbers or symbols, sometimes collected from a survey or experiment, to show information.

Give some examples of data.

A graph that uses points connected the line segments to show changes in data over time.

What type of data can be shown on a line graph?

A table for organizing a set of data that shows the number of times each result has occurred.

What do tally marks mean on a frequency table?

The sum of the numbers in a set of data divided by the number of pieces of data.

How is mean like a "fair share"?

A graph that uses columns of Xs above a number line to show frequency of data.

Why use a line plot instead of a table?

The number(s) that occurs most often in a set of data.

Is it possible that a set of data has no mode? Explain.

The middle value in a set of ordered data. If the set contains an even number of data, the median is the value exactly halfway between the middle numbers.

Why is the median a useful number to know?

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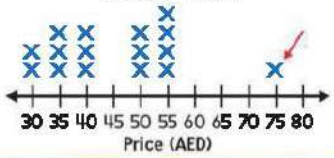
MY Vocabulary Cards

Mathematical Practices

outlier

Prices of Hats



range

data: 2, 4, 5, 7, 12
range: 12-2 or 10

stem-and-leaf plot

Stem	Leaf
1	2 4 5
2	
3	1 2 3 3 9
4	0 4 6 7

4 | 7 = 47

survey

What type of pet is your favorite?

Favorite Pets		
Pet	Tally	Frequency
Horse	𝍸 II	7
Cat	IIII	4
Fish	II	2
None		0

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Directions:
Ideas for Use

- Use a blank card to write this chapter's essential question. Use the back of the card to write or draw examples that help you answer the question.
- Use blank cards to review key concepts from the chapter. Write a few study tips on the back of each card.

The difference between the greatest and the least values in a set of data.

What does it mean if the range is small?

A number in a set of data that is much larger or smaller than most of the other numbers in the set.

How do outliers affect the mean? Explain.

A method of collecting data.

Give an example of a survey question.

A graph in which data are ordered from least to greatest and organized by place value.

What is the purpose of the key on this type of graph?

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Name .....

Collect and Organize Data

Lesson 1

ESSENTIAL QUESTION
How can I measure data and display it visually?

A **survey** is a way to collect **data** or information that answers a question. You can use a **frequency table** to record data that shows the number of times each result has occurred.

Math in My World

Example 1

Look at the data Laila collected.
Organize the data in a frequency table.

1. Use tally marks to represent each vote for that activity.

2. Count the number of tally marks and put that number in the third column.

Favorite After School Activities		
Activity	**Tally**	**Frequency**
Playing a sport	𝍸	5
Reading	𝍸	4
Watching T.V.	𝍸	3

Each tally mark represents a student.

Numbers are used to record the results.

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Example 2

Nisreen lists all of the fish in her tank. Organize the data in a frequency table.

Fish Tank	
angelfish	damsel
angelfish	damsel
angelfish	damsel
clown fish	eel
clown fish	eel

1 Draw a table with three columns. Include a title.

Fish	**Tally**	**Frequency**

2 List each type of fish in the first column.

3 Use tally marks to represent each fish of that type.

4 Count the number of tally marks for each type of fish and put the number in the third column.

Guided Practice

Organize the data in a frequency table.

Vehicle	**Tally**	**Frequency**

1. The data shows the ways students travel to school. Organize the data in a frequency table.

How Do You Travel to School?			
bus	walk	bus	bicycle
walk	bicycle	bus	bus
walk	bus	walk	car
car	walk	car	bus

2. What is the most popular way to travel to school? What is the least popular?

_____

_____

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Name _____

Independent Practice

Organize each set of data in a frequency table.

3. Faris records the type of pizza that the science club members like.

Favorite Type of Pizza		
cheese	cheese	anchovy
cheese	olive	anchovy
cheese	olive	
cheese	olive	

Pizza	Tally	Frequency

4. A survey was taken to see how students spend their time at recess.

Recess Activities		
kickball	drawing	swing
kickball	drawing	swing
kickball	swing	tag
kickball	swing	tag
drawing	swing	tag

Activity	Tally	Frequency

5. Jamal recorded the types of pets that his classmates have. His recordings are shown below.

Pets		
cat	cat	horse
cat	horse	lizard
horse	fish	bird
bird	horse	fish

Pet	Tally	Frequency

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Problem Solving

The frequency table shows items sold at a school store.

Items Sold at School Store		
Item	Tally	Frequency
Eraser	𝍸	5
Bottle of glue		
Pencil	𝍸 |||	8
Scissors	|	1

6. Which item was the top seller? How many were sold? _____

7. Which item sold once? _____

8. How many items were sold altogether? _____

9. Which item was the least popular? _____

HOT Problems

10. **Mathematical Practices** 3 **Find the Error** Ahmed is finding the number of people surveyed from the frequency table. Help find and correct his mistake.

Favorite Subjects		
Item	Tally	Frequency
History	𝍸 |	4
Math	𝍸 𝍸	10
Reading	|||	3
Science	𝍸 ||	7

4
10
3
+ 7
14

There were 14 people surveyed.

11. **Building on the Essential Question** Explain how the information in a frequency table could be represented in another way.

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Name .....

MY Homework

Lesson 1

Measure and Display Data

Homework Helper

Najat conducted a survey to find out the favorite sports of the children in the park. Her recordings are shown below. Organize the data in a frequency table.

Favorite Sports		
football	golf	cricket
football	basketball	cricket
cricket	cricket	basketball
basketball	football	tennis

1 Draw a table with three columns. Include a title.

Sport	Tally	Frequency

2 List each type of sport in the first column.

3 Use tally marks to represent each sport.

4 Count the number of tally marks for each sport and put the number in the third column.

Practice

Organize each set of data in a frequency table.

1. Maysoun recorded the number of siblings each of her students has.

Number of Siblings		
1	4	2
2	2	3
0	3	1
1	1	0

Siblings	Tally	Frequency

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The frequency table shows the Salem twins' activities for the week, not including homework.

Activities		
Activity	**Tally**	**Frequency**
football practice	𝍸	3
martial arts	𝍸	2
piano lessons	𝍸	1
band practice	𝍸	5
reading	𝍸	6

3. Which activity was most frequent?

4. Which activity is the least frequent?

5. How many activities do the Salem brothers have altogether?

6. Which activity do the boys attend twice per week?

Alia, must order t-shirts. Alia created a frequency table to show the sizes of shirts she will need to order.

T-shirts to Order		
T-shirt size	**Tally**	**Frequency**
small	𝍸 𝍸 𝍸	14
medium	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	28
large	𝍸 𝍸 𝍸 𝍸	22
extra large	𝍸 𝍸	13

7. **Mathematical Practices** 3 **Find the Error** Alia realized she made a mistake in her table. What was her mistake?

8. Which size is the most popular?

   Which size is the least popular?

Test Practice

9. Which set of data is shown in the frequency table?

Price (AED)	Tally	Frequency
15	𝍸	2
16	𝍸	1
17		0
18	𝍸	1
19	𝍸	3

Ⓐ AED 15, AED 15, AED 16, AED 18, AED 19, AED 19, AED 19

Ⓑ AED 15, AED 16, AED 17, AED 18, AED 19, AED 19, AED 19

Ⓒ AED 15, AED 15, AED 16, AED 16, AED 18, AED 18, AED 19

Ⓓ AED 15, AED 16, AED 16, AED 17, AED 18, AED 19, AED 19

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Hands On
Construct Line Graphs

Lesson 2

ESSENTIAL QUESTION

How can I measure data and display it visually?

In the following activity, you will collect and represent data in a **line graph**. In a line graph, plotted points are connected to show changes in data over time.

Draw It

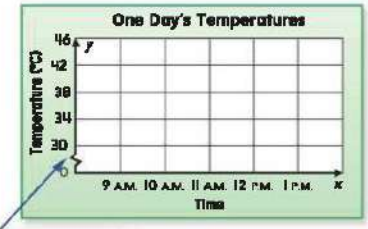
1 **Collect data.**

Collect weather data from one day. Record the temperatures in a table.

Time, x	Temperature (°C), y
9 A.M.	
10 A.M.	
11 A.M.	
12 P.M.	
1 P.M.	

2 **Construct a graph on a coordinate plane.**

Draw the x- and y-axis and label them. Then write a title at the top of the graph. Choose an appropriate scale for your graph.



The break in the scale shows the jump from 0° to 30°C.

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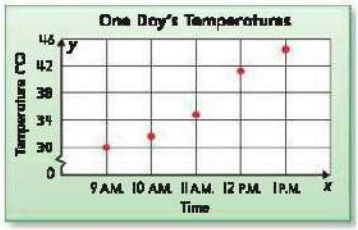
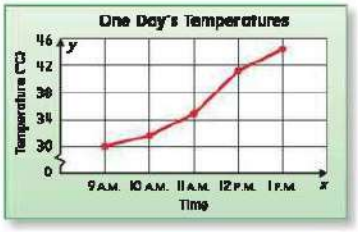
3 **Plot the ordered pairs.**
Place a point on the graph corresponding to each time and temperature. A sample table and graph are shown.

Time, x	Temperature (°C), y
9 A.M.	30
10 A.M.	32
11 A.M.	36
12 P.M.	44
1 P.M.	46



4 **Draw a line.**
Connect the points with straight lines.



Try It

Represent the data set in a line graph.

Plant Growth	
Week, x	Height (cm.), y
1	1
2	2
3	3
4	5
5	8

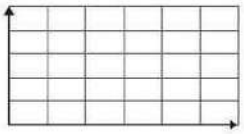
1 Use the given data.

2 Construct a graph on a coordinate plane.

3 Plot the ordered pairs.

4 Draw a line.

My Work!



Talk About It

1. Describe how a line graph shows how data changes over time.

2. Explain how you labeled the axes and chose a scale for the data.

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Name _____

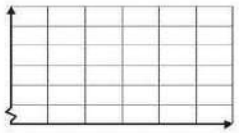
Practice It

Represent each data set in a line graph.

3.

Hot Water's Temperatures	
Time, x	Temperature (°C), y
12 P.M.	62°
1 P.M.	65°
2 P.M.	72°
3 P.M.	66°
4 P.M.	64°

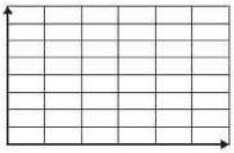
My Work!



4.

Hair Growth	
Week, x	Length (mm), y
1	6
2	7
3	9
4	11
5	14

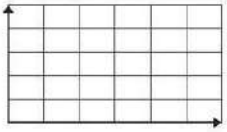
My Work!



5.

Oven Temperature	
Time (min), x	Temperature (°C), y
1	90
2	125
3	158
4	189
5	220

My Work!



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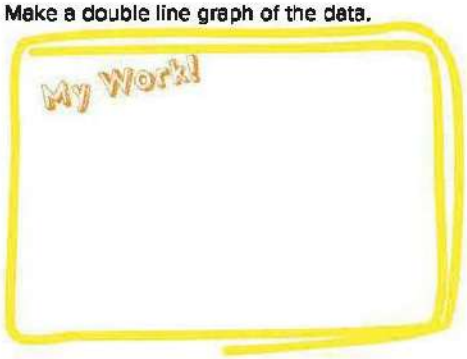
Apply It

The table shows the amount of growth of **two sunflower plants** Ghaya grew for her science fair project.

Sunflower Height													
Week	0	1	2	3	4	5	6	7	8	9	10	11	12
Height of Control Plant (cm)	0	7	14	27	40	52	68	82	90	99	100	101	101
Height of Experimental Plant (cm)	0	3	10	15	18	21	24	28	28	28	32	32	32

6. Make a double line graph of the data.



7. What is the scale of each axis?

8. Would your scale be different if you only had the control plant data to graph? Explain.

Write About It

9. Give an example of a set of data that is best displayed in a line graph.

10. **Mathematical Practices** 2 **Abstract Reasoning** What is an advantage of using a table instead of a graph?

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MY Homework

Lesson 2

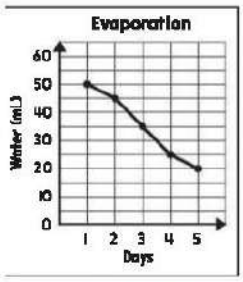
Hands On: Construct Line Graphs

Homework Helper

Make a line graph of the data that shows the amount of water left during a science experiment.

Water (mL)	Time (days)
50	1
45	2
33	3
26	4
20	5

1. Use the given data.
2. Construct a graph on a coordinate plane.
3. Plot the ordered pairs.
4. Draw a line.



1. Make a line graph of the data.

Temperature in Volcanic Hot Springs						
Time	12:00 A.M.	4:00 A.M.	8:00 A.M.	12:00 P.M.	4:00 P.M.	8:00 P.M.
Temperature (°C)	65	60	67	75	84	77

My Work!

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Problem Solving

Depth of Submarine below Sea Level	
Time (min), x	Depth (m), y
10	22
15	26
20	■
25	38
30	34
35	42

2. About how deep is the submarine after 20 minutes?

3. **Mathematical Practices** 6 **Construct Viable Arguments** The line graph is missing a scale. Determine the best scale for the graph.

4. About how deep is the submarine at 32 minutes?

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Line Graphs

Lesson 3

ESSENTIAL QUESTION

How can I measure data and display it visually?

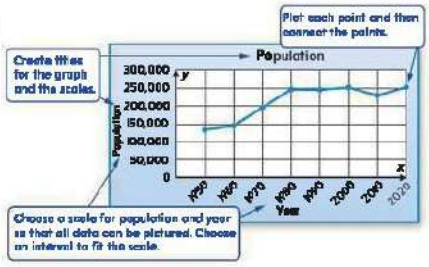
In a **line graph**, plotted points are connected to show changes in data over time. Data can take on any value, so there is no space between data values.

Math in My World

Example 1

The table shows how the population has changed from 1950 to 2020. Make a line graph of the data. Then use the graph to analyze the data.

Year	Population	Year	Population
1950	133,000	1990	245,000
1960	145,000	2000	251,000
1970	195,000	2010	239,000
1980	245,000	2020	252,000



You can make the following statements about the data.

- The population increased from 1950 to 1980.
- Since 1980, the population has been stable.

1. Choose a scale for population and year so that all data can be pictured. Choose an interval to fit the scale
2. Create titles for the graph and the scales.
3. Plot each point and then connect the points.

The interval of years on the graph is _____ years.

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A **double line graph** shows two different data sets, each represented by a line graph. The two line graphs share a common scale.

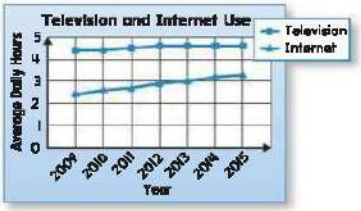
Math in My World

Example 2

The table below shows the changes in television viewing and Internet use, not including the use of e-mail, from 2009 to 2015.

Year	Average Daily Hours	
	Television Viewing	Internet Use
2009	4.4	2.4
2010	4.4	2.6
2011	4.5	2.7
2012	4.6	2.9
2013	4.6	3.0
2014	4.6	3.1
2015	4.7	3.3

Construct a double line graph of the data. Then use the graph to analyze the changes in television viewing and Internet use from 2009 to 2015.



- Both the hours of television viewing and Internet use steadily increased from 2009 to 2015.
- The hours of Internet use appear to be increasing slightly more quickly than the hours of television viewing.
- People still spend more time watching television than using the Internet.

Use the graph to figure out the trends. Which activity, TV or Internet Use, is gaining popularity more rapidly?

Helpful Hint

When making a double line graph, make each set of points different, as in Example 2. Another method is to use different colors for the two lines.

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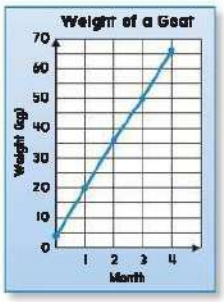
Guided Practice



The line graph shows the weight of a goat.

1. On the vertical axis, the scale (or weight range) starts at _____ kg and goes up to _____ kg.

2. On the vertical axis, each interval is _____ kg.

3. The goat's weight started at _____ kg. At the end of the fourth month, the goat weighed _____ kg. So, the goat gained about _____ kg per month.

Talk MATH

When should you use a line graph to show data?

Independent Practice

The table shows population data for two cities.

Year	City Population	
	City A	City B
1920	1,716	1,641
1930	2,106	2,814
1940	2,064	4,050
1950	2,219	7,691
1960	3,469	10,383
1970	4,252	10,113
1980	7,006	10,975
1990	8,902	9,494
2000	14,260	9,289
2010	17,892	7,976
2020*	22,497	7,928

4. Create a double line graph to show the populations from 1920 to 2020.

5. Write a few sentences to describe each city's population change and how to the cities' populations coompare over time.

6. How much larger was the population of City B than City A in 1980?

_____

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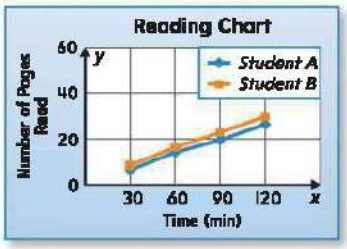
Problem Solving

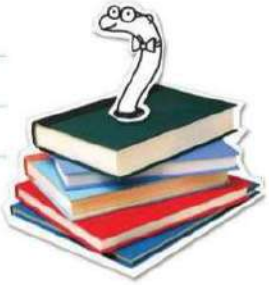
The double line graph shows the number of pages two students read over a 2-hour period.



7. What is the scale of each axis?

8. What is the size of each interval on each axis?

9. Describe the patterns the line graphs show about the number of pages the students read.



HOT Problems

10. **Mathematical Practices** **Make Sense of the Problem** This line graph has several parts missing. Create a story and a context to go along with the graph. Create axes labels and a title for the graph.

11. **Building on the Essential Question** Write a math problem that can be solved by making a line graph. Then make the line graph. Solve.

My Work!

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Name _____

MY Homework

Lesson 3
Line Graphs

Homework Helper

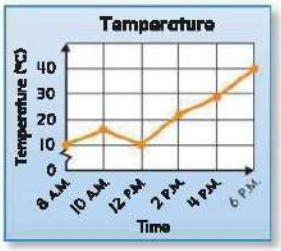
In a **line graph**, plotted points are connected to show changes in data over time. Data can take on any value, so there is no space between data values.

Make a line graph of the data that shows the increase of a lion cub's weight over time.

Lion Cub's Weight	
Time (months)	**Weight (kg)**
Birth	2
6	20
12	40

1. Choose a scale so that all data can be pictured. Choose an interval to fit the scale.
2. Create titles for the graph and the scales.
3. Plot each point and then connect the points.

1. This graph shows hourly temperature data. Find the hottest and coldest temperature.



The warmest temperature is _____.

The coldest temperature is _____.

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Problem Solving

The line graph shows the total water use for a city.

2. What is the scale of each axis?

3. What is the size of each interval on each axis?

4. Describe water use patterns for the city from 2002 to 2020.

The table shows the distance run by two runners over a one-hour period.

Running		
Time (minutes)	Runner 1 (kilometers)	Runner 2 (kilometers)
10	1.8	1.0
20	3.0	1.9
30	4.1	2.7
40	4.7	4.0
50	5.1	4.8
60	5.4	5.7

5. Create a double line graph to show the distance traveled by the two runners in one hour.

6. **Mathematical Practices** 3 **Make a Prediction** If both runners continued for another hour, predict which runner would be leading the race.

Test Practice

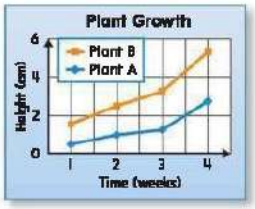
7. Tarek's class measured the growth of two plants and displyed their data in a double line graph. Which of the following statements is true?

   Ⓐ After 2 weeks, Plant A is taller than Plant B.

   Ⓑ the plants are not growing.

   Ⓒ Both plants grew the most between weeks 3 and 4.

   Ⓓ Both plants grew the most during the first week.



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Name _____

Making Predictions From Data

Lesson 4

ESSENTIAL QUESTION

How can I measure data and display it visually?

Data and graphs can help us make predictions.

Math in My World

Example

Omar asked his students to predict the number of students that walk to school. How can groups make this prediction?

Transportation	
Type	Students
walk	
bus	
car	

1. Students work in groups of 10. One person in each group copies the table shown.

Transportation	
Type	Students
walk	2
bus	5
car	3

2. One group recorded the following results in the table:

   What percent of students in the group walk, take the bus, or arrive by car?

   _____ walk, _____ ride the bus, _____ arrive by car.

3. Use the percentages to make a prediction. If there are about 500 students in the school, about how many students in the entire school are walkers? _____

4. Combine your results with other groups in your class. Make a prediction based on the class data.

Compare your group's prediction with the class prediction. Which do you think is more accurate? The class prediction is more accurate because the more students in the group, the more accurate the prediction.

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Guided Practice

Manal pulled a marble from a bag, recorded its color, and replaced it. She repeated this 50 times. The graph shows the results of her experiment. Use the graph to answer the questions.

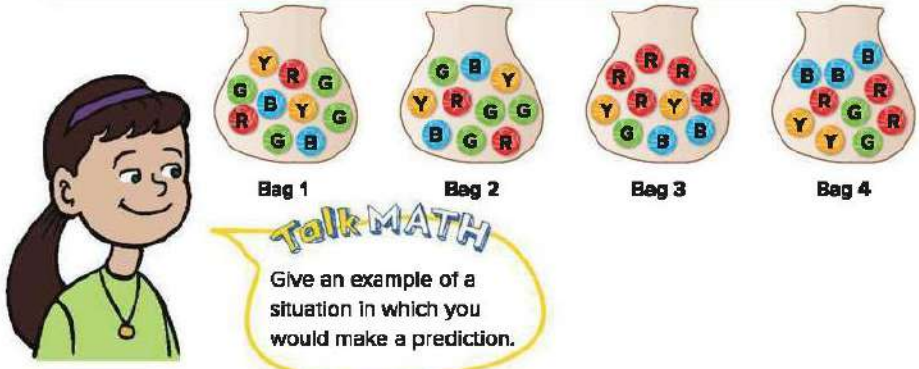
Manal's Experiment		
Marble Color	**Tally**	**Frequency**
Red	𝍸 𝍸 𝍸 𝍸 IIII	24
Yellow	𝍸 𝍸 II	12
Blue	𝍸 𝍸 III	13
Green	I	1

1. Which color marble most likely had the greatest number in the bag? Explain.

2. Two colors had the same number of marbles in the bag. Which two colors do you think they were? Explain.

3. Manal is about to pull one more marble out of the bag. Which color marble will she most likely pull? Which will she least likely pull? Explain your answers.

4. Which of the following is most *likely* the bag Manal used for her experiment? Explain your choice.



Talk MATH

Give an example of a situation in which you would make a prediction.

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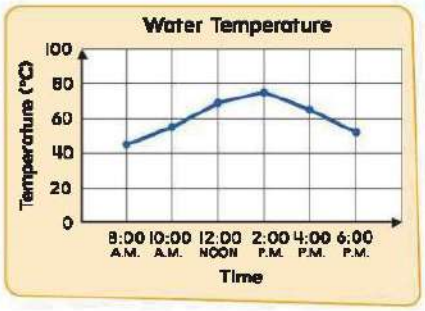
Independent Practice

Use the line graph for Exercises 5–8.



5. What does it mean when the line rises?

_____

_____

6. What does it mean when the line falls?

_____

_____

7. What can you say about the data throughout the day?

_____

_____

8. What is a reasonable estimate of the temperature at 6:00 a.m.? 8:00 p.m.? Explain your answers.

_____

_____

Problem Solving

9. A basketball player makes 5 free throws in one game, 6 in the next game, and 7 in the third game. Make a graph of the data. Then use the graph to answer the questions.

My Work!

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10. What pattern do you see in the data?

11. **Mathematical Practices** **Make an Argument** Do you think the player will make only 2 free throws in the next game? Explain.

Use the graph to answer the following questions.

