UNITED ARAB EMIRATES
MINISTRY OF EDUCATION

YEAR OF TOLERANCE

TEACHER EDITION

2018 - 2019

McGraw-Hill Education

Mathematics

6

General Stream

United Arab Emirates Edition

Interactive Student Guide

مجموعات فخر الوطن وعام زايد

2019
عام التسامح

Mc Graw Hill Education

Answer Key

McGraw-Hill Education

Mathematics

General Stream

United Arab Emirates Edition

Interactive Student Guide

2018 - 2019

6

مجموعات فخر الوطن وعام زايد

Mc Graw Hill Education

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 1 Guided Writing

Area of Parallelograms

HOW does finding the area of a parallelogram relate to finding the area of a rectangle?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
See students' work

2. What key words do you see in the question?
area, parallelogram, rectangle

For Exercises 3 and 4, write the name of each figure on the line provided.

3. 

rectangle

4. 

parallelogram

5. The number of square units needed to cover the inside of a figure is its **area**.

6. What operation is used to find the areas of rectangles and parallelograms?
multiplication

7. To find the area of a rectangle, multiply **length** and **width**.

8. To find the area of a parallelogram, multiply **base** and **height**.

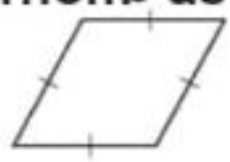
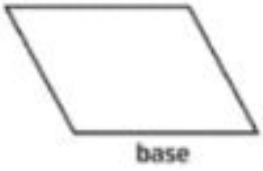
HOW does finding the area of a parallelogram relate to finding the area of a rectangle?
Finding the area of a parallelogram is similar to finding the area of a rectang
Instead of multiplying the length and the width, a parallelogram's area is found by multiplying the base and the height.

NAME _____ DATE _____ PERIOD _____

Lesson 1 Vocabulary

Area of Parallelograms

Use the two column chart to organize the vocabulary in this lesson. Then write the definition of each word. Sample answers are given.

Term	Definition
polygon	a simple closed figure formed by three or more straight line segments
parallelogram 	a quadrilateral with opposite sides parallel and opposite sides congruent
rhombus 	a parallelogram having four congruent sides
base 	any side of a parallelogram
height 	the shortest distance from the base of a parallelogram to its opposite side
formula $A = bh$ $A = \ell w$	an equation that shows the relationship among certain quantities

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 2 Guided Writing

Area of Triangles

HOW can you use the area of a parallelogram to find the area of a triangle?

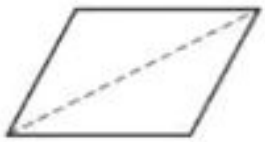
Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   area, parallelogram, triangle

3. You multiply the base and height to find the area of a **parallelogram**.

4. The dotted line divides this parallelogram into two equal **triangles**.



5. The area of the parallelogram above is 40 square units. What is the area of one triangle?
   20 square units

6. How do you know?
   The area of one triangle is half the area of the parallelogram.

7. Write a number sentence that shows how to find the area of the triangle.
   40 square units ÷ 2 = 20 square units

HOW can you use the area of a parallelogram to find the area of a triangle?
The area of the triangle is one half the area of a parallelogram with the same base and height.

NAME _____ DATE _____ PERIOD _____

Lesson 2 Vocabulary

Area of Triangles

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

congruent

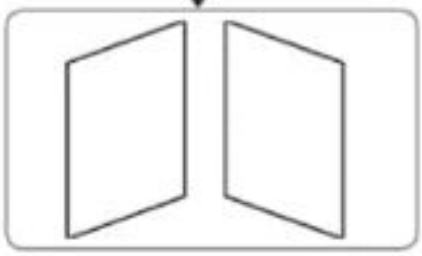
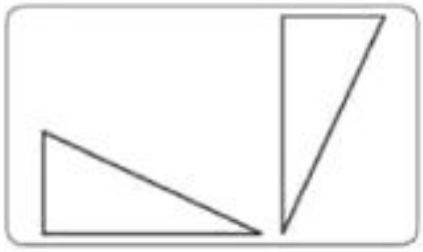
Characteristics (What is it like?)