12. What was the highest height the tree reached?

13. How old was the tree when it was 16 m tall?

14. How tall was the tree when it was 25 years old?

15. Predict the height of the tree after 35 years.

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MY Homework

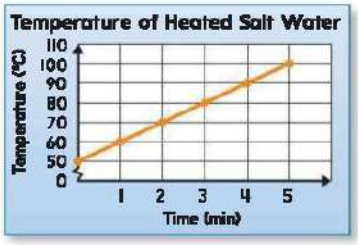
Lesson 4

Making Predictions From Data

Homework Helper

Data and graphs can help us make predictions.

Fahd made a graph of the temperatures as he was heating water.



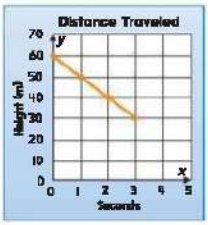
The graph shows steady increase in temperature over time.

After each minute, the temperature of the water increases _____ °C.

Predict how hot the water will be at 6 minutes. _____

Practice

Use the graphs to answer the questions.



1. The graph shows the distance traveled by a ball dropped from 60 m. Predict how far the ball has traveled after 4 seconds. _____

2. Will the number of students at the school be higher or lower than 400?

_____

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Problem Solving

The table shows the amount of money in an account. Graph the data, and then predict how much money will be in the account after five weeks.

Savings Account Balance	
Week	Total
1	AED 21.00
2	AED 28.00
3	AED 35.00
4	AED 42.00
5	■

3. How much money do you predict there will be in the account after 5 weeks?

_____

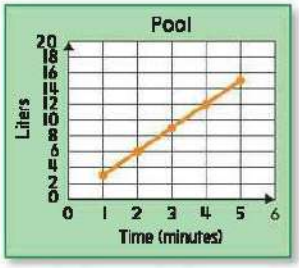
The graph shows the number of liters in a pool as it is being filled.

4. How many liters were in the pool after 2 minutes?

_____

5. How many liters do you think will be in the pool after 8 minutes?

_____



Test Practice

6. At the school carnival, Zayed won the balloon dart game 1 out of every 5 times he played. If he plays the game 15 more times, about how many times can he expect to win?

Ⓐ 3 Ⓒ 5

Ⓑ 4 Ⓓ 15

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Name _____

Analyze Line Graphs

Lesson 5

ESSENTIAL QUESTION

How can I measure data and display it visually?

You can use line graphs to predict events.

Math in My World

Example 1

Flower Height	
Month	Height
March	0 cm
April	3 cm
May	6 cm
June	9 cm
July	■

Obaid and Jamal are measuring the growth of a flower. The table shows the height of the flower over four months. Graph the data, then predict how tall the flower will grow in five months.

1. Choose a scale so that all data can be pictured. Choose an interval to fit the scale.
2. Create titles for the graph and the scales.
3. Plot each point and then connect the points.
4. Extend the graph to predict.

Notice that the plant's height steadily increases. Extend the graph.

If it grows at the same rate, you can predict that the flower will be _____ centimeters tall in July.

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Example 2

The graph shows the weight of a baby bear. Predict how much the bear will weigh after four weeks.

The graph shows that the baby bear's weight has been increasing by _____ kg each week.

What do you predict the baby bear will weigh at 4 weeks? _____

Guided Practice

Use the graph to answer the questions.

1. At what time is the least amount of rain on the ground? _____
2. How much rain is on the ground at 8 P.M.? _____
3. How many more centimeters of rain were on the ground at 8 P.M. than at 6 P.M.?

   _____
4. Describe the trend in the amount of rainfall from this graph.

   _____

   _____

   _____
5. If the rain continues to fall the same amount each hour, how many centimeters of rain will there be at 9 P.M.? _____

Talk MATH

Give an example of a set of data that is best represented in a line graph.

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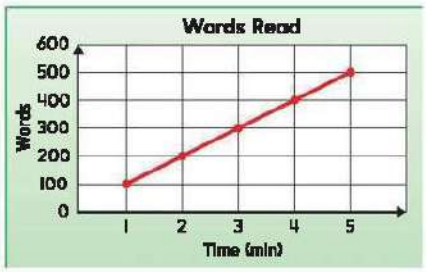
Name _____

Independent Practice

The graph shows the number of words read.



6. How many words were read in 2 minutes? _____

7. How many words were read in 5 minutes? _____

8. At this rate, how many words will be read in 6 minutes? _____

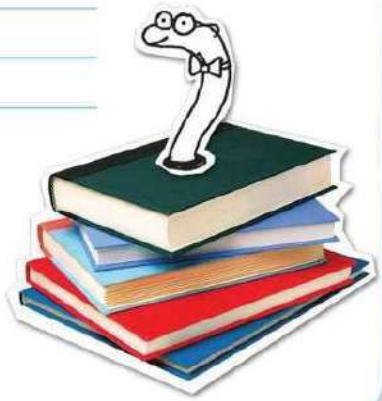
9. Will there be more or fewer than 800 words read at 7 minutes? _____

10. Mathematical Practices 8 **Look for Regularity** Describe the pattern shown in the graph.

_____

_____

_____



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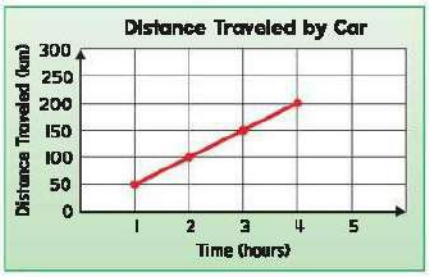
Problem Solving

The graph shows the distance a car travels.



11. How many kilometers did the car travel in two hours? _____

12. What distance did the car travel between two and four hours?

_____

13. A car travels the same number of kilometers each hour. How many kilometers will the car travel in 6 hours? _____

14. About how long would it take to travel 450 km? _____

15. Describe the trend in the number of kilometers traveled each hour. _____

_____

HOT Problems

16. **Mathematical Practices** **Model with Math**

The graph shows the distance a biker travels from home over 6 hours. Describe possible scenarios to explain the data.

_____

_____

_____

_____

17. **Building on the Essential Question** Give an example of a set of data that is best represented in a line graph.

_____

_____

_____

_____

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MY Homework

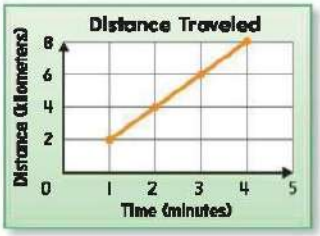
Lesson 5

Analyze Line Graphs

You can use line graphs to predict events.

Homework Helper

The line graph below shows the distance traveled by a car.



1. Choose a scale so that all data can be pictured. Choose an interval to fit the scale.
2. Create titles for the graph and the scales.
3. Plot each point and then connect the points.
4. Extend the graph to predict.

You can predict that the car will travel about 10 km at 5 minutes.

Practice

1. How many kilometers did the car travel in 2 minutes? _____
2. How long did it take the car to travel 8 km? _____
3. Predict how far the car will travel in 10 minutes. _____

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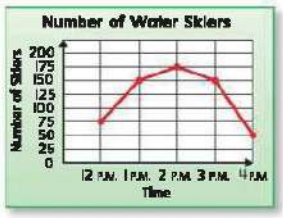
Problem Solving



Use the line graph to answer the questions.

4. At what time were there the most skiers?

5. At which two times were there the same number of skiers?

6. How many more skiers were there at 2 P.M. than at 12 P.M.?

7. Predict whether there will be more or fewer skiers at 5 P.M. than at 3 P.M. Explain.

8. Mathematical Practices 3 **Find the Error** Obaid is a beginning skier. He looks at the graph and decides to practice skiing at noon because that is the time where there are the fewest skiers. Where did Obaid go wrong?

Test Practice

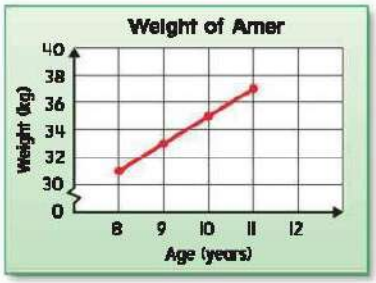
9. Amer's weight is shown on the line graph to the right. At this rate, predict what Amer's weight will be when he is 12 years old.

Ⓐ 36 kg

Ⓑ 40 kg

Ⓒ 50 kg

Ⓓ 45 kg



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Problem-Solving Investigation

STRATEGY: Make a Graph

Lesson 6

ESSENTIAL QUESTION

How can I measure data and display it visually?

Learn the Strategy

The table shows the number of liters of lemonade that were needed at the school picnic in recent years. It also shows the temperature on the day of the picnic.

This year, the amount of lemonade is expected to be 93 L. About how high will the temperature be?

Lemonade (Liters)	Temperature (°C)
91	36
80	15
85	22
95	40
87	25

1 Understand

What facts do you know?

You know the _____ and _____ of lemonade.

What do you need to find?

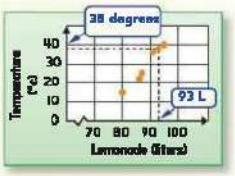
How many _____ will it be today?

2 Plan

I can make a graph of the ordered pairs on a coordinate plane and look for patterns in the data.

3 Solve

As the temperature _____, the number of liters of lemonade _____. Place a dot midway between (91, 36) and (95, 40). The graph shows (93, 38).



So, the temperature _____ °C today.

4 Check

Is my answer reasonable? Explain.

List the temperatures and their respective liters from least to greatest: _____

When the liters of lemonade is between 91 and 95, the temperature is between 36°C and 40°C. The answer is reasonable.

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Practice the Strategy

The table gives the number of gas bubbles per minute made in hot water at a given temperature. What happens when the temperature increases? About how many bubbles per minute will there be at a temperature of 87°C?

Gas Bubbles	Temperature (°C)	72	84	68	80	96	60	76	92	84
	Number	86	165	98	150	210	84	152	221	178

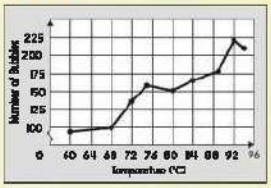
1 Understand

What facts do you know?

What do you need to find?

2 Plan

3 Solve



4 Check

Is my answer reasonable? Explain.

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Name _____

Apply the Strategy

Solve by making a graph.

1. The table lists the number of wins by the teams in Team 1 and Team 2.

Number of Wins	
Team 1	12, 10, 7, 6, 13, 8, 8, 4, 12, 8, 8, 6, 14, 9, 9, 2
Team 2	10, 9, 8, 5, 13, 8, 6, 3, 10, 8, 7, 4, 9, 8, 7, 5

Display the data in a frequency table. Which team seemed to have the better record? Explain your reasoning.

2. The table shows the number of wins the football team had in five seasons. Construct a bar graph of the data.

Football Wins	
Year	Games Won
2015	20
2016	30
2017	25
2018	24
2019	23

In what year did the team have the greatest increase in the number of games won? The greatest decrease? Explain.

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Review the Strategy

3. What are some advantages and disadvantages of showing the data in a graph?

4. What are some advantages and disadvantages of showing the data in a table?

Use the problem about the lemonade at the picnic to answer the following questions.

5. Suppose the amount of lemonade was expected to be 85 L. How high will the temperature be? Explain.

6. One year, the temperature was 45°C. Estimate the amount of lemonade needed that day. Explain.

Use the problem about the gas bubbles to answer the following questions.

7. Suppose the temperature is 65°C. How many times per minute would you expect a gas bubble?

8. Gas bubbles are forming 200 times per minute. About what temperature would you expect it to be?

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MY Homework

Lesson 6
Make a Graph

Homework Helper

Use the data to describe the change in Earth's population from 1750 to 2000.

Earth's Population						
Year	1750	1800	1850	1900	1950	2000
Population (millions)	790	980	1,260	1,650	2,555	6,080

1 Understand

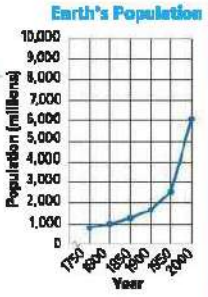
What facts do you know?

- Earth's population between 1750 and 2000

What do you need to find?

- Is population increasing or decreasing?

2 Plan



3 Solve

Earth's population drastically increased from 1750 to 2000.

4 Check

Is my answer reasonable?

The population in 1750 was _____ people. It was _____ people in 2000. The answer is correct.

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Problem Solving

Solve each problem by making a graph.

1. Describe the change in the number of building permits filed in a major city between 2015 and 2020 using the data from the table.

Number of Building Permits Filed in a Major City						
Year	2015	2016	2017	2018	2019	2020
Building Permits Filed	16,000	15,500	13,700	11,000	8,200	5,700

2. Describe the change in the world's remaining rain forests from 1940 to 2010 using the data from the table.

World's Tropical Rainforests								
Year	1940	1950	1960	1970	1980	1990	2000	2010
Remaining Tropical Rainforests (per half-million of hectares)	2,575	2,740	2,600	2,375	2,200	1,300	1,450	825

My Work!

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Check My Progress

The line graph shows the height of a tree.

1. What is the scale of the horizontal axis? _____

2. About how many (meters) did the tree grow between years 1 and 4? _____

3. Describe the growth patterns of the tree. _____

4. About how tall was the tree after $1\frac{1}{2}$ years? _____

Price (AED)	Tally	Frequency
15	||	2
16	|	1
17		0
18	|	1
19	|||	3

5. Which set of data is shown in the frequency table? _____

_____

_____

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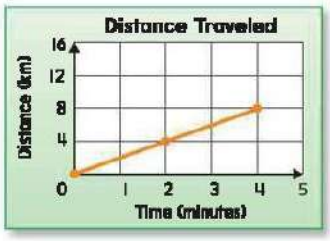
6. The line graph below shows the distance traveled by a car. Predict the distance that the car will travel at 6 minutes. _____



7. Write a real world problem that can be solved by making a graph.

_____

Test Practice

8. According to the tally chart, how many students participated in the survey?

Ⓐ 16 students Ⓒ 18 students

Ⓑ 17 students Ⓓ 19 students

After School Activities	
Activity	Tally
Piano Practice	𝍸 | | |
Football Practice	𝍸 𝍸 | | | |
Book Club	𝍸 𝍸 | |

My Work!

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Name _____

Hands On

Mean

Lesson 7

ESSENTIAL QUESTION

How can I measure data and display it visually?

Model It

For basketball practice, the coach would like to have two teams with the same number of students so that each team has a fair share. Another way of saying fair share is average or mean. There are 6 players on the left side of the gymnasium and 4 players on the right side. How many students should be on each team?

1. Place 6 counters in a cup to represent the players on the left. Place 4 counters in a different cup to represent the players on the right.

2. With your partner, empty the counters onto your desk and find the sum of both sets of counters.

   There are _____ counters total.

3. Divide the total number of counters into two groups. Each team will have 5 students.

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Try It

Determine what the fair share would be for the set of counters.

1. Place counters on plates to represent the sets shown.
2. Empty the counters onto your desk and find the sum of both sets of counters.
3. Divide the total number of counters into two groups.

So, to have a fair share, each group should have _____

Talk About It

1. What was the sum of both sets of counters? _____
2. Explain why you divided the total number of counters into two equal groups. _____
3. How many counters were in each group after dividing the total into two equal groups? _____
4. When the activity was completed, did each team receive their fair share of players? Explain.

_____

_____

_____

5. Explain why both adding and dividing are necessary to find the fair share.

_____

_____

_____

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Name _____

Practice It

Determine what would be the fair share for each set of counters.

1.

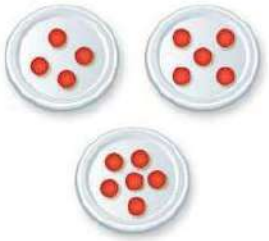
The total number of counters is _____.

A fair share would be _____.

2.

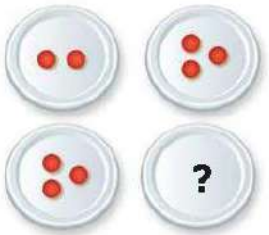
The total number of counters is _____.

A fair share would be _____.

3. 

The total number of counters is _____.

A fair share would be _____.

4. 

If the fair share is 3 counters, how many counters should be on the last plate? _____

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Apply It

5. The table shows the number of coins in each students' cup. What would be the fair share of coins for each student? _____

Student	Number of Coins
Alia	12
Ghaya	11
Fatema	16

6. The number of students in each homeroom is shown in the table. What would be the fair share of students for each homeroom?

_____

Homeroom	Number of Students
5A	22
5B	27
5C	26
5D	25

7. **Mathematical Practices** 2 **Use Reasoning** Refer to the table from Exercise 6. Suppose Homeroom 5E was included and the fair share was now 24 students in each homeroom. How many students are in Homeroom 5E?

_____

8. Give an example of a set of values with a fair share of 7 books.

_____

_____

Write About It

9. **Mathematical Practices** 8 **Repeated Reasoning** Explain why both adding and dividing are necessary to find the fair share.

_____

_____

_____

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Name _____

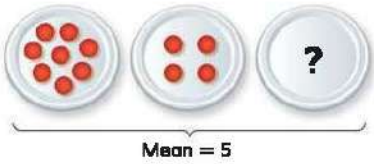
MY Homework

Lesson 7
Hands On: Mean

Homework Helper

Mother has 8 jobs for her two sons. Father adds 4 more. What would be a fair share of the chores for the brothers?

1. Place counters on plates to represent the sets shown.
2. Empty the counters onto your desk and find the sum of both sets of counters.
3. Divide the total number of counters into two groups.



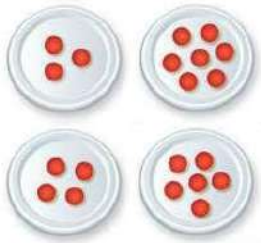
So, to have a fair share, each brother should have 6 chores.

Practice

Find the fair share.

1.

_____

2. 

_____

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Problem Solving

3. There is 4-minute break between classes. What would be a fair share of time if two students want to get a drink of water during the short break?

4. Mom left 15 carrot sticks and dip as an after-school snack for her three daughters. What is a fair share?

5. Mathematical Practices 3 **Analyze and Explain** Noura made a batch of cookies to give to her three friends. There were 18 cookies in the batch. She gave each friend 6 cookies. Did she give them a fair share? Explain.

6. A coach gave a bag of balls to 3 players. One of the bags contained 5 balls. Another had 3, and third bag had 7 balls. How can the players regroup the balls so that each player has a fair share?

Test Practice

7. Find the mean of 43, 25, 46, 17, and 89.

   Ⓐ 220 Ⓒ 44

   Ⓑ 55 Ⓓ 43

8. The manager of a grocery store was scheduling staff to work during a holiday week. He needed to cover 6 hours on Friday, 10 hours on Sunday, and 8 hours on Saturday. How many hours should he assign to his three employees so that each has a fair share?

   Ⓐ 4 Ⓒ 8

   Ⓑ 6 Ⓓ 10

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Name _____

Mean

Lesson 8

ESSENTIAL QUESTION

How can I measure data and display it visually?

Data are pieces of information that are often numerical.
The average of a set of numbers is the mean.

Math in My World

Example 1

The table shows the number of hours 12 athletes exercise per week. Find the mean of the data.

Exercise Hours			
9	5	5	7
5	9	4	4
10	6	8	12

1 Find the sum of the data.

$4 + 4 + 5 + 5 + 5 + 6 + 7 + 8 + 9 + 9 + 10 + 12 =$ _____

2 Divide by the number of pieces of data.

There are _____ pieces of data. Divide by 12.

$84 \div 12 =$ _____

So, the mean number of hours the athletes exercise per week is _____.

Key Concept Mean

The **mean** of a set of data is the sum of the data divided by the number of pieces of data.

$$\frac{1+2+2+3+4+4+5}{7} = \frac{21}{7} \text{ or } 3$$

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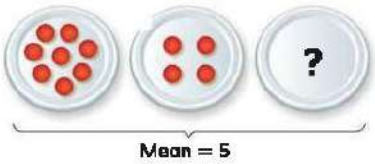
Example 2

The mean of three numbers is 5. Two of the numbers are 8 and 4. Find the missing number.



1. Find the total value of three numbers with a mean of 5.

   $3 \times 5 =$ _____

2. Find the sum of the numbers you know.
   What are the numbers you know? _____

   $8 + 4 = 12$

3. Subtract.
   $15 - 12 =$ _____
   So, the missing number is _____.

Helpful Hint

The mean of a set of data does not have to be one of the values in the set.

Guided Practice

Find the mean of the data set.

1. Cost of snacks: AED 5, AED 5, AED 9, AED 6, AED 10

   The sum of the data is _____.

   The number of pieces of data is _____.

   AED 35 ÷ 5 = _____.

Talk MATH

Look at Exercise 2. How would adding a value of 100 affect the mean? How would adding a value of 36 affect the mean?

2.

Miniature Golf Scores			
70	72	68	72
81	71	74	75

The sum of the data is _____.

The number of pieces of data is _____.

584 ÷ 8 = _____.

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Name _____

Independent Practice

Find the mean of each set of data.

3. Bowling scores: 85, 106, 106, 74, 94 _____

4. Height of trees in meters: 35, 62, 60, 53, 20 _____

5. Number of goals in a football game: 5, 5, 7, 3, 2, 8, 5 _____

6. Kilograms of concrete: 47, 52, 38, 67, 61 _____

7.

Height of Plants (cm)			
49	52	47	52
63	51	54	56

_____

8.

Test Scores			
93	88	85	98
90	96	78	85
92	85	88	90

_____

Find the missing number from a data set when the mean is given.

9. Mean price of a podcast: AED 14; Data set: AED 12, AED 13, AED 18, AED 14, AED 15, ■ _____

10. Mean length of a movie: 94 minutes; Data set: 88, 104, 97, ■ _____

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Problem Solving

11. Maysoun has taken a total of 5 tests, but she only remembers 4 of her scores. They were: 89, 74, 92, and 80. She knows that her mean test score is 79. What is the missing score?

12. **Mathematical Practices** 1 **Understand the Problem** The table shows the number of T-shirts sold each day for two weeks. Find the mean. Then explain how the mean would change if the two data values of 7 were not included.

Number of T-shirts Sold						
32	7	7	38	35	40	29
30	31	45	43	39	44	42

My Work!

HOT Problems

13. Use the newspaper to collect a set of real-world data. Use the mean to describe the data.

14. Write a set of data that has a mean of 14.

15. **Building on the Essential Question** Explain how finding the mean is the same as finding the fair share.

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MY Homework

Lesson 8
Mean

Homework Helper

Data are pieces of information that are often numerical. The average of a set of numbers is the mean.

The fat grams of eleven different food items are shown below. Find the mean.

6, 10, 10, 12, 10, 11, 4, 6, 8, 9, 2

1. Add the numbers together. $6 + 10 + 10 + 12 + 10 + 11 + 4 + 6 + 8 + 9 + 2 = 88$
2. Divide by the number of pieces of data. $88 \div 11 = 8$

The mean is 8.

Key Concept Mean

The **mean** of a set of data is the sum of the data divided by the number of pieces of data.

$$\frac{1+2+2+3+4+4+5}{7} = \frac{21}{7} \text{ or } 3$$

Practice

Find the mean of each data set.

1. Number of laps run: 8, 6, 7, 7, 4, 9, 8 _____
2. Number of minutes played: 14, 21, 18, 18, 12, 7 _____
3. Ages of students: 12, 10, 13, 14, 11, 13, 11 _____

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Problem Solving

Find the mean of each data set.

4.

Basketball Game Scores			
26	16	35	24
21	14	41	7

5.

Number of Stories in a Building			
37	31	16	49
26	25	45	43

6.

Cost of Lunch (AED)		
120	70	85
110	90	125

Use the mean to find the missing number from a data set.

7. Mean number of televisions in a home: 3; Data set: 1, 2, 4, 4, 2, 0, ■

8. Mean number of goals scored by the team 13; Data set: 9, 15, 14, ■

Test Practice

9. Lamya spent 20 minutes on homework on Monday, 20 minutes on Tuesday, 40 minutes on Wednesday, 30 minutes on Thursday, and 0 minutes on Friday. What is the mean number of minutes she spent on homework?

   Ⓐ 27.5 minutes

   Ⓑ 18 minutes

   Ⓒ 22 minutes

   Ⓓ 30 minutes

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Name _____

Median and Mode

Lesson 9

ESSENTIAL QUESTION
How can I measure data and display it visually?