- have the same area
- corresponding sides have equal measures
- corresponding angles have equal measures

Description

figures that are the same size and shape

Examples

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 3 Guided Writing

Area of Trapezoids

HOW can you use the area of a parallelogram to find the area of a corresponding trapezoid?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   area, parallelogram, trapezoid

3. What is the name of the figure is shown? **trapezoid**

4. What is the name of the figure formed by the two congruent trapezoids? **parallelogram**

5. To find the area of a parallelogram, multiply **base** and **height** .

6. What is the area of the parallelogram if the base is 12 units and the height is 4 units? Write the multiplication sentence.
   $12 \times 4 = 48$ square units

7. What is the area of the trapezoid? **24 square units**

8. How do you know? **It is one half the area of the parallelogram.**

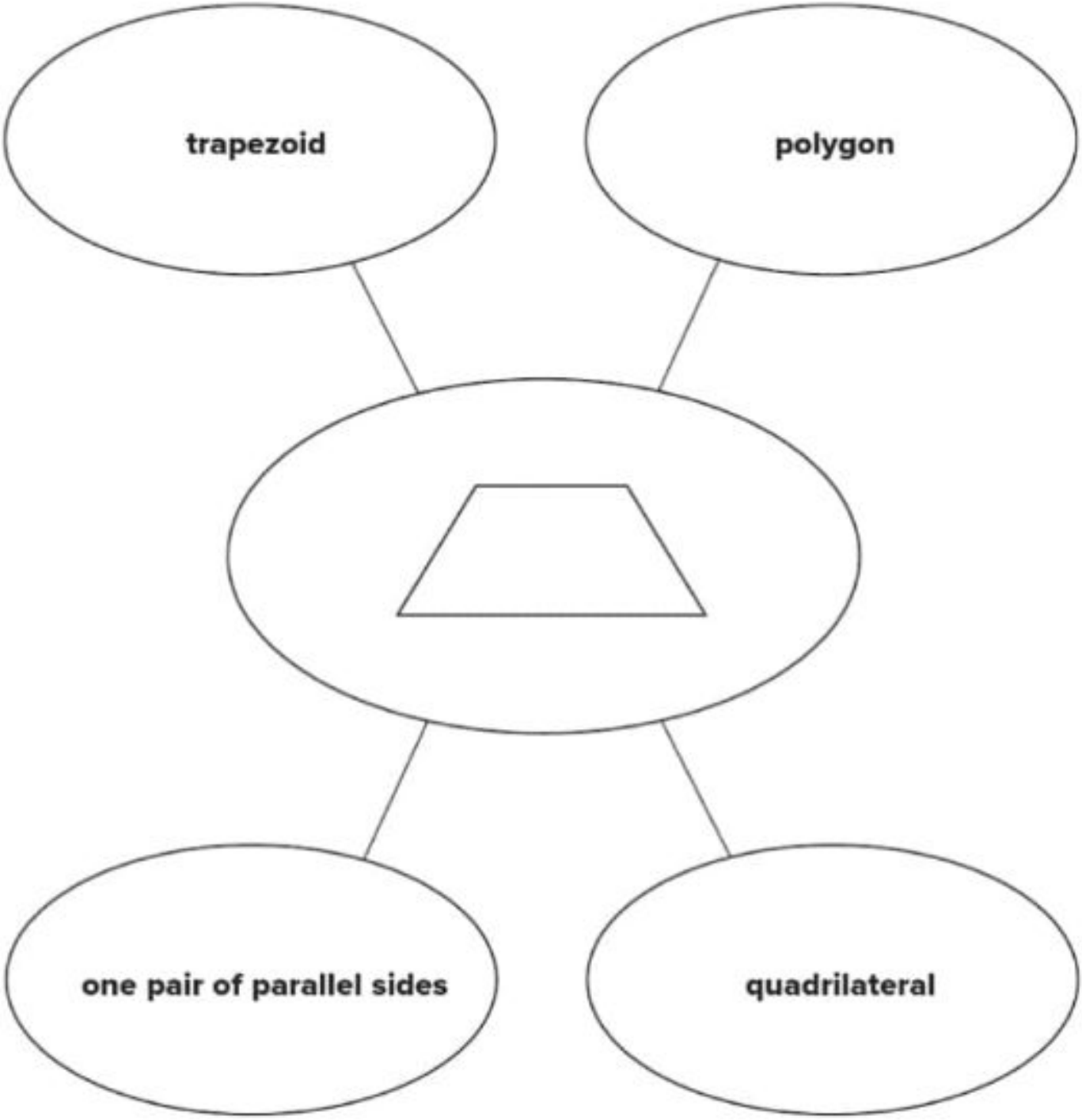
HOW can you use the area of a parallelogram to find the area of a corresponding trapezoid?
The trapezoid is one half the area of the related parallelogram.

NAME _____ DATE _____ PERIOD _____

Lesson 3 Review Vocabulary

Area of Trapezoids

Use the concept web to name the characteristics of the shape. Sample answers are given.



NAME _____ DATE _____ PERIOD _____

Lesson 4 Review Vocabulary

Changes in Dimension

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

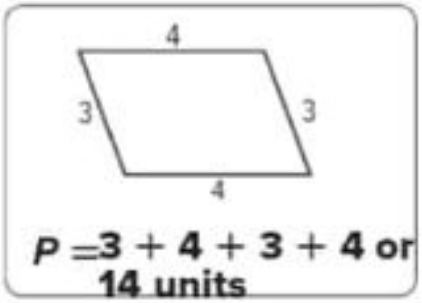
perimeter

Characteristics (What is it like?)

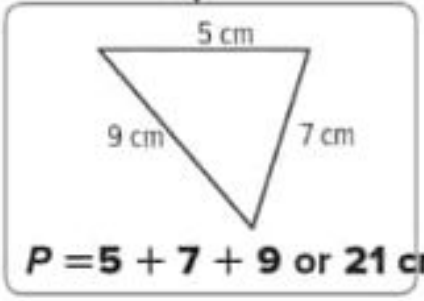
- measured in units
- sum of lengths of each side of polygon
- can be changed by a factor of x if the dimensions are multiplied by x

Description

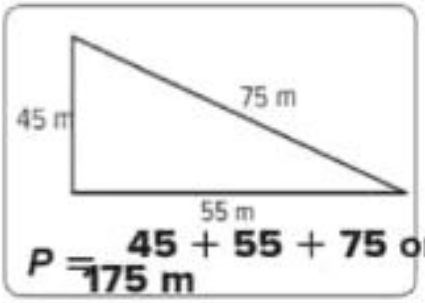
the distance around a figure



$P = 3 + 4 + 3 + 4$ or 14 units



$P = 5 + 7 + 9$ or 21 cm



$P = 45 + 55 + 75$ or 175 m

Find the perimeter of each figure.

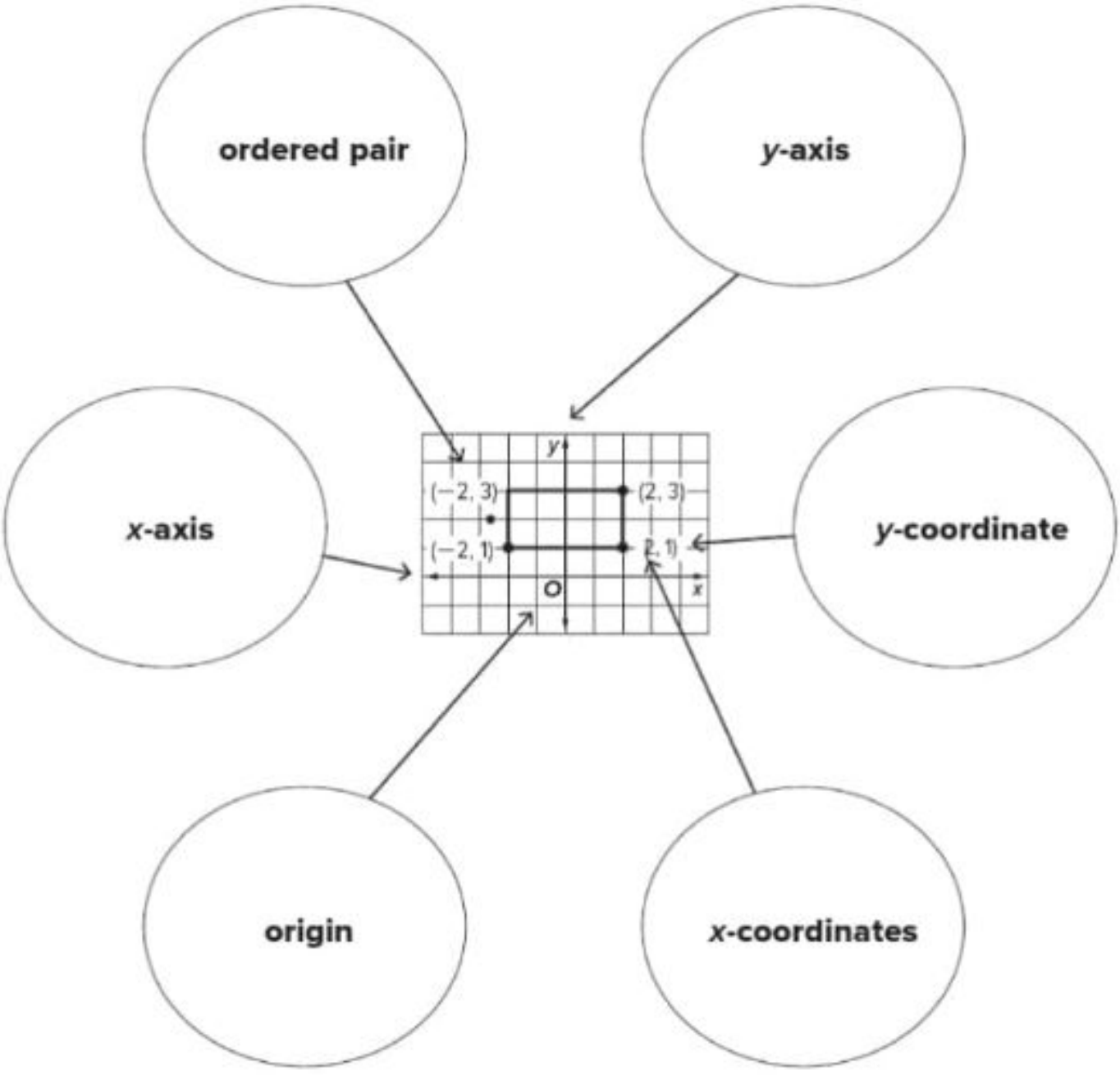
NAME _____ DATE _____ PERIOD _____

Lesson 5 Review Vocabulary

Polygons on the Coordinate Plane

Use the concept web to identify the parts of the coordinate plane. Sample answers are given.