Median and mode are two other ways to describe data. The median of a set of data is the middle number of the data that has been written in order. The mode is the most common value in the set of data.

Math in My World

Example 1

The fifth grade football team had five wins this past year. The table shows the number **of wins in the last 10 years. Find the median of the data. Then describe the data.**

Number of Games Won				
10	5	9	6	5
8	8	5	4	8

1. Order the numbers from least to greatest.

_____

2. The middle two numbers are 6 and 8. The median is the number halfway between them. So, the median is _____.

So, half of these years had fewer than _____ wins per year. Half had more than _____ wins per year.

Key Concept Median

Words The **median** of a set of data is the middle number of the data that has been written in order.

If there is an even number of data, the median is the number exactly halfway between the two middle numbers.

Examples **data:** 2, 4, (5), 7, 11 → **median:** 5

data: 2, 4, (5, 7), 11, 16 → **median:** 6

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Example 2

The cost of a movie popcorn in different theaters is shown below. Find the mode of the data. Then describe the data.

AED 6.00, AED 7.50, AED 7.50, AED 8.00, AED 8.00, AED 8.50, AED 9.75, AED 10.50

The prices AED 7.50 and AED 8.00 each occur twice. So, the modes are _____ and _____. More theaters charge AED 7.50 or AED 8.00 than any other price.

Key Concept Mode

Words	The **mode** of a set of data is the number that occurs most often.
Examples	**data:** 1, 6, 8, 10, 10 → **mode:** 10
	There may be more than one mode.
	data: 1, 6, 6, 8, 10, 10 → **modes:** 6 and 10
	There may not be a mode.
	data: 1, 6, 8, 10 → **mode:** none

Guided Practice

Find the median and mode of each data set.

Talk MATH

Describe the steps for finding the median of a set of data.

1. Number of kilometers biked:

   5, 4, 6, 6, 5, 1, 7, 6, 4, 3, 1, 4, 7, 6

   Put the data in order:

   _____

   The value in the middle of the data is _____.

   The number _____ occurs most often in the data set.

   The median is _____ and the mode is _____.

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Name _____

Independent Practice

Find the median and mode of each set of data.

2. Heights of buildings in meters:
69, 72, 74, 73, 73, 72, 75, 73, 70, 71, 90, 72, 91

_____

3. Centimeters of rain: 7.3, 8.1, 4.2, 7.2, 8.1, 7.3

_____

4. Length of wire in meters: 0.27, 0.15, 1.19, 0.52, 0.50, 0.20, 0.04

_____

5. Liters of water: 207, 198, 187, 201, 178, 200, 196, 201, 197, 204

_____

6. Distance in kilometers: 2, 1, 3, 2, 4, 1, 1

_____

7. Grams of fat: 6, 10, 10, 12, 10, 11, 4, 6, 8, 9, 2

_____

Helpful Hint

The median of a set of data does not have to be one of the values in the set. The mode is always one of the values in the data set.

My Work!

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Problem Solving

8. Several friends were comparing the amount of money in their savings accounts. Use the data in the table to find the median and mode of the data.

Number of Transactions in February			
46	61	38	41
29	55	37	30
48	49	55	62

9. Members of the Historical Society keep track of how many visits they make to the museum. The table shows the number of visits made by the 12 members this year. Find the median and the mode of the data.

Visits to the Museum this Year					
0	3	1	0	2	3
5	2	3	7	0	0

10. The table shows the number of points made by the Middle School football team during nine games. Find the median and mode of the data. Then describe the data.

Number of Points		
3	0	2
2	1	1
1	1	0

My Work!

HOT Problems

11. Use the newspaper to collect a set of real-world data. Find the median and mode and explain what they mean.

12. Write a set of data that has a median of 14 and a mode of 2.

13. **Mathematical Practices** **Look for Structure** Suppose the median weight of the students in your class is 50 kg. What can you conclude about the weights of your classmates? Explain how you know.

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Name _____

MY Homework

Lesson 9
Median and Mode

Homework Helper

The scores of the top eight finishers in a golf tournament are given. Find the median and mode.

Golf Scores			
70	72	68	72
83	71	74	72

1. Order the numbers from least to greatest. 68, 70, 71, 72, 72, 72, 74, 83
2. The middle two numbers are 72. The median is 72.
3. The number that occurs the most often is 72. The mode is 72.

Key Concept Median

Words The **median** of a set of data is the middle number of the data that has been written in order.

If there is an even number of data, the median is the number exactly halfway between the two middle numbers.

Examples **data:** 2, 4, (5), 7, 11 → **median:** 5

data: 2, 4, (5, 7), 11, 16 → **median:** 6

Key Concept Mode

Words The **mode** of a set of data is the number that occurs most often.

Examples **data:** 1, 6, 8, (10, 10) → **mode:** 10

There may be more than one mode.

data: 1, (6, 6), 8, (10, 10) → **modes:** 6 and 10

There may not be a mode.

data: 1, 6, 8, 10 → **mode:** none

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Practice

1. The cost of a video game at eight different stores is shown below. Find the median and mode.

   AED 150, AED 285, AED 175, AED 195, AED 225, AED 230, AED 185, AED 171

Find the median and mode of each set of data.

2. points scored by a basketball team: 55, 67, 55, 98, 85

3. weight of rocks in kilograms: 5, 12, 44, 17, 12

4. bags of flour: 9, 2.5, 4.25, 2.5, 1.75

Problem Solving

5. A data set with three values has a median of 18, a mean of 18, and the greatest data value is 24. What is the least data value?

6. **Mathematical Practices** 3 **Logical Reasoning** The table shows the number of pieces of jewelry that Ayesha sold during several craft fairs. Find the median and mode of the data. Then explain which value she could use to predict how many pieces of jewelry might be sold each day.

Number of Pieces of Jewelry Sold

21	9	13	9	7
12	12	15	9	22
8	25	8	17	11

Vocabulary Check

Write *mean*, *median*, or *mode* on each line.

7. The _____ is the most common value in a set.

8. The middle number in a set of data is called the _____.

9. The _____, or average, of a set of data is the sum of the data divided by the number of pieces of data.

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صوت الجنوب
منتديات

Name _____

Line Plots

Lesson 10

ESSENTIAL QUESTION
How can I measure data and display it visually?

One way to give a picture of the data is to make a line plot. A line plot is a graph that uses Xs above a number line to show the number of times values in a set of data occur.

Math in My World

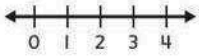
Example 1

Students in the fifth grade class were asked how many after-school activities they have. Their responses are shown in the table. Make a line plot of the data. Then describe the data presented in the graph.

Number of After-School Activities

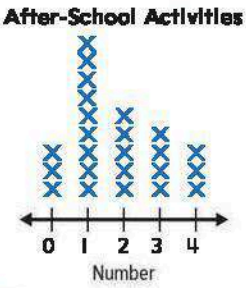
0	2	1	3	3	1
1	1	4	4	0	2
2	1	4	1	3	1
2	3	0	1	2	1

1. Draw and label a number line.



2. Place as many Xs above each number as there are responses for that number.

3. Describe the data.



- How many students responded to the question? _____
- How many students are involved in more than 4 after-school activities? _____
- How many are involved in no after-school activities? _____
- The response given most is _____ after-school activity. This represents the mode.

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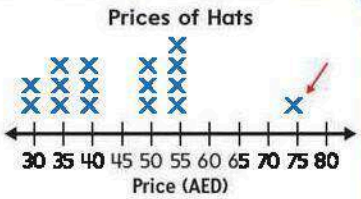
Key Concept Range and Outliers

Words	The **range** of a data set is the difference between the greatest and least values.
Example	**data:** 2, 4, 5, 7, 12 → **range:** 12 − 2 or 10
Words	An **outlier** is a data value that is not close to the other values in a data set.
Example	**data:** 5, 8, 10, 14, 63 → **outlier:** 63

Another way to describe a data set is to use the range and any outliers. A data set with a greater range is more spread out than one with a lesser range.

Math in My World

The line plot shows the prices of hats.



Find the median and the mode of the data. Then use them to describe the data.

There are _____ numbers represented in the line plot. The median is between the _____ and _____ pieces of data.

The two middle numbers, shown on the line plot, are _____ and _____. So, the median is _____. This means that half of the hats cost _____ AED 45 and half cost _____ AED 45.

The number that appears most often is _____. So, the mode of the data is _____. This means that more hats cost _____ than any other price.

Find the range and any outliers of the data. Then describe the data using them.

Range = greatest value − least value

Range = 75 − 30

Range = 45

The range of the prices is _____. The price AED 75 is much higher than the rest of the prices. So, _____ is an outlier.

Talk MATH

What are the advantages of representing data in a line plot rather than in a table?

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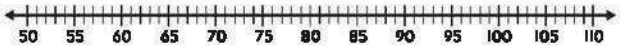
Name _____

Guided Practice

1. Draw a line plot for the set of data. Then find the median, mode, range, and any outliers of the data shown in the line plot.

Number of Stories of 15 Tallest Buildings		
101	88	88
110	88	88
80	69	102
78	70	54
85	80	73

Number of Stories of 15 Tallest Buildings



There are _____ data values.

The middle value, the median, is _____.

The most common value, the mode, is _____.

The highest value is _____, and the lowest value is _____. So the range is _____.

One value is much lower than the rest of the data set.

It is the outlier: _____.

Helpful Hint

You can find the median by counting the Xs on the graph. You do not have to list all of the data values. Alternately cross off a least and greatest value until you reech the middle.

Independent Practice

Draw a line plot for each set of data. Find the median, mode, range, and any outliers of the data shown in the line plot.

2. Length of summer camps in days:
7, 7, 14, 10, 5, 10, 5, 7, 10, 9, 7, 9, 6, 10, 5, 7, and 8.

_____

_____

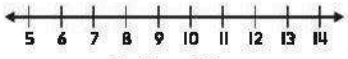
3. Students' estimates of room length:

_____

_____

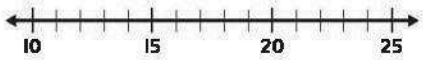
Students' Estimates of Room Length (m)				
10	11	12	12	13
13	13	14	14	14
15	15	15	15	15
16	16	16	17	17
17	17	18	18	25

Length of Summer Camps



Number of Days

Students' Estimates of Room Length



Estimate (m)

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Problem Solving

A softball team scored 14, 9, 6, 11, and 8 runs in their last five games. How many runs would the team need to score in the next game so that each statement is true?

4. The range is 10. _____

5. The mode is 11. _____

6. The median is 9. _____

The table shows the years in which different machines were invented.

Year	Machine Invented
1876	Telephone
1885	Bicycle
1927	Television
1933	FM radio
1994	DVDs

7. What is the range of the years of the inventions?

_____

8. Which machine was invented in the median year?

_____

HOT Problems

9. Mathematical Practices 2 **Logical Reasoning** There are several sizes of flying disks in a collection. The range is 8 cm. The median is 22 cm. The smallest size is 16 cm. What is the largest disk in the collection? _____

10. **Building on the Essential Question** Suppose two sets of data have the same median but different ranges. What can you conclude about the set?

_____

_____

_____

My Work!

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Name .....

MY Homework

Lesson 10

Line Plots

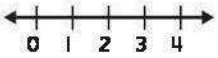
Homework Helper

One way to give a picture of the data is to make a line plot. A line plot is a graph that uses Xs above a number line to show the number of times values in a set of data occur.

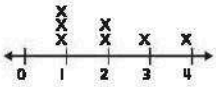
Example 1

The students in the science club need to collect items from the store. When asked how many kilometers they each live from the store, the students gave these responses: 2, 1, 3, 1, 2, 4, 1. Make a line plot, and then describe the data.

1. Draw and label a number line.



2. Place as many Xs above each number as there are responses for the number.



3. Describe the data.

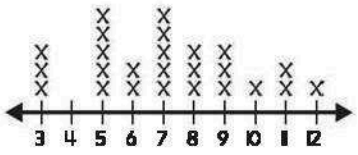
- Seven students responded to the question.
- No one lives more than four kilometers from the store.
- Three students live one kilometer from the store.

Practice

Write the division expression shown by each model. Then divide.

1. Describe the data from the line plot shown, using the terms *median*, *mode*, *range*, and *outlier*.

Sum of Two Number Cubes



Sum

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Problem Solving

Draw a line plot and find the median, mode, range, and any outliers of the data shown in the line plot.

2.

Student Attendance			
52	48	52	51
52	65	58	48
60	45	50	52
56	48	53	58
62	49	51	49

3.

Number of Podcasts on Mobile Phones				
25	50	40	40	42
50	39	39	42	36
38	42	40	45	38

4. **Mathematical Practices** 1 **Understand the Problem** Write a survey question that has a numerical answer. An example is "How many hours do you sleep each night?" Ask your friends and family the question. Record the results and organize the data in a line plot. Use the line plot to make conclusions about your data. For example, describe the data using the mean, median, mode, or range.

My Work!

Vocabulary Check

Circle the correct term that makes the sentence true.

5. The most common value in a set of data is the (mode, outlier).

6. The (median, range) is the difference between the highest and lowest values in a set of data.

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Name _____

Hands On:
Stem-and-Leaf Plots

Lesson 11

ESSENTIAL QUESTION
How can I measure data and display it visually?

In a **stem-and-leaf plot,** the data are ordered from the least to greatest and organized by place value. The digits of the least place-value position form the **leaves.** The next higher place-value digits form the **stems.**

Plot It

A dealership kept track of the number of cars sold each day for several weeks. Construct a stem-and-leaf plot of the data.

Cars Sold						
35	21	14	32	25	10	5
27	12	33	20	45	21	31
17	24	21	27	2	3	7

1. Order the data from least to greatest.

2. Draw a vertical line and write the tens digits from least to greatest to the left of the line. These digits form the stems. Since the least value is 2 and the greatest value is 45, the stems are 0, 1, 2, 3, and 4.

3. Write the ones digits in order to the right of the line with the corresponding stem. These digits form the leaves.

Cars Sold

Stem	Leaf
0	2 3 5 7
1	0 2 4 7
2	0 1 1 1 4 4 7 7
3	1 2 3 5
4	5

In these data, the tens digits form the stems.

Write each leaf, even if it repeats.

The ones digits of the data form the leaves.

2 | 7 = 27 cars sold

4. Which stem had the most leaves? _____
Which had the fewest? _____

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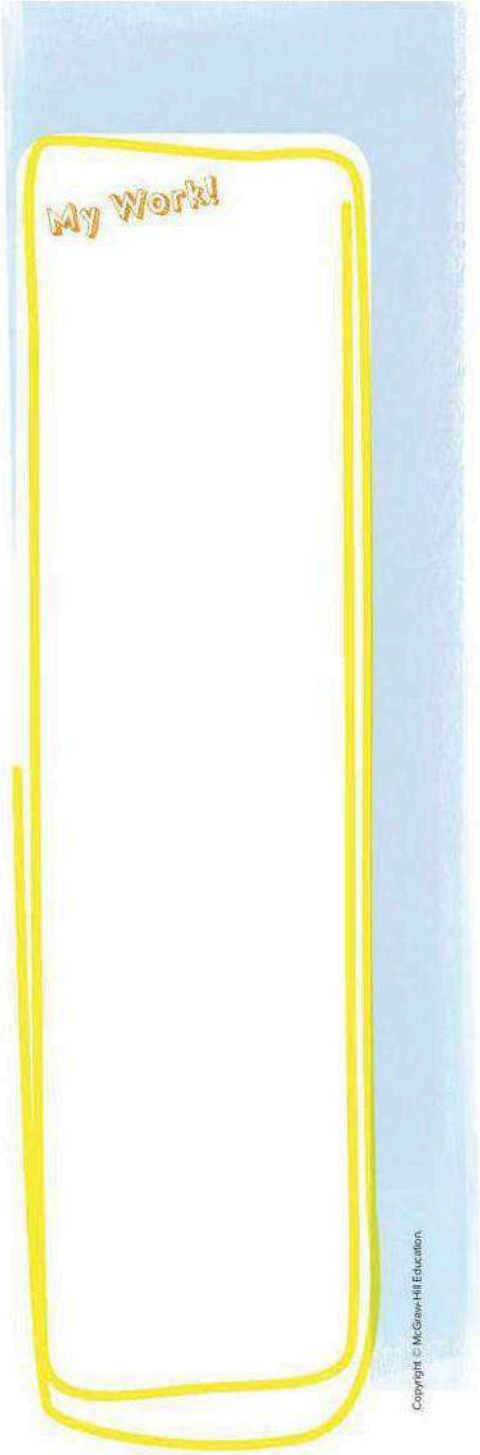
Try It

Display the set of data in a stem-and-leaf plot.

Bus Ride (min)					
24	14	25	28	47	13
17	30	35	16	39	9

1. Order the data from least to greatest.
2. Draw a vertical line and write the tens digits from least to greatest on the left of the line to form the stems.
3. Write the ones digits in order to the right of the line with the corresponding stem to form the leaves.

Include a key that explains the stems and leaves.



Talk About It

1. Describe an advantage of displaying a set of data in a stem-and-leaf plot instead of a bar or a line graph.

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Name _____

Practice It

Display each set of data in a stem-and-leaf plot. Then compare the median and range.

2.

Water Temperatures (°F)				
104	97	89	101	110
111	101	99	113	88
105	96	108	106	98

My Work!

3.

Quiz Scores (%)				
73	97	95	75	90
83	84	70	89	87
78	71	85	83	92
100	95	93	79	86

My Work!

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Apply It

4. Refer to the stem-and-leaf plot below.

Ages of Player on Professional Teams

Stem	Leaf
2	1 2 3 3 4 4 5 5 5 5 6 7 7 8 9 9
3	0 1 1 2 2 3 4 5 6 7 8 9
4	0 1

2 | 3 = 23 years

a. How many players are there on the team?

b. What was the age of the youngest player?

c. What is the range of the ages of the players?

d. Based on the data, can you conclude that the majority of the players were 20–29 years old? Explain your reasoning.

Write About It

5. **Mathematical Practices** 4 **Model with Mathematics** Collect data about students in your class. Display the data in a stem-and-leaf plot. Then analyze the stem-and-leaf plot to draw conclusions about the data.

My Work!

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Name _____

MY Homework

Lesson 11

Hands On: Stem-and-Leaf Plots

Homework Helper

Adnan is keeping track of his video game scores over several weeks. Construct a stem-and-leaf plot of the data. Then compare the median and range.

Video Game Scores							
53	64	15	22	16	42	12	38
68	63	23	35	30	33	34	35

1. Order the data from least to greatest.

2. Draw a vertical line and write the tens digits from least to greatest on the left of the line to form the stems.

3. Write the ones digits in order to the right of the line with the corresponding stem to form the leaves.

4. Include a key that explains the stems and leaves. The median for the video game scores is 34.5 points. The range is 56 points.

Video Game Scores

Stem	Leaf
1	2 5 6
2	2 3
3	0 3 4 5 6 8
4	2
5	3
6	3

4 | 2 = 42 points

Problem Solving

1. Display the set of data in a stem-and-leaf plot. Then compare the median and range.

Number of Points Scored			
35	35	43	21
45	35	21	24
34	35	21	

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2. Use the stem-and-leaf plot that shows the costs of various devices at an electronics store.

Cost of Touch-Screen Device (AED)

Stem	Leaf
18	3 8 9
19	7 9 9 9
20	0 5 5
21	4 5 7 8 9
22	1 6 8 9 9

19 | 9 = AED 199

a. What is the range of the prices? _____

b. Find the mean, median, and mode of the data.

_____

c. If an additional device costs AED 230, would the mean, median, or mode be most affected? Explain.

_____

_____

_____

3. **Mathematical Practices** 4 **Model with Math** The scores for 10 gymnasts in a gymnastics event are 9.3, 10.0, 9.9, 8.9, 8.7, 9.0, 8.7, 8.5, 8.8, and 9.3. Display a stem-and-leaf plot of the data. Then analyze the stem-and-leaf plot to draw two conclusions about the data.

My Work!

_____

_____

Test Practice

4. What is the outlier?

Ⓐ 52 Ⓒ 71

Ⓑ 65 Ⓓ 102

Points Scored

Stem	Leaf
5	2 2 3 5 6 9
6	1 3 5 5 5 7 8 8
7	1 3 4 4
10	2

5 | 2 = 52

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Review

Chapter 12

Data

Vocabulary Check

Use the word bank below to complete the definitions below.

survey	**frequency table**	**line**	**line graph**
median	**stem-and-leaf plot**	**range**	**mean**
data	**mode**	**double line graph**	**outlier**

1. The middle value in a set of ordered data. _____
2. A graph in which data are ordered from least to greatest and organized by place value. _____
3. The difference between the greatest and the least values in a set of data. _____
4. A number in a set of data that is much larger or smaller than most of the other numbers in the set. _____
5. A graph that uses points connected the line segments to show changes in data over time. _____
6. A graphical representation used to display two different sets of data. _____
7. A plot uses columns of Xs above a number line to show frequency of data. _____
8. The number that occurs most often in a set of data. _____
9. Numbers or symbols that illustrate information. _____
10. The sum of the numbers in a set of data divided by the number of pieces of data. _____
11. A table for organizing a set of data that shows the number of times each result has occurred. _____
12. A method of collecting data. _____

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Concept Check

1. Use the data to create a frequency table.

Band Students' Favorite Instruments			
clarinet	flute	flute	trumpet
trombone	trumpet	drum	drum
drum	trombone	trumpet	drum

Band Students' Favorite Instruments		
Instrument	Tally	Frequency
clarinet		
drum		
flute		
trumpet		
trombone		

2. Use the data to create a line graph to show the temperature of a pot of water.

Water Temperature	
Time (min)	Temperature (°C)
1	84
2	82
3	80
4	78

3. Use your line graph to make a prediction about the temperature of the water in the pot after 5 minutes. _____

Fatema took a survey to see how many kilometers from school her classmates lived. Here are the results: 5, 7, 8, 10, 2, 2, 6, 4, 5, and 11. Use the data to answer the questions.

4. What is the mean of the distances? _____

5. What is the mode of the distances?

_____

6. What is the median of the distances? _____

7. What is the range of the distances? _____

8. Is there an outlier? If so, what is it? _____

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Name

Problem

The ages of **the stud**
the table **below. Use**
questions.

Group Membe	
8	13
18	10
13	9
11	12

9. What is the mean

10. What is the medi

11. What is the mode

12. What is the range

13. Is there an outlie

14. Draw a line plot t

Test Practic

15. Choose the cor
sentence: It is p
_____ in a se

Ⓐ mean
Ⓑ median
Ⓒ mode
Ⓓ range

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Reflect

Chapter 12

Answering the ESSENTIAL QUESTION

Use what you learned about data to complete the graphic organizer.

ESSENTIAL QUESTION

How can I measure data and display it visually?

Measure Data

Vocabulary

data, survey, mean, median, mode, range, outlier

Examples

Display Data

Vocabulary

frequency table, line graph, double line graph, line plot, stem-and-leaf plot

Examples

Now reflect on the ESSENTIAL QUESTION. Write your answer below.

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Chapter

13 Geometry

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

Let's Travel!

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Name _____

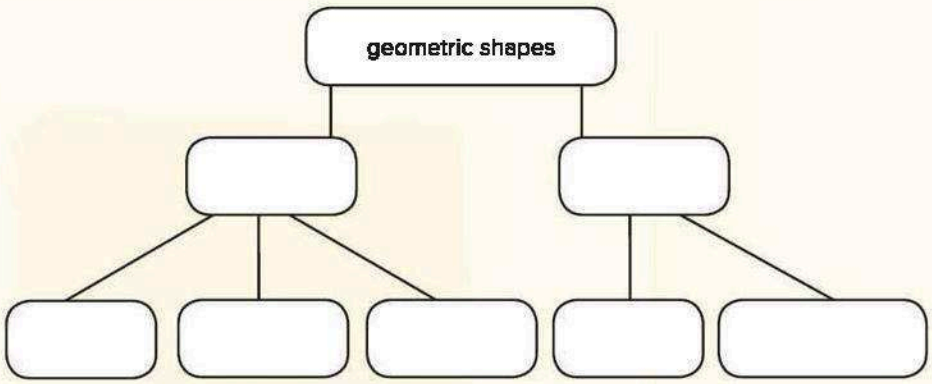
MY Math Words

Review Vocabulary

acute angle	angles	lines	obtuse angle
parallel	perpendicular	right angle	

Making Connections

Use the review words to classify geometric shapes.