Word Bank		
ordered pair	*x*-axis	*y*-axis
origin	*x*-coordinate	*y*-coordinate



NAME _____ DATE _____ PERIOD _____

Inquiry Lab 4 Guided Writing

Area of Irregular Figures

HOW can you estimate the area of an irregular figure?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

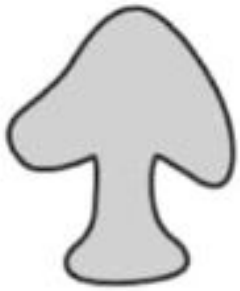
1. Rewrite the question in your ownw words.
   See students' work

2. What key words do you see in the question?
   estimate, area, irregular figure

3. A number that tells about how much is an **estimate** .

4. A figure that does not have a regular shape is an **irregular figure** .

5. An irregular figure is shown below. What two regular shapes can you see in the figure? **a triangle and a rectangle**



6. How can you estimate the area of the mushroom?
   Add the area of the triangle and the rectangle.

7. Why can't you find the exact area of the mushroom?
   The shapes that make it up are not exact.

HOW can you estimate the area of an irregular figure?
Estimate the area of an irregular figure by dividing it into simpler shapes. Find the area of each of the simpler shapes and add them to estimate the tot area of the figure.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Notetaking

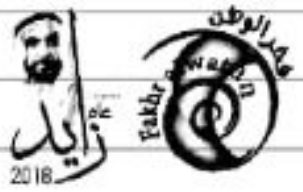
Area of Composite Figures

Use Cornell notes to better understand the lesson's concepts. Complete each sentence by filling in the blanks with the correct word or phrase.

Questions	Notes
1. How do I find the area of a composite figure?	I can **decompose** the composite shape into figures with **areas** I know how to find. Then I can add those **areas** .
2. How do I find the area of an overlapping figure?	First I find the **area** of each overlapping shape. Then I **add** those areas. Next I find the **area** of the overlapping section. Then I **subtract** the overlapping area.

Summary

How can you decompose figures to find ar **See students' work.**



NAME _____ DATE _____ PERIOD _____

Inquiry Lab 5 Guided Writing

Volume of Rectangular Prisms

HOW can you use models to find volume?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   models, volume

3. **Volume** is the amount of space inside a three-dimensional figure.

4. What three dimensions are multiplied to find the volume of a rectangular prism?
   length, width, and height

5. Volume is measured in **cubic** units.

6. What type of three-dimensional figure is best for modeling area? **cubes**

7. What are some items shaped like a cube?
   number cube, sugar cube, candy

8. If 16 centimeter cubes are used to make a rectangular prism, what is the area of the figure? **16 cubic centimeters**

HOW can you use models to find volume?

You can use cubes to model the dimensions of a rectangular prism.
The dimensions tell the height, width, and length of the prism.
The volume is determined by the number of cubes used to build the model.

NAME _____ DATE _____ PERIOD _____

Lesson 1 Vocabulary

Volume of Rectangular Prisms

Use the two column chart to organize the vocabulary in this lesson. Then write the definition of each word. Sample answers are given.