Draw an example of two of the words used above.

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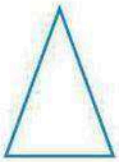
MY Vocabulary Cards

Mathematical Practices

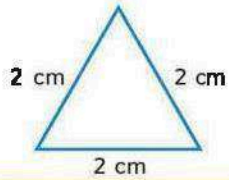
Lesson 13-3

acute triangle



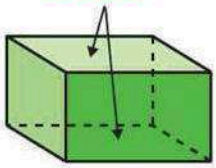
Lesson 13-3

attribute



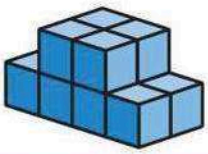
Lesson 13-8

bases



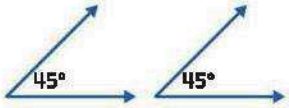
Lesson 13-11

composite figures



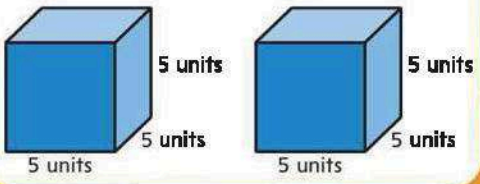
Lesson 13-1

congruent angles



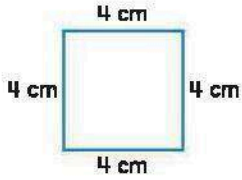
Lesson 13-7

congruent figures



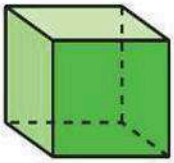
Lesson 13-1

congruent sides



Lesson 13-7

cube



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Ideas for Use

- Design a crossword puzzle. Use the definition for each word as the clues.
- Group 2 or 3 common words. Add a word that is unrelated to the group. Then work with a friend to name the unrelated word.

A characteristic of a figure.

Use *attribute* to describe the sides or angles of a rectangle.

A triangle with 3 acute angles.

Explain how to determine if a triangle is an acute triangle.

A figure that is made of two or more three-dimensional figures.

Composite comes from *compose*, "to put together." How does this help you understand a composite figure?

Two parallel congruent faces in a prism.

Describe the *base* of a rectangular prism.

Two figures that have the same size and shape.

Draw 2 congruent figures in the space below.

Angles of a figure that are equal in measure.

Draw an example of a figure with congruent angles. Then draw a non-example. Cross out the non-example.

A three-dimensional figure with six faces that are congruent squares.

What does *cube* mean when it is used as a verb?

Sides of a figure that are equal in length.

Draw two figures that each have at least two congruent sides.

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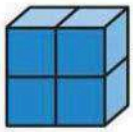
MY Vocabulary Cards

Mathematical Practices

Lesson 13-9

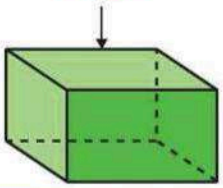
cubic unit



4 cubic units

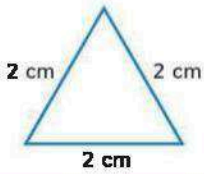
Lesson 13-8

edge



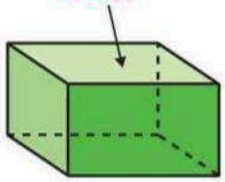
Lesson 13-3

equilateral triangle



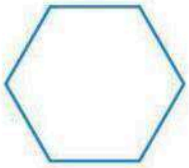
Lesson 13-7

face



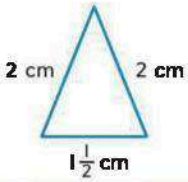
Lesson 13-1

hexagon



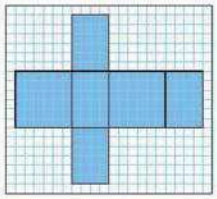
Lesson 13-3

isosceles triangle



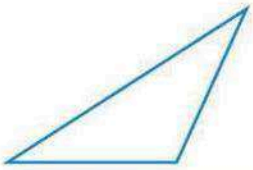
Lesson 13-7

net



Lesson 13-3

obtuse triangle



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Ideas for Use

- Write a tally mark on each card every time you read the word in this chapter or use it in your writing. Challenge yourself to use at least 10 tally marks for each word card.
- Draw or write additional examples for each card. Be sure your examples are different from what is on the front of the card.

The line segment where two faces of a three-dimensional figure meet.

Describe a real-world example of an edge.

The unit of measure for volume.

Name three other units of measurement in math and what they measure.

A flat surface.

Read and solve this riddle: I am a triangular prism. I have nine edges and six vertices. How many faces do I have?

A triangle with three congruent sides.

The prefix *equi-* means "equal." *Lat* is a Latin root meaning "side." Explain how these word parts can help you remember this definition.

A triangle with at least two congruent sides.

Draw an example of an isosceles triangle.

A polygon with six sides and six angles.

How are hexagons a subcatergory of polygons?

A triangle with 1 obtuse angle and 2 acute angles.

Compare a right triangle to an obtuse triangle. Use the space below to draw your comparison.

A two-dimensional pattern of a three-dimensional figure.

What does net mean in this sentence? *The football player's hand became tangled in the goal's net.*

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MY Vocabulary Cards

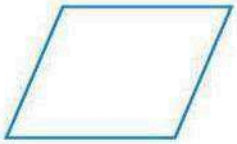
Mathematical Practices

Lesson 13-1

octagon

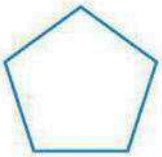
Lesson 13-5

parallelogram



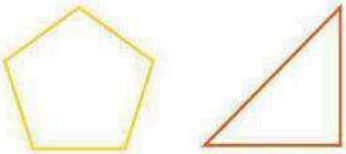
Lesson 13-1

pentagon



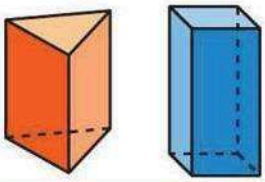
Lesson 13-1

polygon



Lesson 13-7

prism

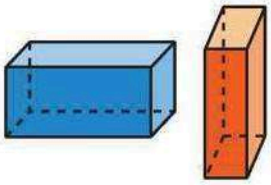


Lesson 13-5

rectangle

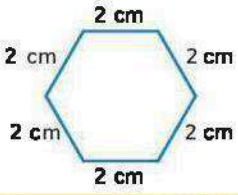
Lesson 13-6

rectangular prism



Lesson 13-1

regular polygon



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Ideas for Use

- Develop categories for the words. Sort them by category. Ask another student to guess each category.
- Draw or write examples for each card. Be sure your examples are different from what is shown on each card.

A quadrilateral in which each pair of opposite sides is parallel and congruent.

How does *parallel* help you remember the meaning of *parallelogram*?

A polygon with eight sides.

Okto is a Greek root meaning "eight." How can this help you remember this vocabulary word?

A closed figure made up of line segments that do not cross each other.

Explain why a circle is not a polygon.

A polygon with five sides.

How can the Pentagon, a government building in Washington, D.C., help you remember pentagon?

A quadrilateral with four right angles; opposite sides are equal and parallel.

Compare a rectangle with a square.

A three-dimensional figure with two parallel, congruent faces, called bases. At least three faces are rectangles.

Look at the orange prism on the front of the card. What shape are its bases?

A polygon in which all sides and angles are congruent.

What is one way to determine if a polygon is regular?

A prism that has rectangular bases.

Describe the faces of any rectangular prism.

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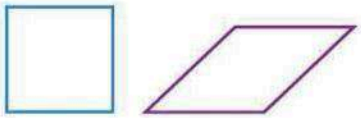
MY Vocabulary Cards

Mathematical Practices

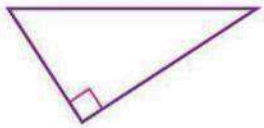
Lesson 13-5

rhombus



Lesson 13-3

right triangle

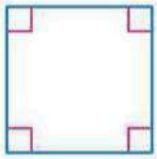


Lesson 13-3

scalene triangle

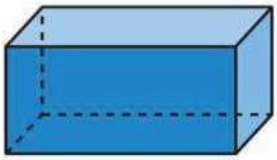
Lesson 13-5

square



Lesson 13-7

three-dimensional figure

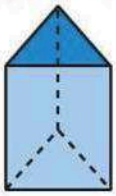


Lesson 13-5

trapezoid

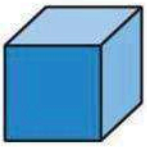
Lesson 13-8

triangular prism



Lesson 13-9

unit cube



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Ideas for Use

- Practice your penmanship! Write each word in cursive.
- Sort cards so that only polygons are displayed. Explain your sorting to a partner.

A triangle with 1 right angle and 2 acute angles.

Is it possible for a right triangle to have more than one right angle? Explain.

A parallelogram with four congruent sides.

Explain whether a rectangle is a rhombus.

A parallelogram with four congruent sides and four right angles.

Is a square also a rectangle? Explain.

A triangles with no congruent sides.

Draw a scalene triangle below.

A quadrilateral with exactly one pair of opposite sides parallel.

Draw a picture of two quadrilaterals—one that is a trapezoid and one that is not.

A figure that has length, width, and height.

Write a tip to help you remember the number of dimensions for *three-dimensional figures*.

A cube with a side length of one unit.

Draw a rectangular prism below that has a volume of 8 unit cubes.

A prism that has triangular bases.

Describe the bases of any triangular prism.

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Name _____

Polygons

Lesson 1

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

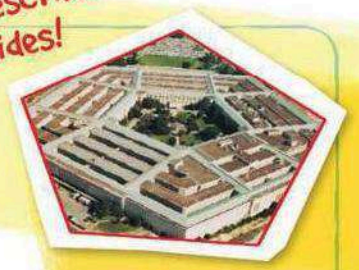
A **polygon** is a closed figure made up of line segments that do not cross each other.

Polygons

Not Polygons

Math in My World

Describe my sides!



Example 1

Describe the sides of the figure formed by the red outline. Does the red outline form a polygon?

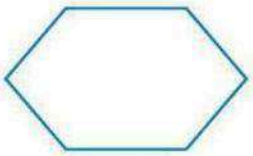
The figure has _____ sides.

Do the sides ever cross each other? _____
The figure is a polygon.

A **regular polygon** is a polygon with congruent sides and congruent angles. **Congruent sides** are equal in length. **Congruent angles** have the same degree measure.

Example 2

Determine if the polygon appears to be *regular* or *not regular*.



The top and bottom sides appear _____ than the other sides.

Are all six sides of the polygon congruent? _____

It is _____ regular.

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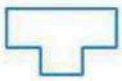
Polygons are a subcategory of two-dimensional figures. A *subcategory* is a subdivision that has common characteristics within a larger category.

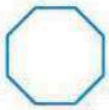
Example 3

Complete the table below.

Polygon	Regular	Not Regular	Number of Sides	Draw another polygon that is not regular.
Triangle				
Quadrilateral				
Pentagon				
Hexagon				
Octagon				

Guided Practice

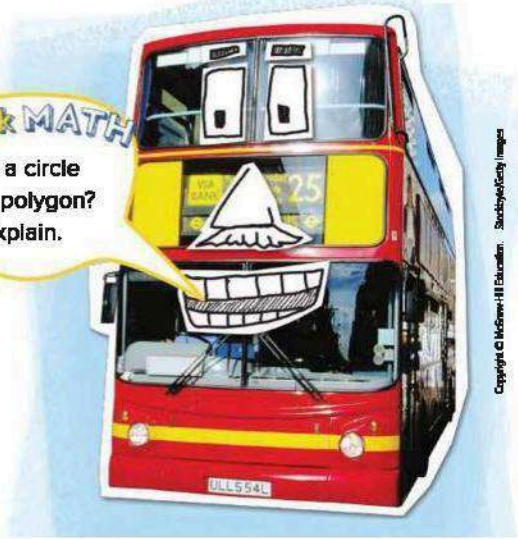
1. Name the polygon. Determine if it appears to be *regular* or *not regular*.



The polygon has _____ sides.

The sides appear to be _____.

It is a _____.



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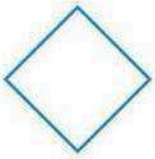
Name _____

Independent Practice

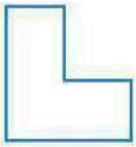
Mathematical Practices 7 **Identify Structure** Name each polygon. Determine if it appears to be *regular* or *not regular*.

2.



_____

3.

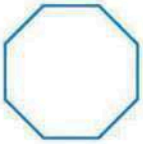


_____

4.

_____

5.



_____

Draw each polygon.

6. triangle; not regular

7. pentagon; not regular

8. quadrilateral; not regular

9. triangle; regular

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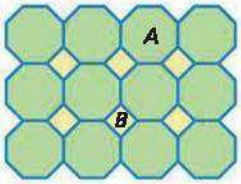
Problem Solving

10. What polygons make up the design?



11. Describe polygon B as *regular* or *not regular*.

For Exercises 12 and 13, use the map shown at the right.

12. Circle the polygon that is a quadrilateral.

13. Describe polygon C as *regular* or *not regular*.

HOT Problems

14. **Mathematical Practices** **Make Sense of Problems** Explain why every square is a regular polygon.

15. **Building on the Essential Question** How can polygons be considered a subcategory of two-dimensional figures?

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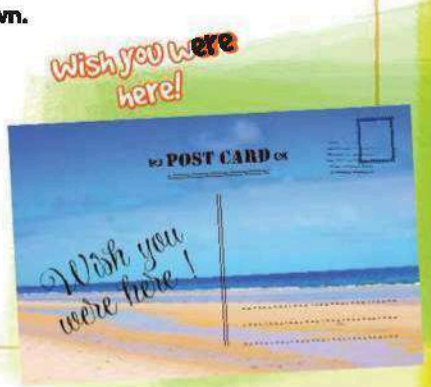
Name _____

MY Homework

Lesson 1
Polygons

Homework Helper

Name the polygon used to form the greeting card shown. Does the red outline appear to be a regular polygon?



The polygon has four sides.

The top and bottom sides appear to be slightly longer than the other sides.

It is a quadrilateral.

It is not regular.

Practice

Name each polygon. Determine if it appears to be *regular* or *not regular*.

1.

_____

2.

_____

Vocabulary Check

Fill in each blank with the correct word(s) to complete each sentence.

3. A polygon is a _____ figure made up of line segments that do not cross each other.

4. A regular polygon is a polygon with _____ sides and _____ angles.

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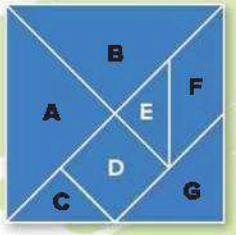
Problem Solving

For Exercises 5–7, use the tangram pieces shown at the right.



5. Which of the polygon(s) appear to be regular?

6. What polygons are represented in the tangrams?

7. Congruent figures have the same size and shape. Which polygons appear to be congruent?

8. Name the polygon used to form the front of the tent shown. Determine if it appears to be *regular* or *not regular*.

9. Mathematical Practices 1 **Make Sense of Problems**
Explain why the figure is not a polygon.

Test Practice

10. Which of the following figures is a polygon?

Ⓐ
Ⓑ
Ⓒ
Ⓓ

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Name _____

Hands On
Sides and Angles of Triangles

Lesson 2

ESSENTIAL QUESTION

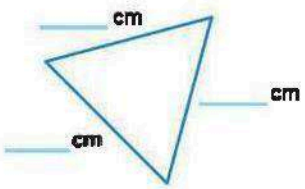
How does geometry help me solve problems in everyday life?

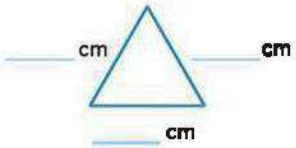
A triangle is a polygon with three sides and three angles.

Measure It

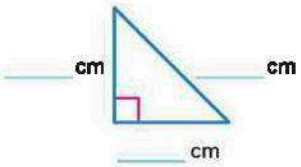
Measure the sides of each pair of triangles below to the nearest tenth of a centimeter. Then record the measures.

Pair A

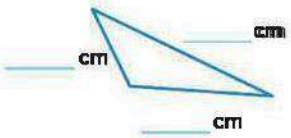


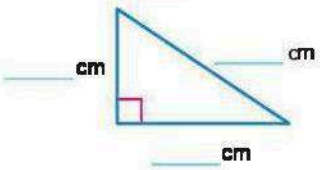


Pair B



Pair C





Cut and use this centimeter ruler.

Talk About It

1. Compare the side lengths of each pair of triangles above. What do you notice?

_____

_____

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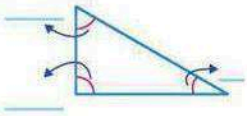
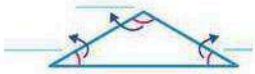
Try It

Measure the angles of each p
degree. Then record the mea





Talk About It

2. Compare the angle measu
What do you notice?

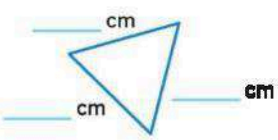
3. **Mathematical Practices** 1 **Mak**
triangle is a special kind o

Name _____

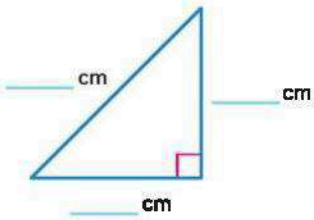
Practice It

Measure the sides of each triangle to the nearest tenth of a centimeter. Then describe the number of congruent sides.

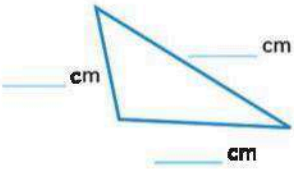
4.



5.



6.

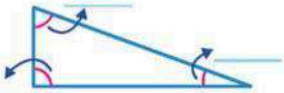


7.

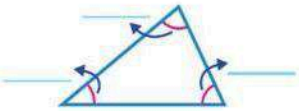
Measure the angles of each triangle to the nearest degree. Then describe the number of acute, right, or obtuse angles.

8.

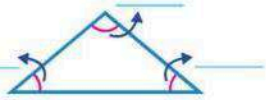
9.



10.



11.



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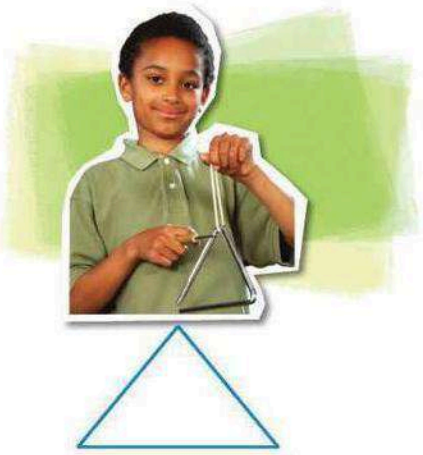
Apply It



12. In music, the "triangle" is an instrument with three congruent sides. If you know that the perimeter of the triangle is 36 cm, what is the measure of one side?

13. Mathematical Practices 5 **Use Math Tools** Measure the angles in the triangle shown. What type(s) of angles are in the triangle shown?

14. Refer to Exercise 13. Measure the sides of the triangle. Then describe the number of congruent sides.

15. Mathematical Practices 3 **Which One Doesn't Belong?** Circle the triangle that does not belong with the other three. Explain your reasoning.

Write About It

16. How are all triangles the same and how can they be different?

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Name _____

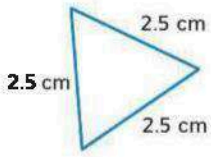
MY Homework

Lesson 2

Hands On: Sides and Angles of Triangles

Homework Helper

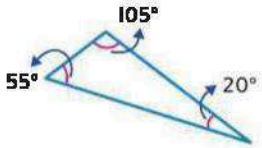
Measure the sides of each triangle to the nearest tenth of a centimeter. Then describe the number of congruent sides.



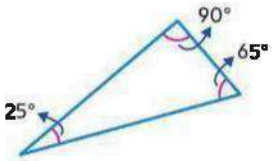
The triangle has 3 congruent sides.

The triangle has 2 congruent sides.

Measure the angles of each triangle to the nearest degree. Then describe the number of acute, right, or obtuse angles.



The triangle has 1 obtuse angle and 2 acute angles.



The triangle has 1 right angle and 2 acute angles.

Practice

Measure the sides of each triangle to the nearest tenth of a centimeter. Then describe the number of congruent sides.

1. _____ cm _____ cm

_____ cm

_____

_____

2. _____ cm

_____ cm _____ cm

_____

_____

Cut and use this centimeter ruler.

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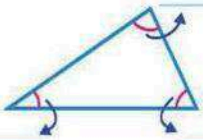
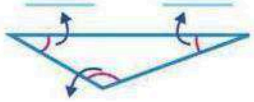
Measure the angles of each triangle to the nearest degree. Then describe the number of acute, right, or obtuse angles.

3.

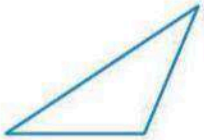


4.



Problem Solving

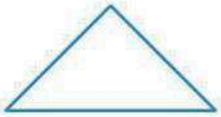
5. Measure the sides of the triangle shown. How many sides of the triangle are congruent?



6. Refer to the triangle in Exercise 5. Measure the angles of the triangle shown. How many angles of the triangle are congruent?

7. In billiards, a rack is used to organize billiard balls at the beginning of the game. Jassim is making the wood rack and found that each angle is congruent and that the sum of the angles is 180°. What is the measure of each angle?

8. Measure each angle of the triangle. How many acute angles does the triangle have?



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Name _____

Classify Triangles

Lesson 3

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

You can classify triangles using one or more of the following attributes. An **attribute** is a characteristic of a figure like side measures and angle measures.

Math in My World

Example 1

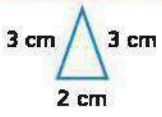
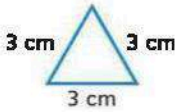
Hareb's family traveled from Columbus, Ohio, to Dallas, Texas, and then to Atlanta, Georgia, before returning home. The distance of each flight is shown on the map. Find the number of congruent sides.

The lengths of the sides of the triangle are

1480 km, 719 km, and _____ km.

How many sides of the triangle are congruent? _____

Key Concept Classify Triangles by Sides

Isosceles Triangle	Equilateral Triangle	Scalene Triangle
		
at least two sides congruent	all sides congruent	no sides congruent

So, the triangle formed on the map in Example 1 is a

_____ triangle.

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Example 2

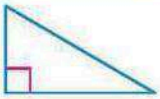
Triangles form the sides of the Khafre Pyramid in Egypt. Determine the number of acute, obtuse, or right angles in the triangle.

How many angles of the triangle are acute? _____

How many angles of the triangle are obtuse? _____

How many angles of the triangle are right? _____

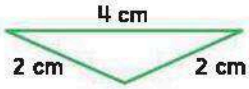
Key Concept Classify Triangles by Angles

Acute Triangle	Right Triangle	Obtuse Triangle
		
3 acute angles	1 right angle, 2 acute angles	1 obtuse angle, 2 acute angles

So, the triangle in Example 2 is a(n) _____.

Guided Practice

1. Classify the triangle based on its sides.

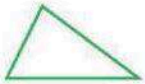


How many sides of the triangle are congruent?

_____

The triangle is a(n) _____.

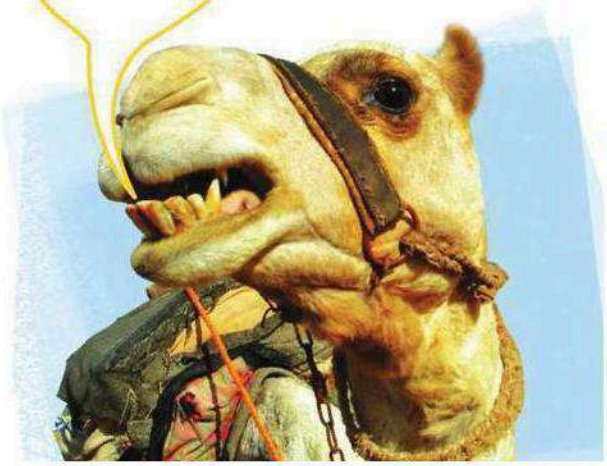
2. Classify the triangle based on its angles.



The triangle is a(n) _____.

Talk MATH

Describe an isosceles right triangle.



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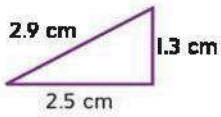
Name _____

Independent Practice

Determine the number of congruent sides for each triangle. Then classify the triangle based on its sides.

3.



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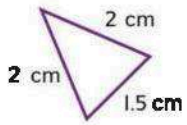
4.



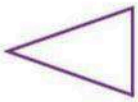
_____

Classify each triangle based on its angles.

5.

_____

6.



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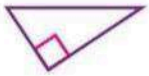
7.



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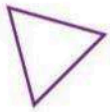

_____

Draw each triangle.

9. equilateral triangle

10. right triangle

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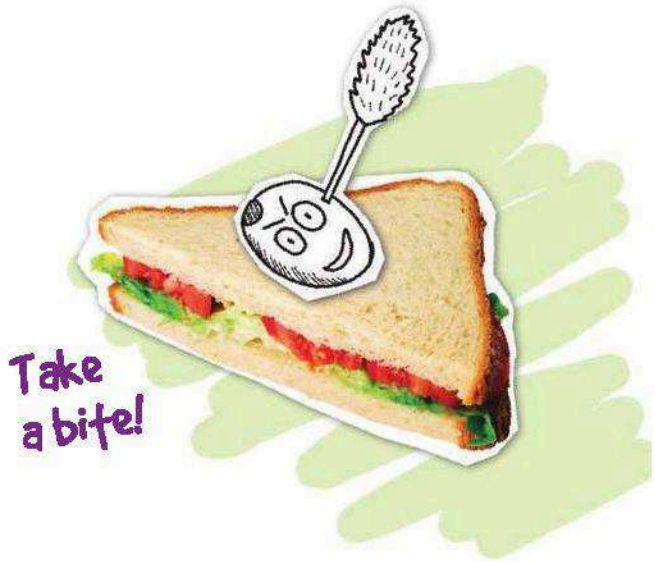
Problem Solving

11. Half of a rectangular sandwich looks like a triangle. Classify it based on its angles.



12. **Mathematical Practices 7** **Identify Structure** Measure the sides of the sandwich. Classify the triangle based on its sides.

HOT Problems

13. **Mathematical Practices 3** **Draw a Conclusion** Hamad, Ibrahim, Ahmed, and Husam each drew a different triangle. Use the clues below to describe each person's triangle as isosceles, equilateral, or scalene and also as acute, right, or obtuse.

- Ibrahim and Ahmed each drew a 90° angle in their triangles.
- Ibrahim's triangle does not have any congruent sides.
- One angle in Hamad's triangle measures greater than 90°.
- Each side of Husam's triangle and two sides of Hamad's and Ahmed's triangles are four centimeters long.

14. **Building on the Essential Question** How do I classify triangles using their attributes?

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Name _____

MY Homework

Lesson 3
Classify Triangles

Homework Helper

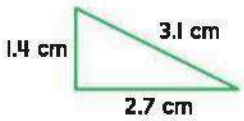
There is a large pyramid standing in front of the Louvre museum in Paris, France. The sides of the pyramid are shaped like triangles. Classify the red triangle based on its angles.

There are three acute angles.

So, the triangle formed by the side of the pyramid is an acute triangle.

Practice

1. Determine the number of congruent sides. Then classify the triangle based on its sides.



How many sides of the triangle are congruent?

_____

The triangle is a _____.

Vocabulary Check

Fill in each blank with the correct term(s) or number(s) to complete each sentence.

2. An equilateral triangle is a triangle with _____ congruent sides.

3. An acute triangle is a triangle with _____ angles each less than _____.

4. An obtuse triangle is a triangle with one angle that is greater than _____.

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Problem Solving

5. Amani has an art easel with sides of equal length. She opened the easel and placed it on her desk. Classify the type of triangle formed by the easel and the desk according to its sides. Next, classify the type of triangle formed by the easel and the desk according to its angles.

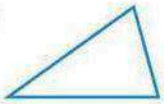
6. Mathematical Practices 7 **Identify Structure** The image shown at the right contains many triangles. Describe the different types of triangles found in the image.

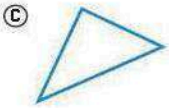
7. Mathematical Practices 3 **Justify Conclusions** A triangle has two sides that are perpendicular. Could the triangle be isosceles, equilateral, or scalene? Explain.

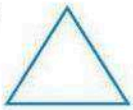
Test Practice

8. Which of the following figures is an obtuse triangle?

Ⓐ

Ⓑ 

Ⓒ 

Ⓓ 

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Check My Progress

Vocabulary Check

State whether each sentence is *true* or *false*.

1. A triangle with no congruent sides is a **scalene triangle**. _____
2. A polygon that has 4 sides and 4 angles is a **pentagon**. _____
3. Sides or angles with the same measure are **congruent**. _____
4. A **right triangle** is a triangle with two right angles. _____

Concept Check

Name each polygon. Determine if it appears to be *regular* or *not regular*.

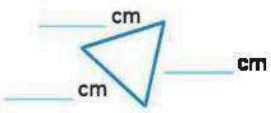
5.

_____

6.

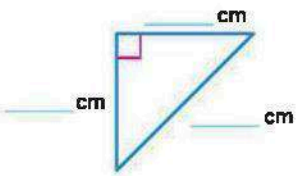
_____

Measure the sides of each triangle to the nearest tenth of a centimeter. Then describe the number of congruent sides.

7. 

_____

_____

8. 

_____

_____

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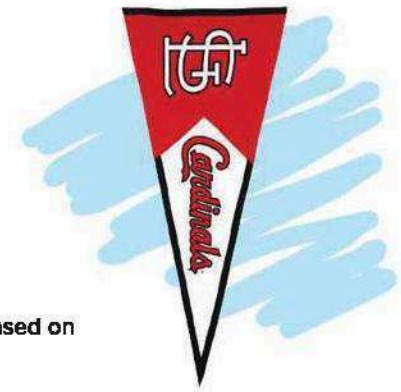
Problem Solving

9. Name the polygon shown by the video game screen at the right. Determine if it appears to be *regular* or *not regular*.

10. Usama has three lengths of fence. He connects them to make a triangular pen for his cat. If the lengths are 5 m, 6 m, and 10 m, what type of triangle is formed by the cat pen?

11. Name the polygon shown by the banner at the right. Determine if it appears to be *regular* or *not regular*.



12. Refer to the art in Exercise 11. Classify the triangle based on its angles.

13. Buthaina was going to visit her grandmother, shop at the mall, and then return home. The route she took was in the shape of a triangle. The distance between each place she visited was 16 km. What type of triangle is formed by the route she traveled?

Test Practice

14. Badr has a ladder with legs of equal length. He opened the ladder and placed it on the floor. What type of triangle is formed by the ladder and the floor?

Ⓐ scalene triangle Ⓒ equilateral triangle

Ⓑ isosceles triangle Ⓓ obtuse triangle

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Name _____

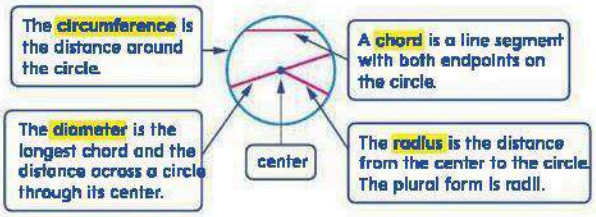
Circles

Lesson 4

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

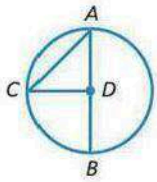
A **circle** is the set of all points in a plane that are the same distance from a point called the **center**.



Math in My World

Example 1

Use the circle to identify each of the following.



1 **center**

The _____ of the circle is point *D*.

2 **radius**

The _____ is a line segment from the center to the circle. There are three radii shown: *DN*, *DB*, *DC*.

3 **diameter**

The _____ is the chord that passes through the center of the circle. The diameter is *AB*.

4 **chord**

The _____ is a line segment with its endpoints on the circle. There are two chords, the diameter and *AC*.

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The diameter of a circle is made up of two radii. So, the length of the diameter of a circle is twice the length of the radius.

Words	The diameter d of a circle is twice the radius r. The radius r of a circle is half of its diameter d.
Symbols	$d = 2r$ $\quad r = \frac{d}{2}$

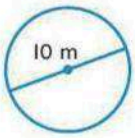
Example 2

The diameter of a circle is 10 m. Find the radius.

$r = \frac{d}{2}$ Radius of a circle

$r = \frac{10}{2}$ Replace d with 10.

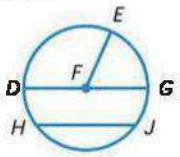
$r = 5$ Divide.



The radius is _____ m.

Guided Practice

For each circle, identify the radius, diameter, chord, and center.



5. The _____ of the circle is point _____.

There are three radii: $\overline{FD}$, $\overline{FE}$, and _____.

The _____ $\overline{DG}$.

There are 2 _____ $\overline{DG}$ and $\overline{HJ}$.

Find the radius or diameter of each circle with the given dimensions.

6. $r = 16$ m diameter = 2(_____) → _____

So, the diameter if $r = 16$ m is _____ m.

7. $d = 18$ cm radius = _____/2 → _____

So, the radius if $d = 18$ cm is _____ cm.

Talk MATH

Can a chord of a circle be longer than the diameter?

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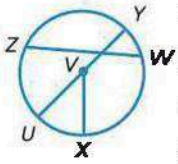
Name _____

Independent Practice

For each circle, identify the radii, diameter, chords, and center.

1.



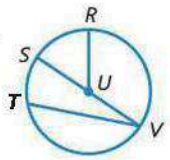
radii: _____ _____ and _____

diameter: _____

chord: _____ or _____.

center: _____

2.



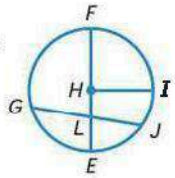
radii: _____ _____ or _____

diameter: _____

chord: _____ or _____.

center: _____.

3.



radii: _____ _____ or _____

diameter: _____

chord: _____ or _____.

center: _____.

Find the radius or diameter of each circle with the given dimensions.

4. $r = 42$ mm _____

5. $r = 29$ m _____

6. $d = 100$ m _____

7. $d = 36$ cm _____

8. $r = 35$ m _____

9. $d = 48$ cm _____

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Problem Solving

10. The diameter of a tree is 24 cm. What is the radius of the tree?

11. One of the largest mining dump trucks has tires with a radius of 2 m. What is the diameter of each tire?

My Work!

HOT Problems

12. Mathematical Practices 4 **Make a Model** Draw a circle and label the center, radius, diameter, a chord, and circumference.

13. What is the length of the diameter of the largest circle that will fit inside a square with 17 cm sides?

14. Mathematical Practices 3 **Make an Argument** Is every radius within a circle the same length? Explain.

15. **Building on the Essential Question** Hessa would like to walk the greatest distance on a circular path at a park. Should she walk the radius, diameter, or circumference? Explain.

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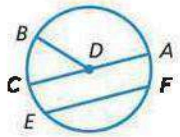
Name _____

MY Homework

Lesson 4
Circles

Homework Helper

Identify the radius, diameter, chord, and center of the circle.



The radii are $\overline{DB}$, $\overline{DC}$, and $\overline{DA}$. The diameter is $\overline{CA}$. The chords are $\overline{CA}$ and $\overline{EF}$. The center is point D.

The diameter of a circle is made up of two radii. So, the length of the diameter of a circle is twice the length of the radius.

The radius of a circle is 7 cm. Find the diameter.

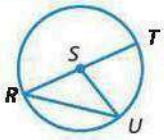
$d = 2r$ Diameter of a circle

$d = 2(7)$ Replace r with 7.

$d = 14$ Multiply.

The diameter is 14 cm.

Practice

1. 

radii: _____ _____ or _____

diameter: _____

chord: _____ or _____.

center: _____

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Find the radius or diameter of each circle with the given dimensions.

2. $r = 20$ cm _____ **3.** $r = 15$ m _____

4. $r = 34$ cm _____ **5.** $d = 70$ m _____

6. $d = 100$ m _____ **7.** $d = 42$ km _____

Problem Solving

8. Zurich, Switzerland, is home to one of the largest clock faces in Europe. The clock face has a diameter of 870 cm. What is the radius of the clock face?

9. Mathematical Practices 1 **Model the Math** A statue is standing in the center of a circular pool. If the diameter of the pool is 8 m how far away from the edge of the pool is the statue? Explain.

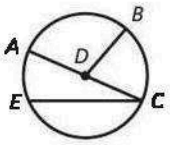
10. Mathematical Practices 2 **Logical Reasoning** A park is surrounded by a circular path. Several sidewalks cross the park from one edge of the circle to another. If the northward path is 25 m long and the eastward path is 40 m long, which one could be the diameter? Explain.

Test Practice

11. Which of the following is NOT a radius of the circle shown?

Ⓐ $\overline{DB}$ Ⓒ $\overline{AD}$

Ⓑ $\overline{CE}$ Ⓓ $\overline{BD}$



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Name _____

Hands On
Sides and Angles of Quadrilaterals

Lesson 5

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

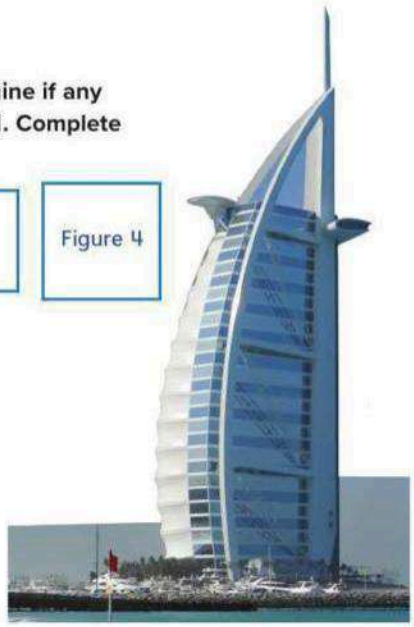
A quadrilateral is a polygon with four sides and four angles.

Measure It

Measure the sides and angles of each figure to determine if any are congruent. Then determine if any sides are parallel. Complete the table.

Attribute	Figure(s)
Opposite sides are congruent.	
Opposite sides are parallel.	
Opposite angles are congruent.	

Each figure has _____ sides and _____ angles.



Talk About It

1. What common attributes do all of the figures have?

2. Does Figure 3 have all the attributes of Figure 2? Explain.

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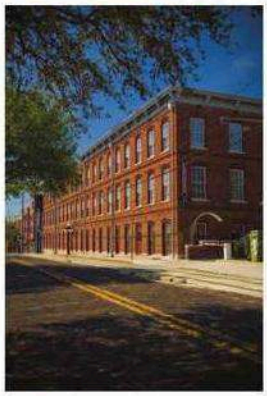
Try It

Measure the sides and angles of each figure to determine if any are congruent. Then determine if any sides are parallel. Complete the table.

Attribute	Figure(s)
Opposite sides are congruent.	
Opposite sides are parallel.	
Opposite angles are congruent.	



Talk About It

3. Does Figure 3 have all the attributes of Figure 2? Explain.

4. What are some additional attributes that Figure 4 has that Figure 3 doesn't have?

5. Mathematical Practices **Make Sense of Problems** Explain how Figure 2 is a special kind of polygon.

6. Which figure does not have any of the attributes listed in the table?

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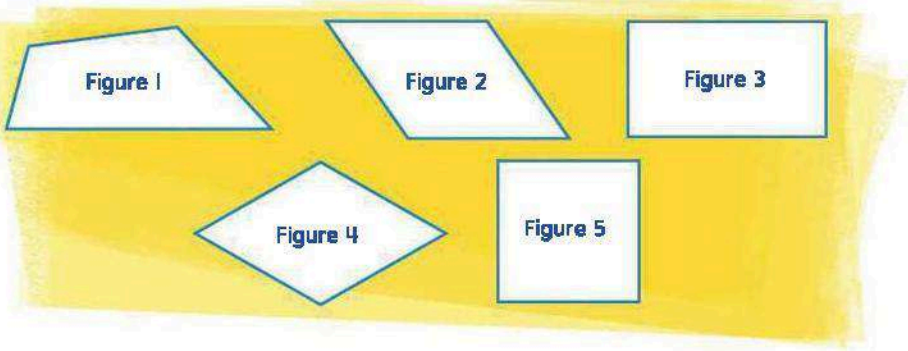
Name _____

Practice It

Measure the sides and angles of each figure to determine if any are congruent or parallel. Then answer Exercises 7–13.



7. Complete the attributes of Figure 1.

Opposite sides are _____ and _____.

Opposite angles are _____.

The figure has _____ sides and _____ angles.

8. Complete the attributes of Figure 2.

Opposite sides are _____ and _____.

Opposite angles are _____.

The figure has _____ sides and _____ angles.

9. Which figures have all the attributes of Figure 1? _____

10. Which figures have all the attributes of Figure 2? _____

11. Which figures have all the attributes of Figure 3? _____

12. Which figures have four right angles? _____

13. Which figures have four equal sides? _____

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Apply It

14. Complete the attributes of the red quadrilateral outlining one side of the Chichen Itza pyramid in Mexico.

There is one pair of _____ opposite sides.

There is a different pair of _____ opposite sides.

Opposite angles are not _____, but there are two sets of congruent angles.

15. Mathematical Practices 2 **Reason** Explain one way to determine if a quadrilateral has parallel sides.

16. Mathematical Practices 3 **Which One Doesn't Belong?** Circle the quadrilateral that does not belong with the other three. Explain your reasoning.

Write About It

17. How are all quadrilaterals alike and how can they be different?

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Name _____

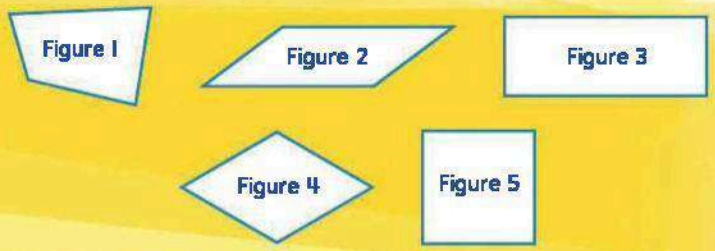
MY Homework

Lesson 5

Hands On: Sides and Angles of Quadrilaterals

Homework Helper

Measure the sides and angles of each figure to determine if any are congruent. Then determine if any sides are parallel. Complete the table.



Attribute	Figure(s)
Opposite sides are congruent.	2, 3, 4, 5
Opposite sides are parallel.	2, 3, 4, 5
Opposite angles are congruent.	2, 3, 4, 5

Each figure has 4 sides and 4 angles.

Practice

Refer to the figures above in the Homework Helper to solve Exercises 1–3.

1. Complete the attributes of Figure 2.

   Opposite sides are _____ and _____.

   Opposite angles are _____.

   The figure has _____ sides and _____ angles.

2. Which figures have all the attributes of Figure 2? _____

3. Which figures have four right angles? _____

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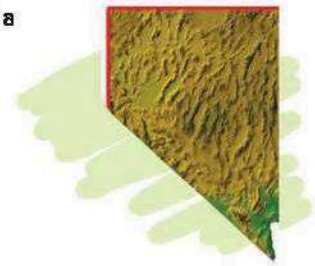
Problem Solving

4. The state of Nevada in the United States is in the shape of a quadrilateral. Complete the attributes of the outline of the state of Nevada.



There is one set of _____ opposite sides.

Opposite sides are not _____.

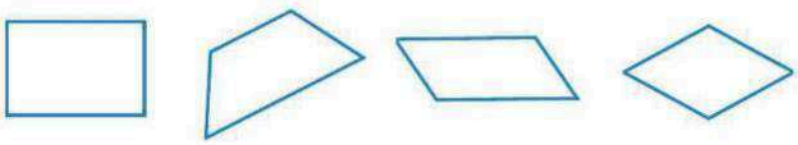
Opposite angles are not _____, but there are two right angles.

5. Mathematical Practices 2 **Reason** Explain one way to determine if a quadrilateral has congruent angles.

_____

_____

6. Mathematical Practices 3 **Which One Doesn't Belong?** Circle the quadrilateral that does not belong with the other three. Explain your reasoning.



_____

_____

Vocabulary Check

Fill in each blank with the correct term or number to complete the sentence.

7. A quadrilateral is a polygon with _____ sides and _____ angles.

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Name _____

Classify Quadrilaterals

Lesson 6

ESSENTIAL QUESTION

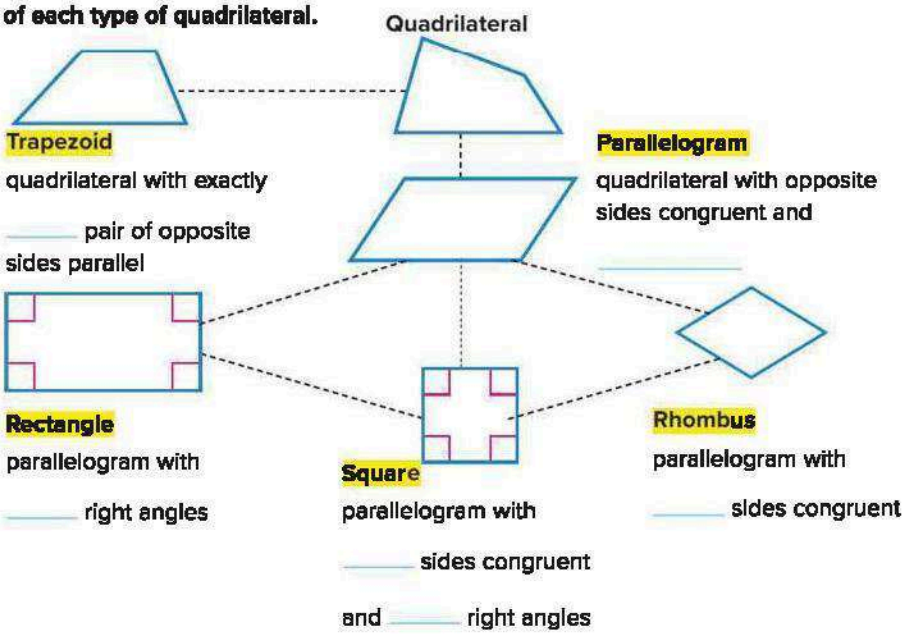
How does geometry help me solve problems in everyday life?

You can classify quadrilaterals using one or more of the following attributes like congruent sides, parallel sides, and right angles.

Math in My World

Example 1

Muna cut out polygon mats to use for her travel photos. Use the figures below to determine the missing attribute(s) of each type of quadrilateral.



A square has all the attributes of a rectangle and a _____.

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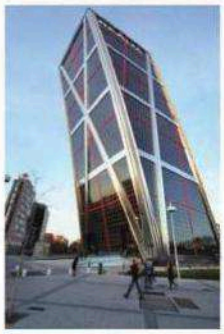
Example 2

One side of the Realia building in Madrid, Spain, is shown at the right. Describe the attributes of the quadrilateral. Then classify it based on its attributes.



The quadrilateral has opposite sides _____

and _____.

So, it is a _____.

Guided Practice

1. Describe the attributes of the quadrilateral below. Then classify the quadrilateral based on its attributes.

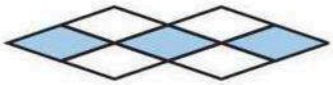
The opposite sides of the quadrilateral are _____

and _____.

There are _____ right angles.

So, the quadrilateral is a _____.

2. The design below is made up of a repeating quadrilateral. Describe the attributes of the quadrilateral. Then classify the quadrilateral based on its attributes.



The quadrilateral has _____ congruent sides.

Opposite sides are _____.

So, the quadrilateral is a _____.

Talk MATH

Tell why a square is a special kind of rectangle.

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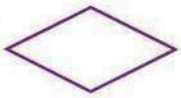
Name _____

Independent Practice

Describe the attributes of each quadrilateral. Then classify the quadrilateral.