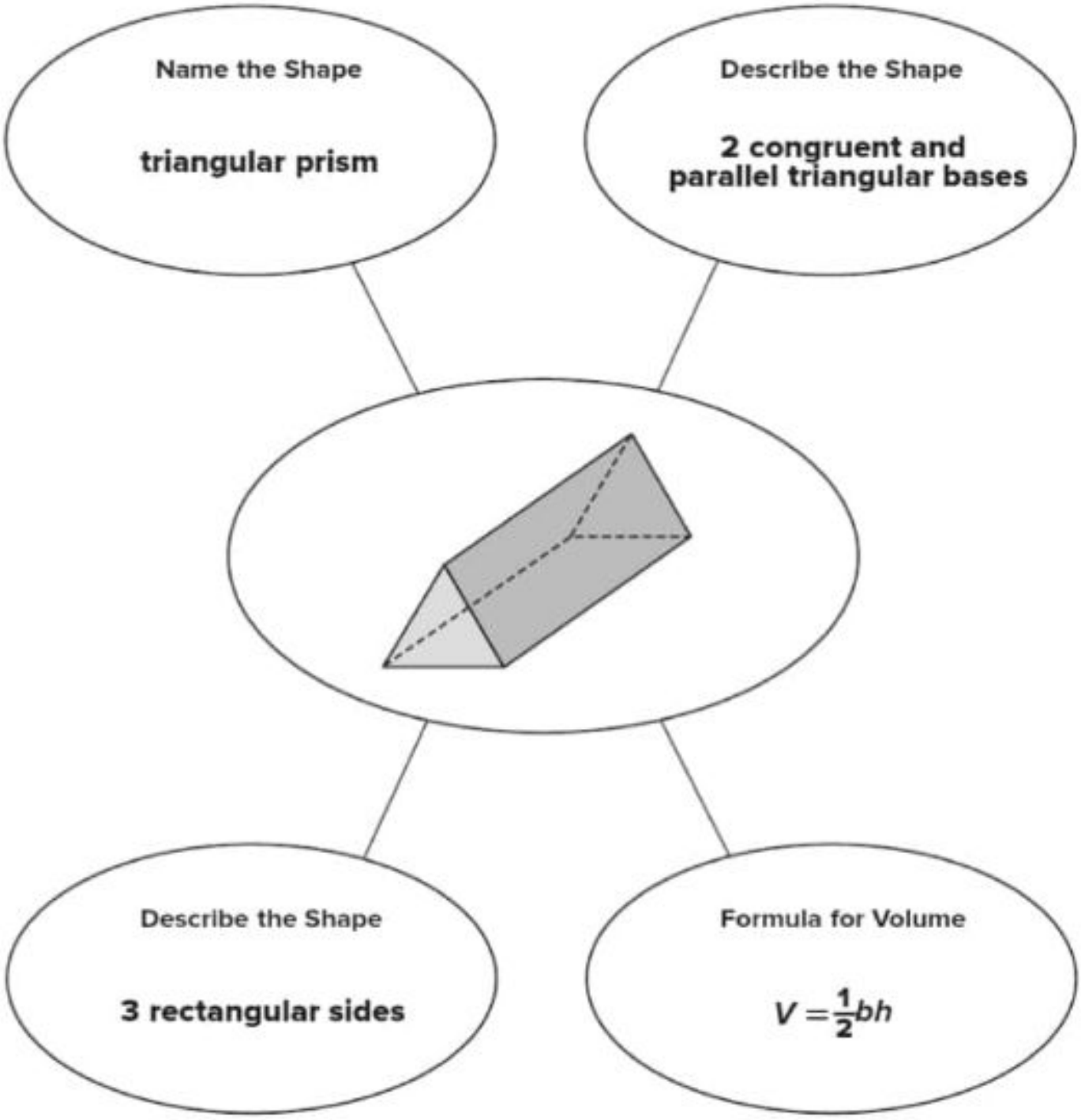
Term	Definition
three-dimensional figure	a figure with length, width, and height
prism	a three-dimensional figure with at least three rectangular lateral faces and top and bottom faces parallel
rectangular prism 	a prism that has rectangular bases
volume	the amount of space inside a three-dimensional figure
cubic units	used to measure volume; tells the number of cubes of a given size it will take to fill a three-dimensional figure

NAME _____ DATE _____ PERIOD _____

Lesson 2 Vocabulary

Volume of Triangular Prisms

Use the concept web to show what you know about the three-dimensional shape shown. Name the shape and write the formula used to find the volume in two of the pieces of the web. Sample answers are given.



NAME _____ DATE _____ PERIOD _____

Inquiry Lab 2 Guided Writing

Surface Area of Rectangular Prisms

HOW can you use nets to find surface area?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   nets, surface area

3. A **net** is a two-dimensional pattern of a three-dimensional figure.

4. Each flat side of a three-dimensional figure is called a **face**.

5. Name some real-life examples of rectangular prisms.
   tissue box, pack of gum, box of popcorn

6. How many faces does a rectangular prism have? **six**

7. You used a net to find the area of each face of a rectangular prism. How would you find the total surface area of the rectangular prism?
   I would add the areas for each of the six faces.

HOW can you use nets to find surface area?

Nets help you determine the area of each face of a rectangular prism. Add th areas of the faces to find the surface area.

NAME _____ DATE _____ PERIOD _____

Lesson 3 Vocabulary

Surface Area of Rectangular Prisms

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

surface area

Define the variables.