3.

4. 

5. Circle the quadrilateral(s) that have all the attributes of a parallelogram.

rectangle rhombus square trapezoid

6. Circle the quadrilateral(s) that have all the attributes of a rhombus.

rectangle square trapezoid parallelogram

State whether the following statements are *true* or *false*. If *false*, explain why.

7. All parallelograms have opposite sides congruent and parallel. Since rectangles are parallelograms, all rectangles have opposite sides congruent and parallel.

8. All squares have four congruent sides. Since rectangles are squares, all rectangles have four congruent sides.

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Problem Solving

9. Mathematical Practices 7 **Identify Structure** Many aircraft display the shape of the UAE flag as shown below to indicate motion. Classify the quadrilateral.

10. Halima used a quadrilateral in her art design. The quadrilateral has no sides congruent and only one pair of opposite sides parallel. Classify the shape of the quadrilateral she used.

11. Hamdah planted two tomato gardens. One garden is rectangular. The shape of the second garden has all the attributes of the rectangular garden. In addition, it has four congruent sides. Classify the shape of the second tomato garden.

HOT Problems

12. Mathematical Practices 4 **Model Math** Draw a parallelogram that is neither a square, rhombus, nor rectangle.

My Drawing!

13. **Building on the Essential Question** How do I classify quadrilaterals using their attributes?

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Name _____

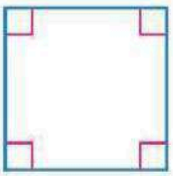
MY Homework

Lesson 6

Classify Quadrilaterals

Homework Helper

Describe the attributes of the quadrilateral. Then classify it based on its attributes.



The quadrilateral has all sides congruent and opposite sides parallel.

It has four right angles.

So, the quadrilateral is a square.

Practice

Describe the attributes of each quadrilateral. Then classify the quadrilateral.

1.

_____

_____

_____

2.

_____

_____

_____

3. Circle the quadrilateral(s) that have all the attributes of a rectangle.

trapezoid parallelogram square rhombus

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Problem Solving

Name all the quadrilaterals that have the given attributes.

4. opposite sides parallel

5. four right angles

6. exactly one pair of opposite sides parallel

7. four congruent sides

Mathematical Practices 4

8. **Model Math** Write a real-world problem that involves classifying a quadrilateral. Then solve the problem.

Vocabulary Check

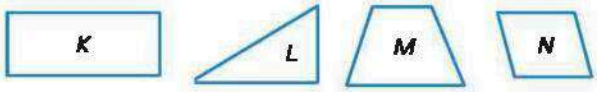
Fill in each blank with the correct term or number to complete each sentence.

9. A rectangle is a parallelogram with _____ right angles.

10. A trapezoid is a quadrilateral with exactly _____ pair of parallel sides.

Test Practice

11. Which statement about the figures shown below is true?



Ⓐ Figures *K* and *N* are rectangles.

Ⓑ Figures *L* and *N* are quadrilaterals.

Ⓒ Figures *K* and *N* are parallelograms.

Ⓓ Figures *M* and *N* are parallelograms.

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Name _____

Hands On

Build Three-Dimensional Figures

Lesson 7

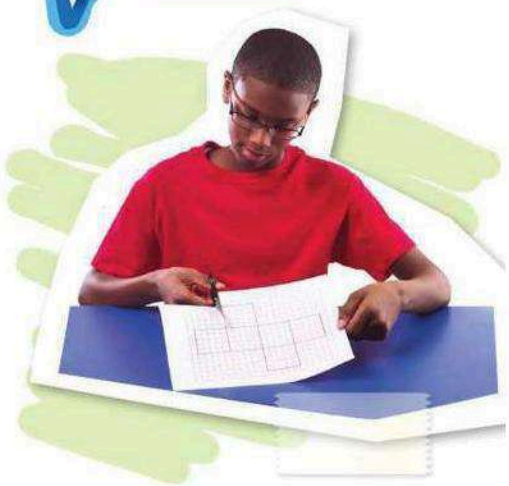
ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

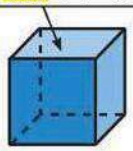
A **three-dimensional figure** has length, width, and height. A **net** is a two-dimensional pattern of a three-dimensional figure. You can use a net to build a three-dimensional figure.

A **cube** is a three-dimensional figure with six faces that are congruent squares. **Congruent figures** have the same size and shape.

A **rectangular prism** is a three-dimensional figure with six rectangular faces. Opposite faces are parallel and congruent.



A **face** is a flat surface.

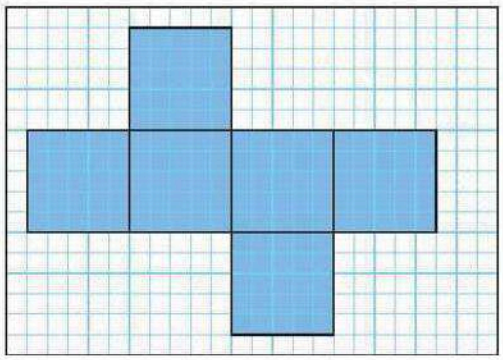


Cube

Rectangular Prism

Build It

1. **Copy the net shown onto grid paper.**



2. **Cut out the net. Fold along the lines to form a three-dimensional figure. What figure did you form?**

_____

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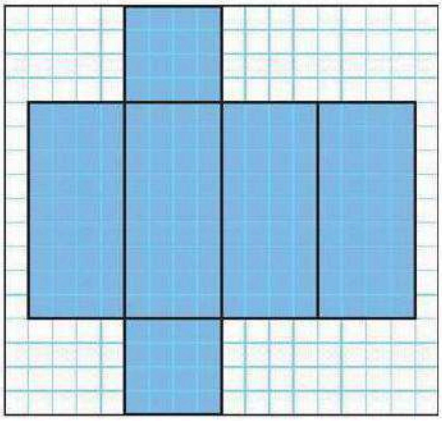
Try It

1 **Copy the net shown onto grid paper.**

2 **Cut out the net. Fold along the lines to form a three-dimensional figure. What figure did you form?**



How are the two figures you just built alike?

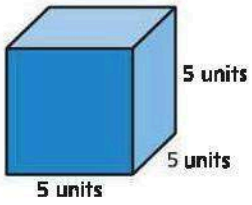
How are the two figures you just built different?

Talk About It

1. In the first activity, what two-dimensional figure forms the faces of the figure? How many faces are there? How many are congruent?

2. Identify the length, width, and height of the cube you formed in the first activity.

3. What do you notice about the length, width, and height of the cube?



4. **Mathematical Practices** **7** **Identify Structure** In the second activity, what two-dimensional figures form the faces of the figure? How many faces are there? How many are congruent?

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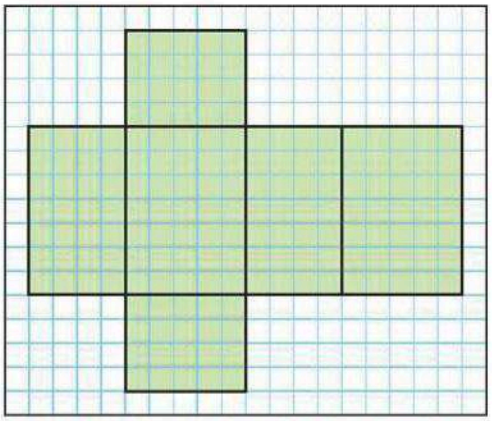
Name _____

Practice It

For Exercises 5 and 6, refer to the grid at the right.



5. Copy the net onto grid paper. Cut out the net and fold along the lines to form a three-dimensional figure. What figure did you form?

_____

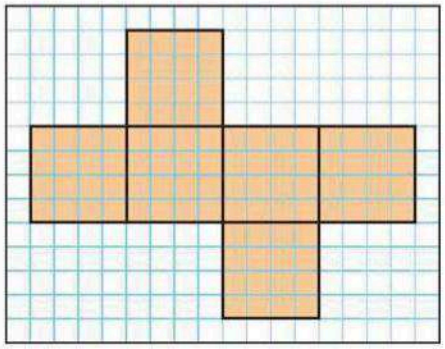
6. What two-dimensional figure forms the faces of the figure?

_____

How many faces are there? _____ Describe the congruent faces.

_____

For Exercises 7–9, refer to the grid at the right.



7. Copy the net onto grid paper. Cut out the net and fold along the lines to form a three-dimensional figure. What figure did you form?

_____

8. What two-dimensional figure forms the faces of the figure?

_____

How many faces are there?

_____

Describe the congruent faces.

_____

9. Identify the length, width, and height of the figure you formed.

_____

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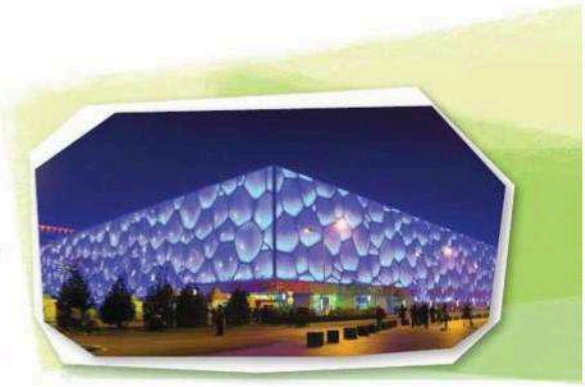
Apply It

10. The rectangular prism-shaped building shown at the right was used for the 2008 Olympics in Beijing, China. What two-dimensional figures form the sides of the building?

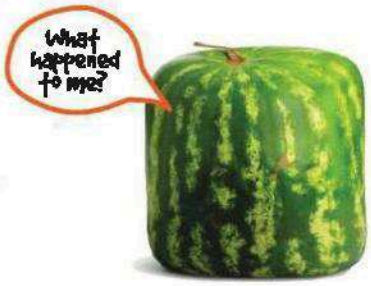


Including the floor, how many faces are there?

Mathematical Practices **11.** **Model Math** Draw two different nets that would fold to form a cube with length, width, and height each 4 units.

My Drawing!

12. Farmers have learned how to grow watermelons in the shape shown at the right. What three-dimensional figure is the watermelon?



Write About It

13. How are nets used to build three-dimensional figures?

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Name _____

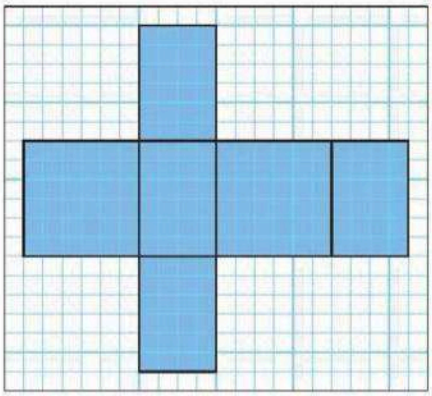
MY Homework

Lesson 7

Hands On: Build Three-Dimensional Figures

Homework Helper

The net shown was used to form the three-dimensional figure below.



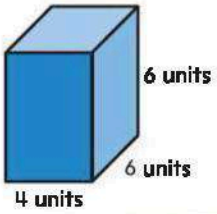
The three-dimensional figure formed from the net is a rectangular prism.

The faces of the rectangular prism are rectangles.

The figure has 6 faces.

The four rectangles are congruent, and the two squares are congruent.

The figure formed has a length of 4 units, a width of 6 units, and a height of 6 units.



Vocabulary Check

Fill in each blank with the correct word(s) to complete each sentence.

1. A three-dimensional figure has _____, width, and _____.
2. A net is a two-dimensional _____ of a three-dimensional figure.
3. A cube is a three-dimensional figure with six square faces that are _____.

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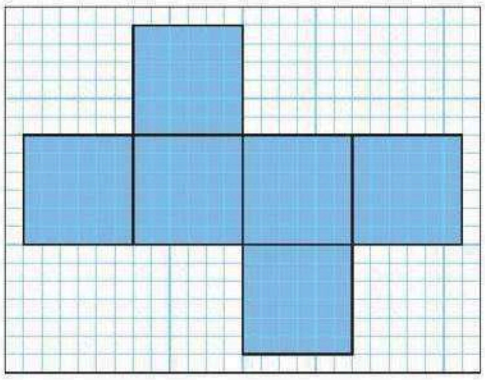
Practice

For Exercises 4–6, refer to the grid at the right.

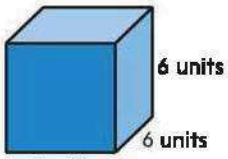


4. What three-dimensional figure is formed using the net shown?

5. What two-dimensional figure forms the sides of the figure?

Describe the congruent faces.

6. Identify the length, width, and height of the figure formed.



Problem Solving

7. Houriyya used a rectangular prism-shaped box to ship a package to her friend. What two-dimensional figure forms the faces of the box?

Including the bottom, how many faces are there?

Describe the faces.

8. Jassim is forming a three-dimensional figure using a net. The figure has six congruent square faces. What type of figure did he make?

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Name _____

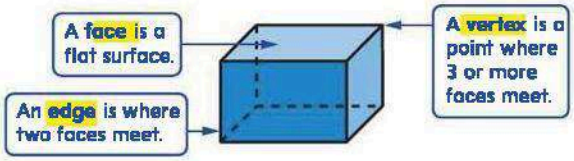
Three-Dimensional Figures

Lesson 8

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

A **three-dimensional figure** has length, width, and height.



Math in My World

Describe the faces, edges, and vertices of the figure outlined on the luggage bag. Then identify the shape of the figure.

faces The figure has _____ faces. Each face appears to be a rectangle.

edges There are _____ edges. The opposite edges are parallel and congruent.

vertices The figure has _____ vertices.

Prisms are three-dimensional figures. A **prism** has at least three faces that are rectangles. The top and bottom faces, called the **bases**, are congruent parallel polygons.

The figure above is a rectangular prism. In a **rectangular prism**, the bases are congruent rectangles. A rectangular prism has six rectangular faces, twelve edges, and eight vertices.

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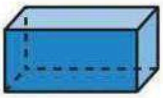
Key Concept Prisms

Rectangular Prism

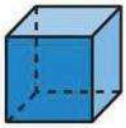


A rectangular prism has six rectangular faces, twelve edges, and eight vertices.

Triangular Prism

A triangular prism has triangular bases. It has five faces, nine edges, and six vertices.

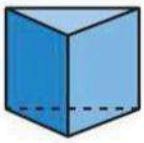
Cube



A cube has six square faces, twelve edges, and eight vertices. A cube is also a square prism.

Guided Practice

1. Describe the faces, edges, and vertices of the three-dimensional figure. Then identify it.



faces This figure has _____ faces. The _____ bases are congruent and parallel. The other faces are _____.

edges There are _____ edges. The edges that form the vertical sides of the rectangles are parallel and _____.

vertices This figure has _____ vertices.

The figure is a _____.

Talk MATH

Describe the differences between a triangular prism and a rectangular prism.

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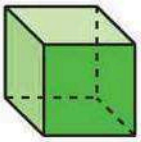
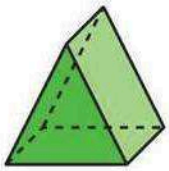
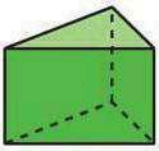
Name

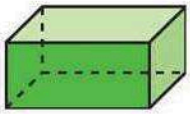
Independent Practice

Describe the faces, edges, and vertices of each three-dimensional figure. Then identify it.

2. 

3. 

4. 

5. 

6.

7.

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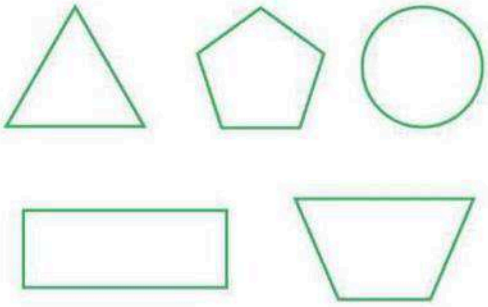
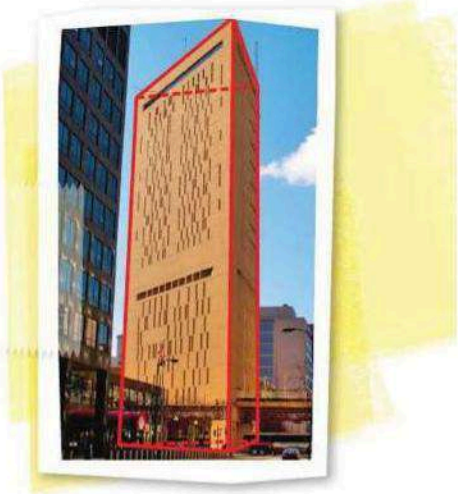
Problem Solving

Mathematical Practices 7 **8. Identify Structure** A high-rise building is in the shape of a triangular prism. Circle the two-dimensional figures that make up the faces of the prism.





9. Describe the number of vertices and edges in an unopened cereal box. Identify the shape of the box.

HOT Problems

Mathematical Practices 4 **10. Model Math** What figure is formed if only the height of a cube is increased? Draw the figure to support your answer.

My Drawing!

11. Building on the Essential Question Why is it important to know the different properties of three-dimensional figures?

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Name _____

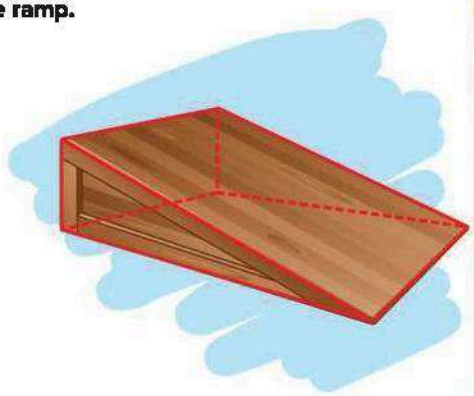
MY Homework

Lesson 8

Three-Dimensional Figures

Homework Helper

Describe the faces, edges, and vertices of the ramp. Then identify the shape of the ramp.



faces This figure has 5 faces. The triangular bases are congruent and parallel. The other faces are rectangles.

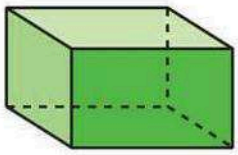
edges There are 9 edges. The edges that form the horizontal sides of the rectangles are parallel and congruent.

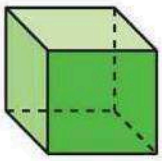
vertices This figure has 6 vertices.

The ramp is a triangular prism.

Practice

Describe the faces, edges, and vertices of each three-dimensional figure. Then identify it.

1. 

2. 

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Problem Solving

3. Jamal made a simple drawing of his house. It is a three-dimensional figure with four faces that are rectangular and two that are square. What kind of figure is it?

4. A toy box has 6 faces that are squares. There are 12 edges and 8 vertices. Identify the shape of the toy box.

5. **Mathematical Practices** 1 **Make Sense of Problems** Ibrahim is playing a board game. When it is his turn, he tosses a three-dimensional figure that has 6 square faces. What kind of figure is it? How many edges and vertices does it have?

Vocabulary Check

Fill in the blank with the correct term or number to complete the sentence.

6. A vertex is a point where _____ or more edges meet.

Test Practice

7. Which statement is true about the three-dimensional figure that most closely represents the slice of pie?

   Ⓐ The figure has 4 vertices.

   Ⓑ The figure has 6 vertices.

   Ⓒ The figure has 8 vertices.

   Ⓓ The figure has 9 vertices.

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Check My Progress

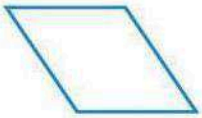
Vocabulary Check

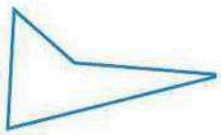
Circle the correct term or terms to complete each sentence.

1. A (**rectangular prism**, **triangular prism**) is a three-dimensional figure that has six rectangular faces and eight vertices.
2. A (**rectangle**, **rhombus**) is a parallelogram with all sides congruent.
3. A(n) (**vertex**, **edge**) of a three-dimensional figure is where two faces meet.
4. A (**prism**, **trapezoid**) has at least three faces that are rectangles.

Concept Check

Describe the attributes of each quadrilateral. Then classify the quadrilateral.

5. 

6. 

7. Circle the quadrilateral(s) that have all the attributes of a rhombus.

   trapezoid square parallelogram rectangle

8. Circle the quadrilateral(s) that have all the attributes of a rectangle.

   parallelogram square trapezoid rhombus

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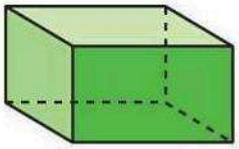
Describe the faces, edges, and vertices of each three-dimensional figure. Then identify it.

9.



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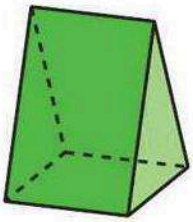
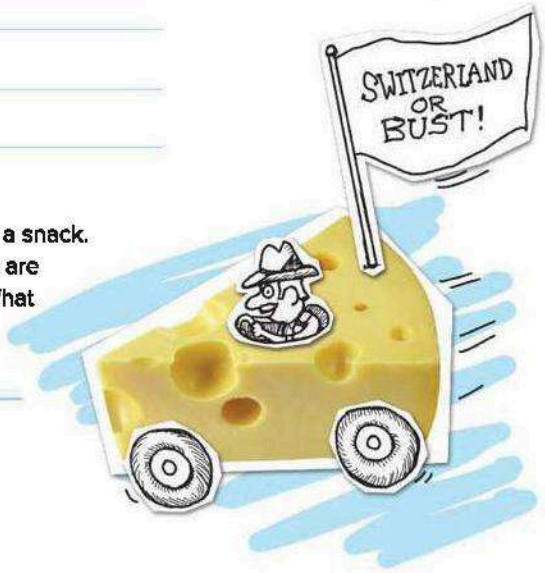


Problem Solving

11. Khadija's xylophone is in the shape of the trapezoid shown at the right. Describe any parallel, perpendicular, or congruent sides of the xylophone.



12. Husam cut a piece of cheese to eat for a snack. The cheese is a prism with 3 faces that are rectangular and 2 that are triangular. What kind of figure is it?

Test Practice

13. Which is *not* a true statement?

Ⓐ All squares are parallelograms.

Ⓑ Some rhombi are squares.

Ⓒ All rectangles are squares.

Ⓓ All rectangles are parallelograms.

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Name _____

Hands On

Use Models to Find Volume

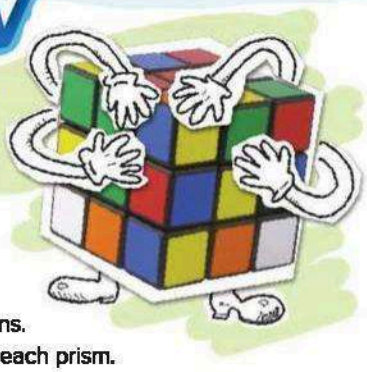
Lesson 9

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

Volume is the amount of space inside a three-dimensional figure. Centimeter cubes can help you find the volume of a prism.

what's Up?



Build It

Use centimeter cubes to build four different rectangular prisms.
Complete the fourth and fifth columns of the table below for each prism.

Prism	Length (cm)	Width (cm)	Height (cm)	Number of Cubes	Volume (cubic cm)
A	1	2	1		
B	2	2	1		
C	3	2	2		
D	4	2	2		

A prism built from cubes has no gaps or overlaps.

A cube with a side length of one unit is called a **unit cube.**
A unit cube has a volume of 1 cubic unit, or 1 unit^3.
A **cubic unit** is a unit for measuring volume.

1 cubic unit

2 cubic units

4 cubic units

So, if you use 12 cm cubes to build a rectangular prism, the prism has a volume of _____ cubic centimeters, or _____ cm^3.

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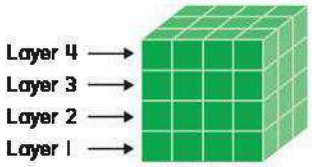
Try It

Use centimeter cubes to build the rectangular prism shown. Complete the table for each layer.



Layer	Length (cm)	Width (cm)	Height (cm)	Number of Cubes	Volume (cubic cm)
1					
2					
3					
4					

How many cubes were used to build the prism? _____

What is the volume? _____

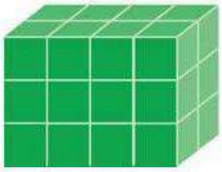
Talk About It

1. Describe the relationship between the number of cubes needed to build a rectangular prism and its volume, in cubic units.

2. Describe the pattern in the table between the length, width, height, and volume of each prism.

3. Use ℓ for length, w for width, and h for height to write a formula for the volume V of a rectangular prism.

4. **Mathematical Practices 5** **Use Math Tools** Use your formula to find the volume of the prism at the right in appropriate units. Verify your solution by counting the number of cubes.



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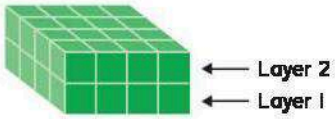
Name _____

Practice It

Mathematical Practices 5 **Use Math Tools Use centimeter cubes to build the rectangular prism shown.**



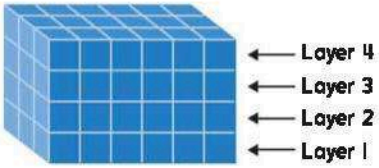
5. Complete the table below.

Layer	Length (cm)	Width (cm)	Height (cm)	Number of Cubes
1				
2				

6. How many cubes were used to build the prism? _____

What is the volume? _____ cm^3

Use centimeter cubes to build the rectangular prism shown.



7. Complete the table below.

Layer	Length (cm)	Width (cm)	Height (cm)	Number of Cubes	Volume (cubic cm)
1					
2					
3					
4					

8. How many cubes were used to build the prism? _____

What is the volume? _____ cm^3

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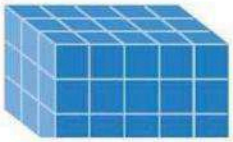
Apply It

Use the prism shown for Exercises 9–11.

9. What shape is the base of the prism?



My Work!

10. **Mathematical Practices** 6 **Explain to a Friend** Explain to a friend how to find the area of the base of the prism.

11. Find the volume of the prism above by multiplying the area of the base by the height. Verify your solution by counting the number of centimeter cubes.

12. **Mathematical Practices** 1 **Make Sense of Problems** Khawla knows that the volume of a prism is 36 cubic units. She knows that the length of the prism is 4 units and the width is 3 units. What is the height of the prism?

Write About It

13. Describe a way to find the volume of a rectangular prism without using models.

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Name _____

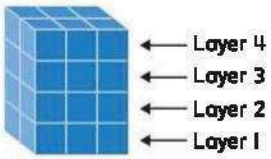
MY Homework

Lesson 9

Hands On: Use Models to Find Volume

Homework Helper

Centimeter cubes were used to build the rectangular prism shown. The table shows the number of cubes needed to build each layer.



Layer	Length (cm)	Width (cm)	Height (cm)	Number of Cubes	Volume (cubic cm)
1	3	2	1	6	6
2	3	2	1	6	6
3	3	2	1	6	6
4	3	2	1	6	6

So, 24 cubes were used to build the prism.

The volume of the prism is 24 cubic centimeters, or 24 cm^3.

Vocabulary Check

Fill in each blank with the correct term or number to complete each sentence.

1. Volume is the amount of _____ inside a three-dimensional figure.
2. A cube with a side length of _____ unit is called a unit cube.
3. The volume of a rectangular prism can be found by multiplying the length by the _____ by the height.

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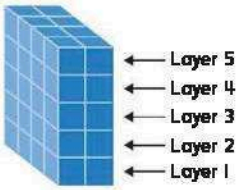
Practice

For Exercises 4–7, centimeter cubes were used to build the rectangular prism shown.



4. How many cubes were needed to build Layer 1?

5. Complete the table below.

Layer	Length (cm)	Width (cm)	Height (cm)	Number of Cubes	Volume (cubic cm)
1					
2					
3					
4					
5					

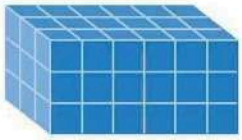
6. How many cubes were used to build the prism?

7. What is the volume of the prism?

Problem Solving

8. Mathematical Practices 1 **Make Sense of Problems** Hassan knows that the volume of a prism is 40 cubic units. He also knows that the width of the prism is 2 units and the height is 5 units. What is the length of the prism?

9. Centimeter cubes were used to build the prism. What is the volume of the prism?



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Name _____

Volume of Prisms

Lesson 10

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

Volume is the amount of space inside a three-dimensional figure. You can use either formula below to find the volume of a prism.

$V = \ell \times w \times h$ V = volume, ℓ = length, w = width, and h = height

$B = \ell w$

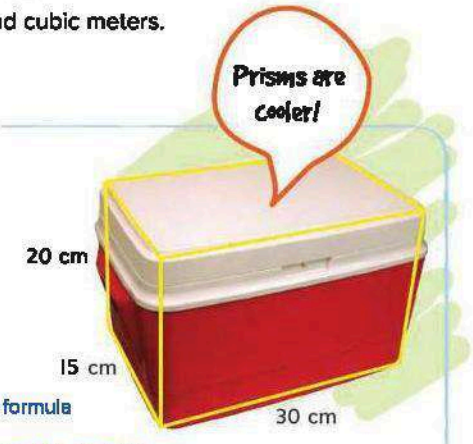
$V = B \times h$ V = volume, B = area of the base, and h = height

Common units of volume are cubic centimeters and cubic meters.

Math in My World

Example 1

On his family vacation to the beach, Hasan filled a cooler with water and snacks. Find the volume of the cooler.



One Way Use $V = \ell \times w \times h$.

$V = \ell \times w \times h$	Volume formula
$V =$ _____ × _____ × _____	$\ell = 30$, $w = 15$, $h = 20$
$V =$ _____	Multiply.

Another Way Use $V = B \times h$.

$V = B \times h$	Volume formula
$V =$ _____ × _____	$B = 30 \times 15$, $h = 20$
$V =$ _____	Multiply.

The volume of the cooler is _____ cm^3.

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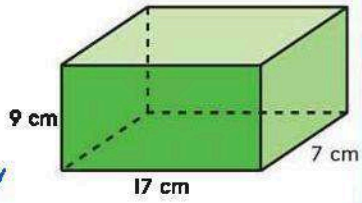
Remember that the Associative Property of Multiplication tells you that the way in which factors are grouped does not change the product. You can group the factors to make the multiplication easier.

Example 2

Find the volume of the prism.



$V = \ell \times w \times h$ Volume formula

$V = 17 \times 7 \times 9$

$V =$ _____ $\times$ (_____ $\times$ _____) Associative Property

$V =$ _____ $\times$ _____ Multiply.

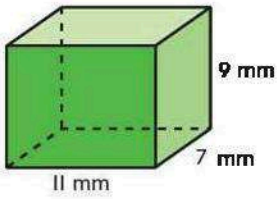
$V =$ _____ Multiply.

The volume of the prism is _____ cm^3.

Guided Practice

Find the volume of each prism.

1.

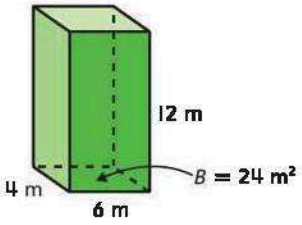


$V = \ell \times w \times h$

$V =$ _____ $\times$ _____ $\times$ _____

$V =$ _____ mm^3

2.



$V = B \times h$

$V =$ _____ $\times$ _____

$V =$ _____ m^3

Talk MATH

If you know the area of the base of a rectangular prism and the prism's height, which formula would you use? Why?

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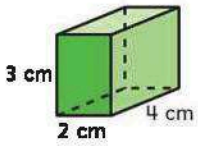
Name _____

Independent Practice

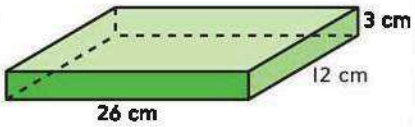
Mathematical Practices 2 **Use Symbols** Find the volume of each prism. Use the formula $V = \ell \times w \times h$ or $V = B \times h$.

3.



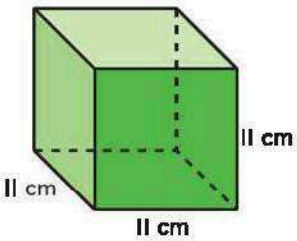
$V =$ _____

4.



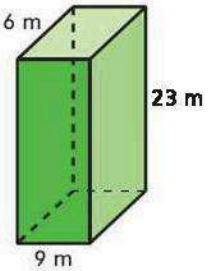
$V =$ _____

5.



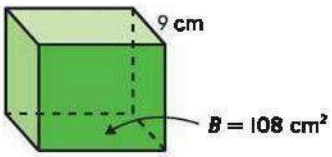
$V =$ _____

6.



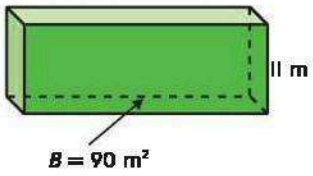
$V =$ _____

7.



$V =$ _____

8.



$V =$ _____

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Problem Solving

9. Find the volume of the Frog Queen building in Graz, Austria. The building is 18 m long, 17 m tall, and 18 m wide.

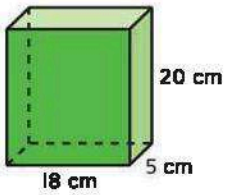
My Work!

10. **Mathematical Practices** 4 **Model Math** Two pet carriers are in the shape of rectangular prisms. Determine the volume of each pet carrier. Circle the carrier that has the greater volume.

Land Carrier: _____ cm^3 Olympic Carrier: _____ cm^3

HOT Problems

11. **Mathematical Practices** 2 **Use Number Sense** Explain how the Associative Property can be used to mentally find the volume of the prism shown.



12. **Building on the Essential Question** How do I find the volume of rectangular prisms?

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Name _____

MY Homework

Lesson 10
Volume of Prisms

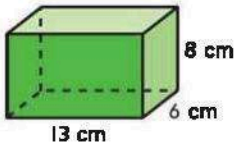
Homework Helper

Find the volume of the prism.

$V = \ell \times w \times h$ Volume formula

$V = 13 \times 6 \times 8$ $\ell = 13, w = 6, h = 8$

$V = 624$ Multiply.

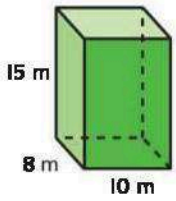


The volume of the prism is 624 cm^3.

Practice

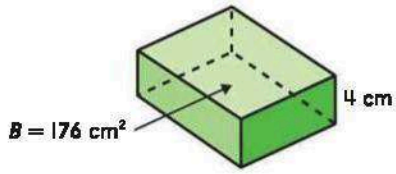
Find the volume of each prism.

1.



$V =$ _____

2.



$V =$ _____

Vocabulary Check

Fill in the blank with the correct term or number to complete the sentence.

3. Volume is measured in _____ units.

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Problem Solving

4. Hamad's swimming pool measures 15 m long, 8 m wide, and 3 m deep. How many cubic meters of water will the pool hold?

5. The hotel that the Hamdan family is staying at on vacation is shaped like a rectangular prism. It is 71 m long, 48 m wide, and 11 m tall. What is the volume of the hotel?

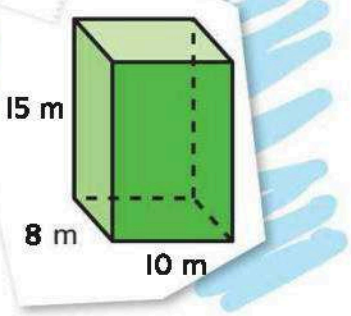
6. Rana keeps her recipes in a box with dimensions 18 cm, 13 cm, and 10 cm. What is the volume of the box?

7. **Mathematical Practices** 4 **Model Math** Describe the dimensions of two different prisms that each have a volume of 2,400 cm^3. Then draw each prism.

My Drawing!

Test Practice

8. What is the volume of the prism formed by the room?



Ⓐ 1,000 m^3

Ⓑ 1,200 m^3

Ⓒ 1,500 m^3

Ⓓ 1,800 m^3

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Name _____

Hands On
Build Composite Figures

Lesson 11

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

A **composite figure** is made up of two or more three-dimensional figures.

Build It

A composite figure is shown below. Use centimeter cubes to build the figure.

1. Count the number of cubes needed to make the base layer.

   How many cubes did you use? → ☐

2. Count the number of cubes needed to make the top layer.

   How many cubes did you use? → ☐ + ☐

3. Add the number of cubes for the base and the top. → ☐

Talk About It

1. How many cubes did it take to build the figure? _____

2. What is the volume of the composite figure?

   _____ cm^3

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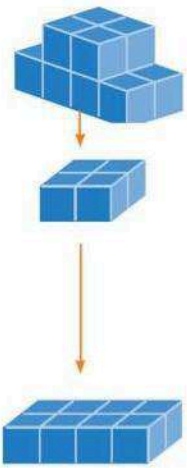
Try It

Separate the composite figure into two rectangular prisms. Then find the volume of each prism.



1. Find the volume of the top prism.

   $V = \ell \times w \times h$

   $V =$ _____ × _____ × _____

   $V =$ _____

   The volume of the top prism is _____ cm^3.

2. Find the volume of the bottom prism.

   $V = \ell \times w \times h$

   $V =$ _____ × _____ × _____

   $V =$ _____

   The volume of the bottom prism is _____ cm^3.

3. Add the volumes to find the volume of the composite figure.

   _____ + _____ = _____

   So, the volume of the composite figure is _____ cm^3.

Talk About It

3. Explain how you can use addition to find the volume of a composite figure.

_____

_____

4. **Mathematical Practices** 1 **Make Sense of Problems** Explain how you would find the volume of the composite figure shown.

_____

_____

5. What is the volume of the figure in Exercise 4?

_____ cm^3

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Name _____

Practice It

Use the model at the right to build the composite figure using centimeter cubes.

6. Separate the figure into prisms. Make a drawing of each prism used to build the composite figure.

My Drawing!

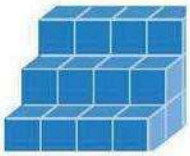
7. How many cubes did it take to build the figure?

_____

8. What is the volume of this figure?

_____ cm^3

Use the model at the right to build the composite figure using centimeter cubes.



9. Separate the figure into prisms. Make a drawing of each prism used to build the composite figure.

My Drawing!

10. How many cubes did it take to build the figure?

_____

11. What is the volume of this figure?

_____ cm^3

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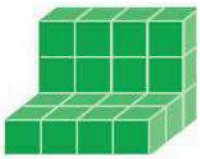
Apply It

Nisreen arranged centimeter cubes into the composite figure shown. Use the composite figure for Exercises 12 and 13.



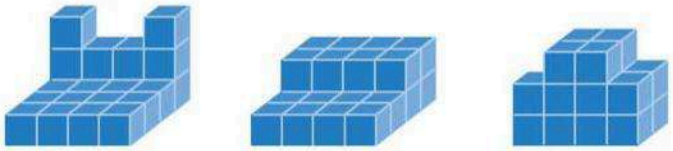
12. Mathematical Practices 4 **Model Math** Separate the figure into prisms. Make a drawing of each prism used to build the composite figure.

My Drawing!

13. What is the volume of the composite figure? Check your answer by building a model and counting the number of cubes.

_____ cm^3

14. Circle the composite figure that has a volume of 24 cm^3.



15. Mathematical Practices 1 **Make Sense of Problems** Explain how to use the formula of a rectangular prism to find the volume of a composite figure that is composed of rectangular prisms.

Write About It

16. How can you use models to find the volume of composite figures?

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Name _____

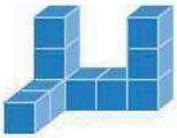
MY Homework

Lesson 11

Hands On: Build Composite Figures

Homework Helper

A composite figure is shown at the right. Centimeter cubes were used to build the figure. Find the volume.

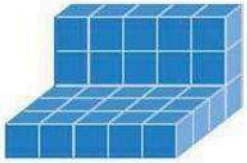


1. Six cubes were used to make the base layer.
2. Four cubes were used to make the two top layers.
3. Add the number of cubes for the base and the top.
   $6 + 4 = 10$

So, a total of 10 cubes were used to build the figure.
The volume is 10 cm^3.

Practice

Refer to the composite figure at the right.



1. How many cubes are needed to build the bottom layer?

   _____

2. How many cubes are needed to build the top two layers?

   _____

3. Use addition to add the bottom and top layers.

   _____

4. What is the volume of the composite figure?

   _____ cm^3

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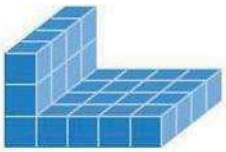
Problem Solving

Jamal built the composite figure at the right using centimeter cubes.



5. Separate the figure into prisms. Make a drawing of each prism used to build the composite figure.

My Drawing!

6. How many cubes did it take Jamal to build the figure?

_____

7. What is the volume of this figure? _____ cm^3

8. **Mathematical Practices** 3 **Find the Error** Ghaya built a composite figure using 12 cubes for the bottom layer and 10 cubes for the top layer. She said that the volume of the composite figure was 12×10, or 120 cm^3. Find and correct her error.

_____

_____

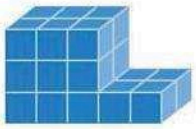
Vocabulary Check

Fill in the blank with the correct term or number to complete the sentence.

9. A composite figure is made up of two or more

_____ figures.

10. The composite figure was built using centimeter cubes. What is the volume of the composite figure shown?



$V =$ _____ cm^3

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Name _____

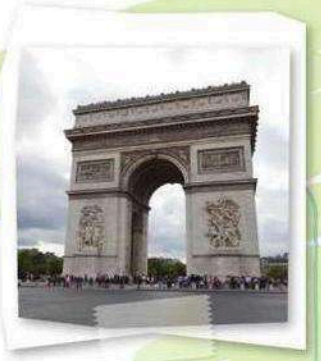
Volume of Composite Figures

Lesson 12

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

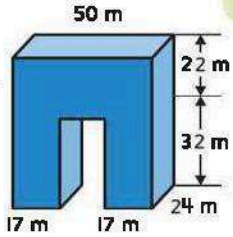
A **composite figure** is made up of two or more three-dimensional figures. To find the volume, separate the figure into figures with volumes you know how to find.



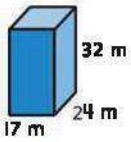
Math in My World

Example 1

The Arc de Triomphe in Paris, France, is roughly in the shape of the composite figure shown. Find the volume of the Arc de Triomphe.

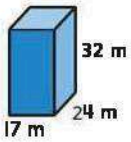


Separate the figure into three rectangular prisms. Find the volume of each prism.



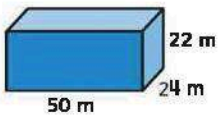
$V = \ell \times w \times h$

$V = 17 \times 24 \times 32$ → $V =$ _____



$V = \ell \times w \times h$

$V = 17 \times 24 \times 32$ → $V =$ _____



$V = \ell \times w \times h$

$V = 50 \times 24 \times 22$ → $V =$ _____

\+ _____

So, the total volume is _____ cubic meters, or _____ m^3.

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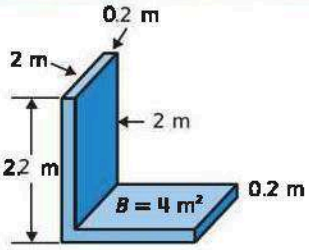
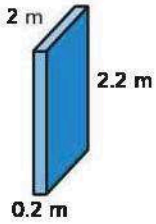
Example 2

Find the volume of the composite figure.

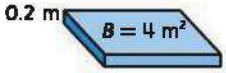
Separate the figure into two prisms.
Find the volume of each prism.





$V = \ell \times w \times h$

$V =$ ____ × ____ × ____ → $V =$ ☐



$V = B \times h$

$V =$ ____ × ____ → $V =$ ☐

\+

Add the volumes. The total volume is ____ cubic meters, or ☐ m^3.

Guided Practice

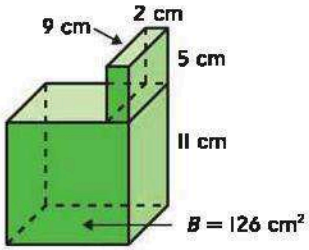
1. Find the volume of the composite figure.

Bottom Prism

$V = B \times h$

$V = 126 \times 11$

$V =$ ____



Top Prism

$V = \ell \times w \times h$

$V = 2 \times 9 \times 5$

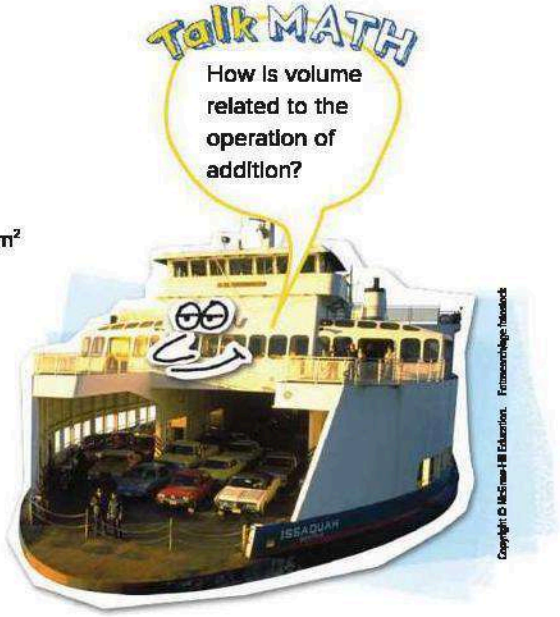
$V = 2 \times (9 \times 5)$ Associative Property

$V = 2 \times 45$

$V =$ ____

The total volume is ____ + ____

or ____ cm^3.



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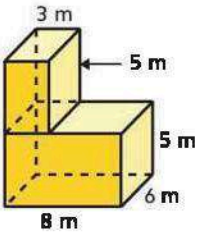
Name _____

Independent Practice

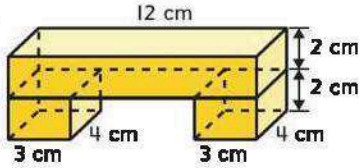
Find the volume of each composite figure.

2.



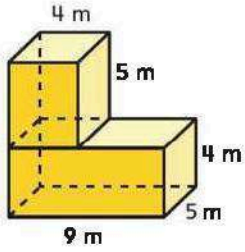
$V =$ _____

3.



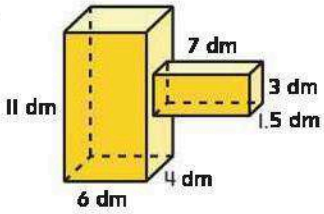
$V =$ _____

4.



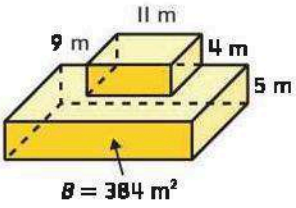
$V =$ _____

5.



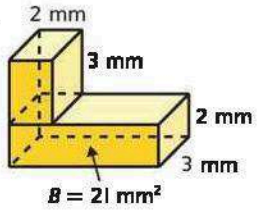
$V =$ _____

6.



$V =$ _____

7.



$V =$ _____

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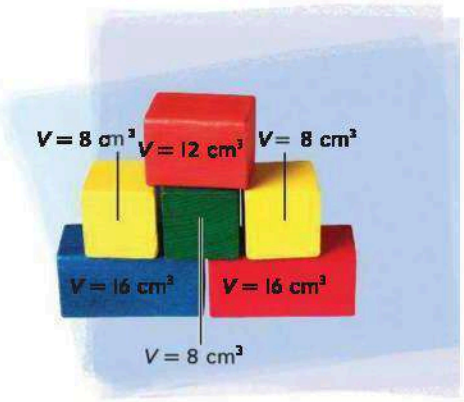
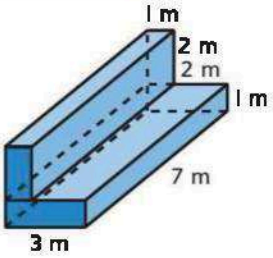
Problem Solving

8. Sally ordered the set of blocks shown at the right for her classroom. Find the total volume of all the blocks.



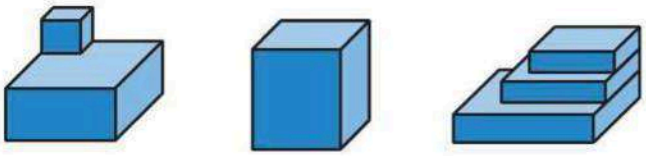
Would all of the blocks fit in a shipping box with a length of 4 cm, width of 4 cm, and height of 4 cm? Explain.