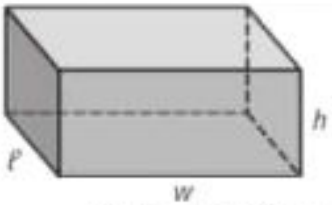
Description

sum of the areas of all the faces of a 3-dimensional figure

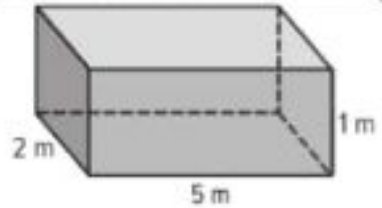
ℓ = **length**

w = **width**

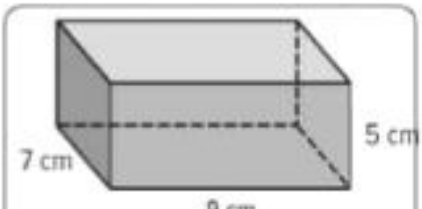
h = **height**



S.A. = $2\ell h + 2\ell w + 2hw$ units^2



S.A. = 34 m^2



S.A. = 224 cm^2

Find the surface area of each rectangular prism.

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 3 Guided Writing

Nets of Triangular Prisms

HOW is the area of a triangle related to the surface area of a triangular prism

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   area, triangle, surface area, triangular prism

3. What is a net?
   a two-dimensional figure that can be used to build a three-dimensional figure

4. How many faces does a triangular prism have? **5**

5. What shape are the bases of a triangular prism? **triangles**

6. How do you find the area of a triangle? **$\frac{1}{2} \times$ base $\times$ height**

7. What shape are the other faces of a triangular prism? **rectangles**

8. How do you find the area of a rectangle? **length $\times$ width**

HOW is the area of a triangle related to the surface area of a triangular prism?

If you know the area of a triangle, you can find the area of the bases of a triangular prism. Add the area of the bases of a triangular prism to the combined area of the other faces to find the surface area of the figure.

NAME _____ DATE _____ PERIOD _____

Lesson 4 Review Vocabulary

Surface Area of Triangular Prisms

Use the concept web to find the surface area of the triangular prism. Identify the shape of each face. Find the area of each face. Then find the total surface area.

Shape triangle

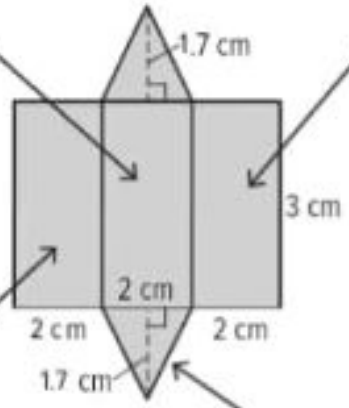
Area: $\frac{1}{2}(2)1.7 = 1.7 \text{ cm}^2$

Shape: rectangle

Area: $2(3) = 6 \text{ cm}^2$

Shape: rectangle

Area: $2(3) = 6 \text{ cm}^2$



Shape rectangle

Area: $2(3) = 6 \text{ cm}^2$

Shape: triangle

Area: $\frac{1}{2}(2)1.7 = 1.7 \text{ cm}^2$

Total Surface Area = $1.7 + 1.7 + 6 + 6 + 6$ or 21.4 cm^2

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 4 Guided Writing

Nets of Pyramids

HOW is the area of a triangle related to the surface area of a square pyramid

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work

2. What key words do you see in the question?
   area, triangle, surface area, square pyramid

3. How many faces does a square pyramid have? **5**

4. What shape is the base of a square pyramid? **square**

5. How do you find the area of a square? **side × side**

6. What shape are the other faces of a square pyramid? **triangles**

7. How do you find the area of a triangle? **$\frac{1}{2}$ × base × height**

HOW is the area of a triangle related to the surface area of a square pyramid?

If you know the area of a triangle, you can find the area of the triangular face of the pyramid. Add the area of the square base to the area of the triangular faces to find the surface area of the square pyramid.

NAME _____ DATE _____ PERIOD _____

Lesson 5 Vocabulary

Surface Area of Pyramids

Use the vocabulary squares to write a definition and a sentence for each vocabulary word. Sample answers are given.

lateral surface area	**Definition** the sum of the areas of all of the lateral faces of a solid
Write the formula. $L.A. = \frac{1}{2}bp$	**Sentence** The lateral surface area is abbreviated L.A.

slant height	**Definition** the height of each lateral face
Draw an arrow showing the slant height. 	**Sentence** The slant height is used to find the surface area of a lateral face of a pyramid.

lateral face	**Definition** one side of a three-dimensional figure
Draw an arrow showing a lateral face. 	**Sentence** There are four lateral faces on a square pyramid.

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 5 Guided Writing

Volume of Pyramids

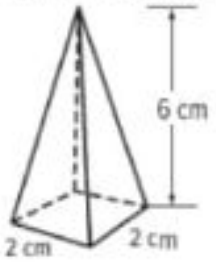
WHAT is the relationship between the volume of a prism and the volume of a pyramid with the same base area and height?

Use the exercises below to help answer the Inquiry Question. Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work.