9. The figure represents a piece of foam packaging. Find the volume of the foam.



HOT Problems

10. **Mathematical Practices** 3 **Which One Doesn't Belong?** Circle the figure that is not a composite figure.



11. **Building on the Essential Question** How can I find the volume of a composite figure?

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Name _____

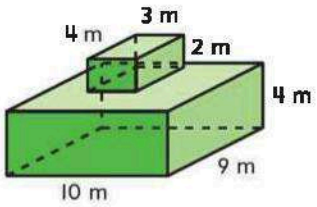
MY Homework

Lesson 12
Volume of Composite Figures

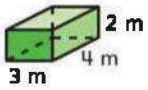
Homework Helper

Find the volume of the composite figure.

The figure was separated into two prisms.
Find the volume of each rectangular prism.



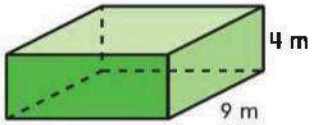
Top prism



$V = \ell \times w \times h$

$V = 3 \times 4 \times 2 \rightarrow 24$

Bottom prism



$V = \ell \times w \times h$

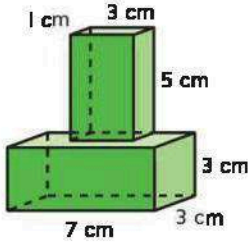
$V = 10 \times 9 \times 4 \rightarrow \begin{array}{r} +\ 360 \\ \hline 384 \end{array}$

The total volume of the composite figure is $24 + 360$ or $384\ m^3$.

Practice

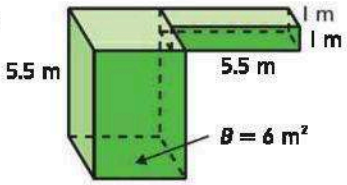
Find the volume of each composite figure.

1.



$V =$ _____

2.



$V =$ _____

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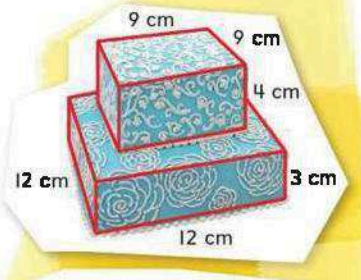
Problem Solving

3. Sumayya is decorating the cake shown. Find the volume of the cake.



_____

4. The firehouse shown is in the shape of a composite figure. How many cubic meters of space are in the firehouse?

_____

5. **Mathematical Practices** 4 **Model Math** Draw an example of a composite figure that has a volume between 750 and 900 cubic units.

My Drawing!

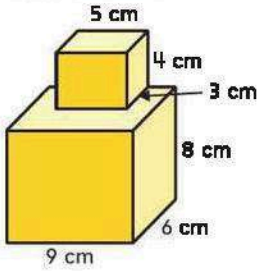
Vocabulary Check

Fill in the blank with the correct term or number to complete the sentence.

6. A _____ is made up of two or more three-dimensional figures.

Test Practice

7. What is the total volume of the composite figure?



Ⓐ 282 cm³

Ⓑ 432 cm³

Ⓒ 492 cm³

Ⓓ 502 cm³

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Name _____

Problem-Solving Investigation

STRATEGY: Make a Model

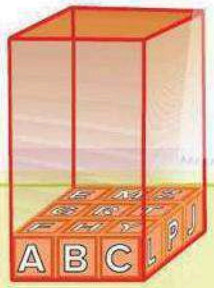
Lesson 13

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

Learn the Strategy

Humaid is helping his sister put away her alphabet blocks. To fill one layer, it takes nine blocks. If there are six layers, how many blocks would be in the box?



1 Understand

What facts do you know?

There are _____ blocks in each layer and there are six layers.

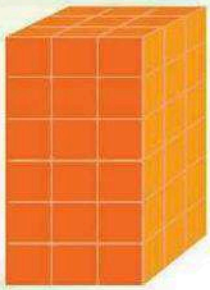
What do you need to find?

The number of blocks in the box when there are _____ layers.

2 Plan

I can solve the problem by making a _____.

3 Solve



Arrange _____ cubes in a 3 × 3 array. Stack the cubes until there are _____ layers. There are a total of _____ cubes. So, the box would have _____ blocks.

4 Check

Is my answer reasonable? Explain.

Multiply.

6 × 9 = _____

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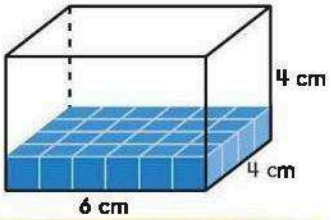
Practice the Strategy

Maryam wants to mail a package to her cousin. What is the volume of the package if it is 6 cm long, 4 cm wide, and 4 cm tall?



1 Understand

What facts do you know?

What do you need to find?

2 Plan

3 Solve

4 Check

Is my answer reasonable? Explain.

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Name

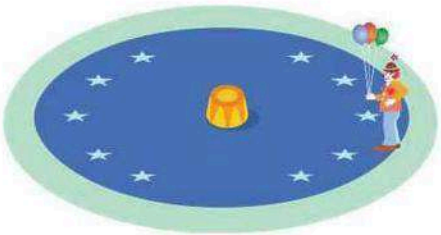
Apply the Strategy

Solve each problem by making a model.

1. On an assembly line that is 150 m long, there is a work station every 15 m. The first station is at the beginning of the line. How many work stations are there?

2. **Mathematical Practices 5** **Use Math Tools** A store is stacking cans of food into a rectangular prism display. The bottom layer has 8 cans by 5 cans. There are 5 layers. How many cans are in the display?

3. The distance around a circle is 80 m. A person stands every 10 m along the circle. How many people are there?



4. Khalid wants to arrange 18 square tiles into a rectangular shape with the least perimeter possible. Perimeter is the distance around a figure. How many tiles will be in each row?

My Work!

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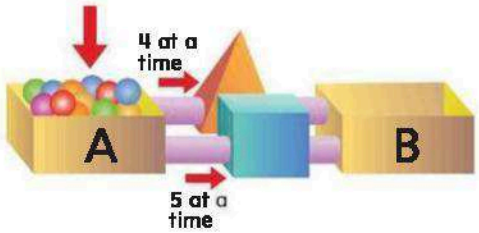
Review the Strategies

Use any strategy to solve each problem.

- Make a model.
- Guess, check, and revise.
- Look for a pattern.
- Make a table.

5. Five friends are standing in a circle and playing a game where they toss a ball of yarn to one another. If each person is connected by the yarn to each other person only once, how many lines of yarn will connect the group?

6. Mathematical Practices 8 **Look for a Pattern** In the figure below, there are 22 marbles in Box A. To go from Box A to Box B, exactly four marbles must pass through the triangular machine at a time. Exactly five marbles must pass through the square machine at a time. Describe how to move all the marbles from Box A to Box B in the fewest moves possible.



7. The volume of a rectangular prism is 5,376 cm^3. The prism is 14 cm long and 16 cm wide. How tall is the prism?

8. The table at the right shows the number of minutes Suha spent practicing the trumpet over the last 7 days. If she continues this pattern of practicing, in how many days will she have practiced 340 minutes?

Day	Time (min)
1	20
2	20
3	35
4	20
5	20
6	35
7	20

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Name _____

MY Homework

Lesson 13

Problem Solving: Make a Model

Homework Helper

Khalaf wants to build a brick wall. Each brick layer is 3 cm thick, and the wall will be 18 cm tall. How many layers will it have?

1 Understand

What facts do you know?

Each brick layer is 3 cm thick. The wall will be 18 cm tall.

What do you need to find?

the number of layers the wall will have

2 Plan

Solve the problem by making a model.

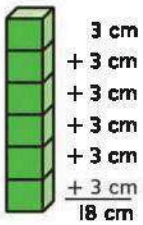
3 Solve

Make a model of the wall by using cubes.

Each cube represents a 3 cm brick.

He needs 6 cubes to build the 18 cm wall.

So, the wall would have 6 layers.



3 cm
+ 3 cm
+ 3 cm
+ 3 cm
+ 3 cm
+ 3 cm
18 cm

4 Check

Is my answer reasonable? Explain.

Multiply. $6 \times 3 = 18$ cm

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Problem Solving

Solve each problem by making a model.

1. Khalifa and Rashid are designing a coffee table using 4 cm tiles. Khalifa uses 30 tiles and Rashid uses half as many. How many total tiles did they use?

   If the area of the table is 36 cm by 24 cm, will they have enough tiles to cover the table? If not, how many more will they need?

2. Khamis family is landscaping their yard. Their yard is 160 m^2 and one side is 10 m long. What is the length of the other side of the yard?

   If they plant 3 bushes that need to be 3 m apart and 3 m away from the fence around the yard, will they have the space?

3. Rasheed is organizing his closet. He has clothing bins that measure 20 cm high, 18 cm wide, and 14 cm long. How many bins can he fit in a 60 cm long closet that is 36 cm deep and 72 cm high?

4. **Mathematical Practices** 4 **Model Math** Zayed is organizing his pantry. If he has cracker boxes as shown, how many boxes can he fit on a 20 cm long shelf that is 14 cm deep?

My Work!

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Review

Chapter 13
Geometry

Vocabulary Check

Match each word to its definition. Write your answers on the lines provided.

1. **equilateral triangle** _____
2. **composite figure** _____
3. **parallelogram** _____
4. **volume** _____
5. **rectangular prism** _____
6. **regular polygon** _____
7. **triangular prism** _____
8. **obtuse triangle** _____
9. **face** _____
10. **polygon** _____
11. **square** _____
12. **pentagon** _____

A. a three-dimensional figure with six rectangular faces, twelve edges, and eight vertices

B. a flat surface of a three-dimensional figure

C. a triangle with one obtuse angle

D. a closed figure made up of line segments that do not cross each other

E. a figure made up of two or more three-dimensional figures

F. a polygon with five sides

G. a prism with two congruent triangular bases

H. a polygon with congruent sides and all congruent angles

I. a quadrilateral with opposite sides both parallel and congruent

J. a triangle with three congruent sides

K. the amount of space within a three-dimensional figure

L. a rectangle with four congruent sides

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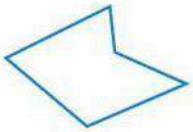
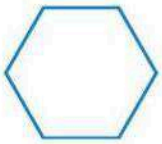
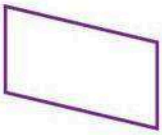
Concept Check

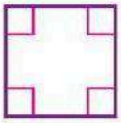
Name each polygon. Determine if it appears to be *regular* or *not regular*.

13. 

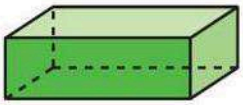
14. 

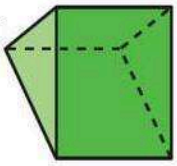
Describe the attributes of each quadrilateral. Then classify the quadrilateral.

15. 

16. 

Describe the faces, edges, and vertices of each three-dimensional figure. Then identify it.

17. 

18. 

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Name _____

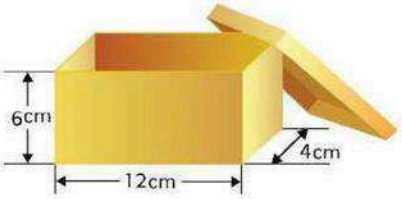
Problem Solving

19. A triangle forms the front of the Pantheon in Rome, Italy. Classify the triangle based on its sides. Then classify it based on its angles.

_____

_____

20. Omar keeps his photos in a box like the one shown.



What is the area of the box?

_____

21. Ali wants to build a long train track. If each piece of track is 6 cm long, and he has 42 pieces, can he make a track that is 20 m long?

_____

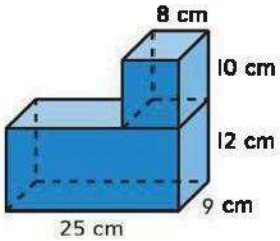
Can he make a track that is 22 m long?

_____

My Work!

Test Practice

22. Find the volume of the composite figure.



Ⓐ 2,700 cm^3 Ⓒ 3,420 cm^3

Ⓑ 2,780 cm^3 Ⓓ 3,660 cm^3

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Reflect

Chapter 13

Answering the
ESSENTIAL QUESTION

Use what you learned about geometry to complete the graphic organizer.

ESSENTIAL QUESTION

How does geometry help me solve problems in everyday life?

Faces, Edges, and Vertices

Vocabulary

Real-World Example

Now reflect on the ESSENTIAL QUESTION **Write your answer below.**

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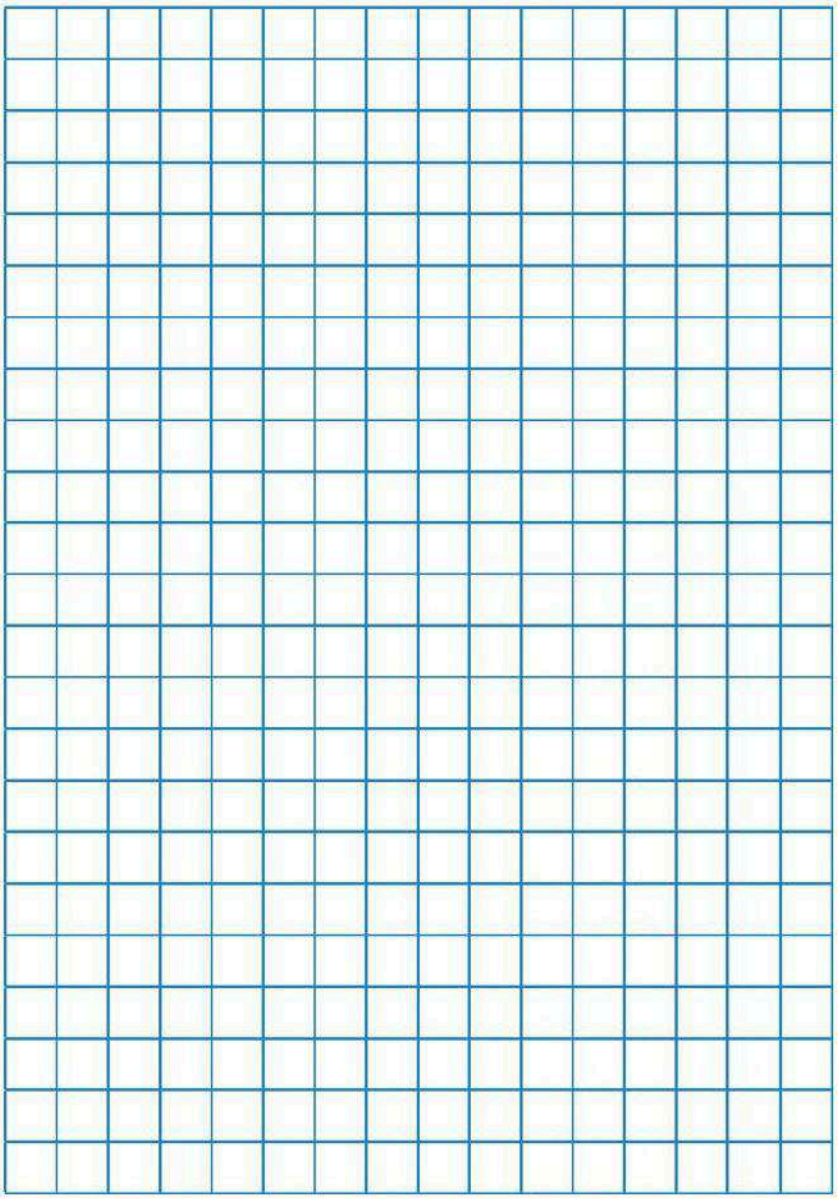
Name & Date

Work Mat 3: Centimeter Grid



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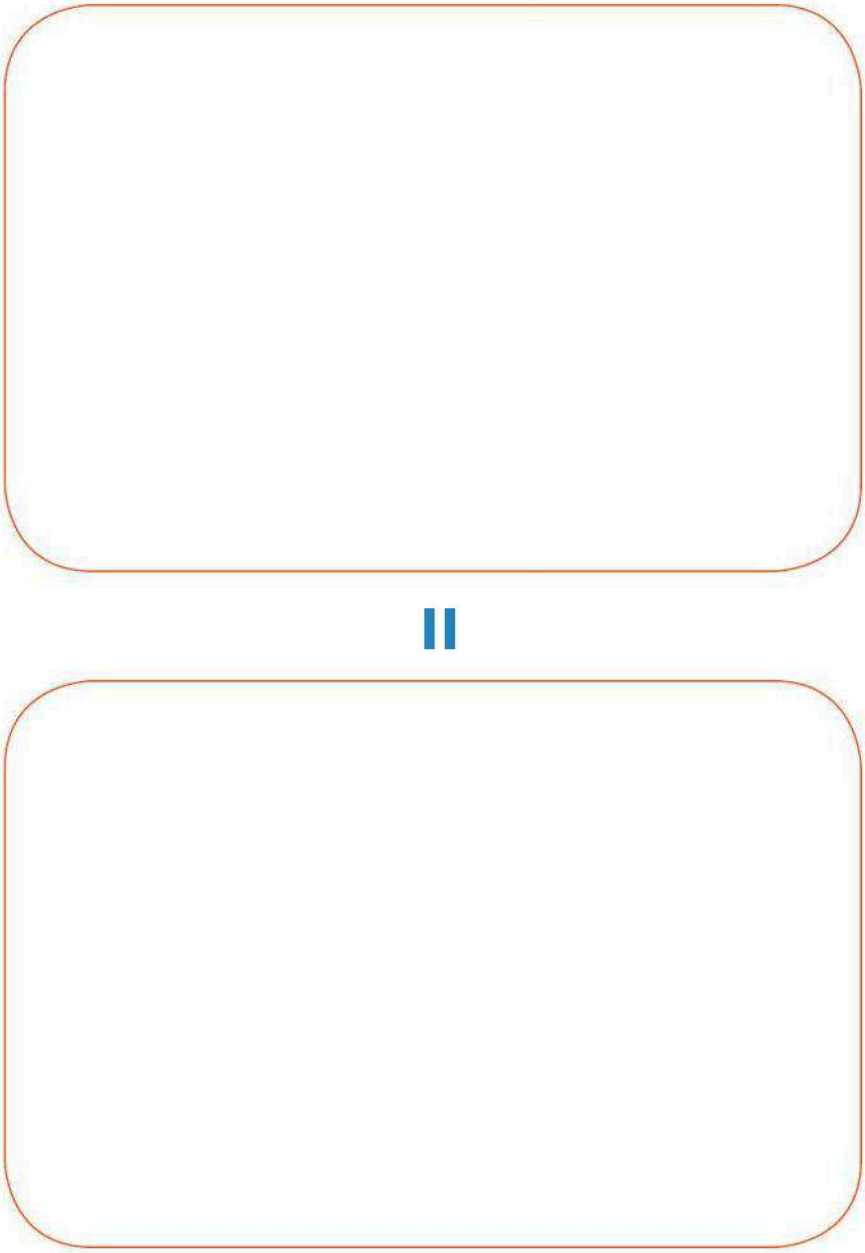
Work Mat 6: Algebra Mat



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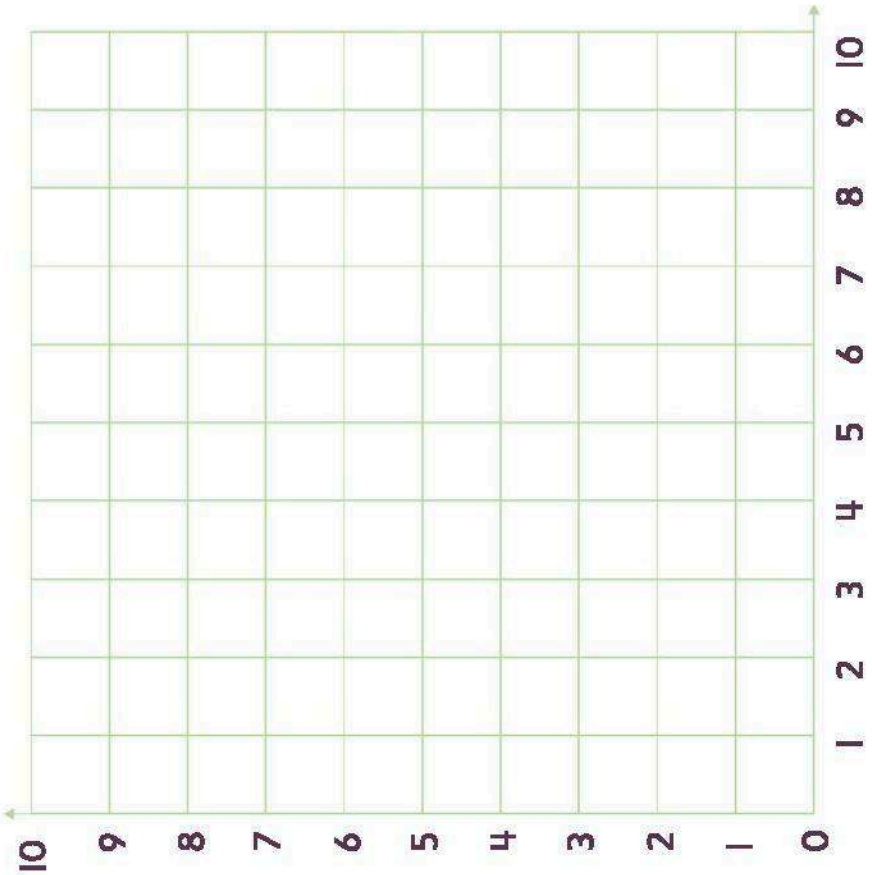
Name & Date

Work Mat 7: First-Quadrant Grid



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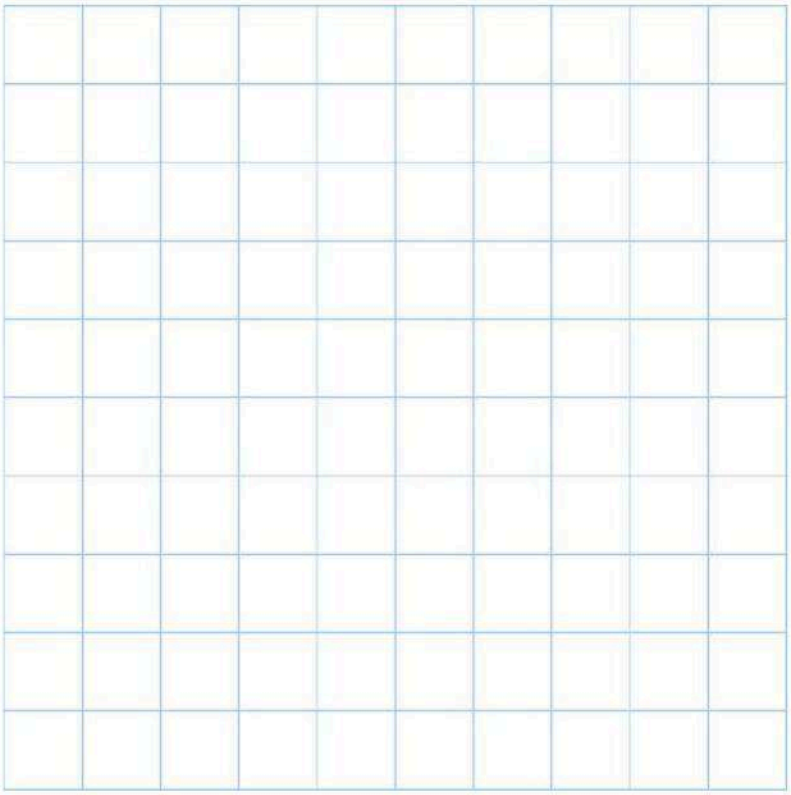
Work Mat 8: First-Quadrant Grid (blank)



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Name & Date

Work Mat 9: Multiplication Fact Table, To 12

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

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