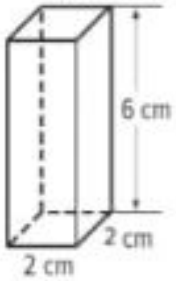
2. What key words do you see in the question?
   volume, prism, pyramid

3. Write the name of the figure shown.



pyramid

4. Write the name of the figure shown.



prism

5. Are the heights of the figures the same? **yes**
   Are the bases of the figures the same? **yes**

6. The formula for finding the **volume** of a rectangular prism is $V = \ell wh$ or $V = bh$. The volume of the prism is **24 cm³**.

7. The volume of the pyramid is 8 cm³. What fraction represents the volume of the pyramid compared to the volume of the prism? **$\frac{1}{3}$**

WHAT is the relationship between the volume of a prism and the volume of a pyramid with the same base area and height?

The volume of the pyramid is $\frac{1}{3}$ the volume of the prism.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Vocabulary

Volume of Pyramids

Use the word cards to define each vocabulary word or phrase and give an example. Sample answers are given.

Word Cards

pyramid

Definition

a polyhedron with one base that is a polygon and three or more triangular faces that meet at a common vertex

Example Sentence

If the base of a pyramid is a square, it is called a square pyramid.

Word Cards

lateral face

Definition

in a polyhedron, a face that is not a base

Example Sentence

The lateral faces of a pyramid are all triangular.

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 6 Vocabulary

Surface Area of Pyramids

Use the definition map to list qualities about the vocabulary word or phrase. Sample answers are given.

Vocabulary

pyramid

Characteristics (What it has.)

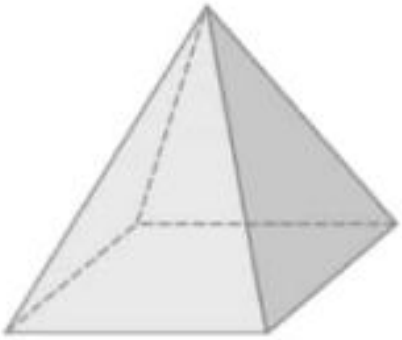
lateral face: **there are at least 3 lateral faces and they are always triangles**

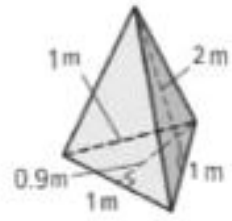
slant height: **the height of each lateral face is used to find surface area**

vertex: **lateral faces or sides meet at a common vertex**

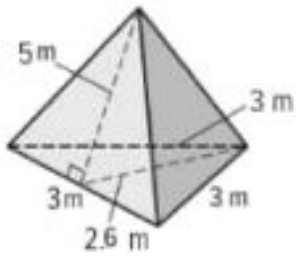
base: **the base is a polygon**

Draw a picture.

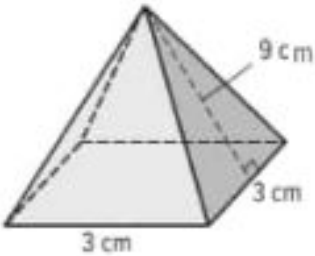




S.A. = **6.5 m²**



S.A. = **28.5 m²**



S.A. = **54 cm²**

Find the surface area of each pyramid.

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 7 Guided Writing

Composite Figures

HOW can you find the volume and surface area of a composite figure?

Use the exercises below to help answer the Inquiry Question. Write the correct word or phrase on the lines provide Sample answers are given.

1. Rewrite the question in your own words.
   See students' work.

2. What key words do you see in the question?
   volume, surface area, composite figure

3. A **composite** figure is made up of two or more three-dimensional figures.

Use the figure below to answer Exercises 4-8.

4. What two figures make up the composite figure?
   a prism and a pyramid

5. What is the formula for finding the volume of a rectangluar prism? $V = \ell wh$

6. What is the formula for finding the volume of a pyramid? $V = \frac{1}{3}Bh$

7. To find the volume of the composite figure, **add** the volumes of the figures that make up the composite figure.

8. Are the faces where the figures touch part of the surface area of the composite figure? **no**

HOW can you find the volume and surface area of a composite figure?

Add the volumes and surface areas of the figures that make up the composi figure. When finding surface area, be sure to subtract the overlapping areas.

NAME _____ DATE _____ PERIOD _____

Lesson 7 Notetaking

Volume and Surface Area of Composite Figures

Use Cornell notes to better understand the lesson's concepts. Complete each sentence by filling in the blanks with the correct word or phrase.

Questions	Notes
1. How do I find the volume of a composite figure?	Since a composite figure is made up of two or more **three-dimensional figures**, decompose the composite figure. Separate it into solids whose **volume** formulas are known. Then find the **sum** of these **volumes**.
2. How do I find the surface area of a composite figure?	Find the **areas** of the **faces** that make up the composite figure.

Summary

How did the lessons in this chapter help you find the surface area and volume of a composite figure? **See students' work.**

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 1 Guided Writing

Statistical Questions

HOW are surveys created to collect and analyze data?

Use the exercises below to help answer the Inquiry Question. Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work.

2. What key words do you see in the question?
   surveys, data

3. A **survey** is a question or set of questions used to collect information.

4. Pieces of information are called **data**.

5. What kind of questions are used in surveys?
   statistical questions; questions that allow for a variety of answers

6. Write an example of a statistical question about food.
   How many sandwiches do you eat in a week? How many cups of milk do you drink in a day?

7. Data with a wide range of values can be separated into **intervals**.

8. How do you find the equal share of a set of data?
   Divide the response total by the number of responses.

HOW are surveys created to collect and analyze data?

Surveys ask statistical questions. Statistical questions anticipate a variety of responses. You can compare the responses individually or by using intervals. Finding the equal share of the responses can also provide information about response patterns.

NAME _____ DATE _____ PERIOD _____

Lesson 1 Vocabulary

Mean

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

mean

Characteristics (What is it like?)

- also called the average
- summarizes data using a single number
- the balance point for the data set

Description

the sum of the data divided by the number of items in the data set

Examples

- {7, 3, 6, 4, 5} mean = **5**
- {27, 29, 30, 30} mean = **29**
- {10, 12, 17, 13} mean = **13**

NAME _____ DATE _____ PERIOD _____

Lesson 2 Vocabulary

Median and Mode

Use the vocabulary squares to write a definition, a sentence, and an example for each vocabulary word Sample answers are given.

measures of center	**Definition** numbers that are used to describe the center of a set of data
Find the measures of center for the following data set. (3, 4, 5, 5, 7, 9, 11, 12) measures of center: mean = 7, median = 6, mode = 5	**Sentence** Mean, median, and mode are different measures of center.

median	**Definition** the value appearing at the center, or the mean of the two central values, of a sorted version of a list of values
Find the median of the following data set. (3, 4, 5, 5, 7, 9, 11, 12) median = 6	**Sentence** If a list contains an even number of values, the median is the mean of the two central values.

mode	**Definition** the number or numbers that appear most often in a set of data
Find the mode of the following data set. (3, 4, 5, 5, 7, 9, 11, 12) mode = 5	**Sentence** If there are two or more numbers that occur most often, all of them are modes in the data set.

NAME _____ DATE _____ PERIOD _____

Problem-Solving Investigation

Use Logical Reasoning

Case 3 Marketing

A survey showed that **70** customers bought **white bread, 63** bought **wheat bread**, and **35** bought **pita bread**.

Of those who bought exactly two types of bread, **12** bought **wheat and white, 5** bought white and pita, and **7** bought **wheat and pita.**

Two customers **bought all three**.

How many customers bought only wheat bread?

- Understand:
- Plan:
- Solve:
- Check:

Case 4 Pets

Dr. Amani is a veterinarian.

One week she treated **20 hamsters, 16 cats**, and **11 birds**.

Some owners had more than one pet, as shown in the table.

How many owners had **only a hamster** as a pet?

Pet	Number of Owners
hamster and cat	7
hamster and bird	5
cat and bird	3
hamster, cat and bird	2

- Understand:
- Plan:
- Solve:
- Check:

NAME _____ DATE _____ PERIOD _____

Lesson 3 Vocabulary

Measures of Variation

Use the two column chart to organize the vocabulary in this lesson. Then write the definition of each word. Sample answers are given.

Term	Definition
measures of variation	a measure used to describe the distribution of data
quartiles	values that divide a data set into four equal parts
first quartile	For a data set with the median *M*, the first quartile is the median of the data values less than *M*.
third quartile	For a data set with the median *M*, the third quartile is the median of the data values greater than *M*.
interquartile range	a measure of variation in a set of numerical data; the distance between first and third quartiles of the data set
range	the difference between the greatest number and the least number in a set of data
outliers	a data value that is either much *greater* or much *less* than the median

NAME _____ DATE _____ PERIOD _____

Lesson 4 Notetaking

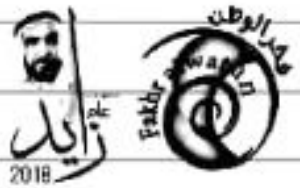
Mean Absolute Deviation

Use Cornell notes to better understand the lesson's concepts. Complete each sentence by filling in the blanks with the correct word or phrase.

Questions	Notes
1. How do I find the mean absolute deviations for a data set?	I find the **sum** of the distances between each data value and the **mean**, then I **divide** by the number of data values.
2. How do I compare mean absolute deviations for two data sets?	The data set with a **smaller** mean absolute deviation has data values that are **closer** to the mean than a data set with a **greater** mean absolute deviation.

Summary

What does the mean absolute deviation tell you about a set of d… **See students' work.**

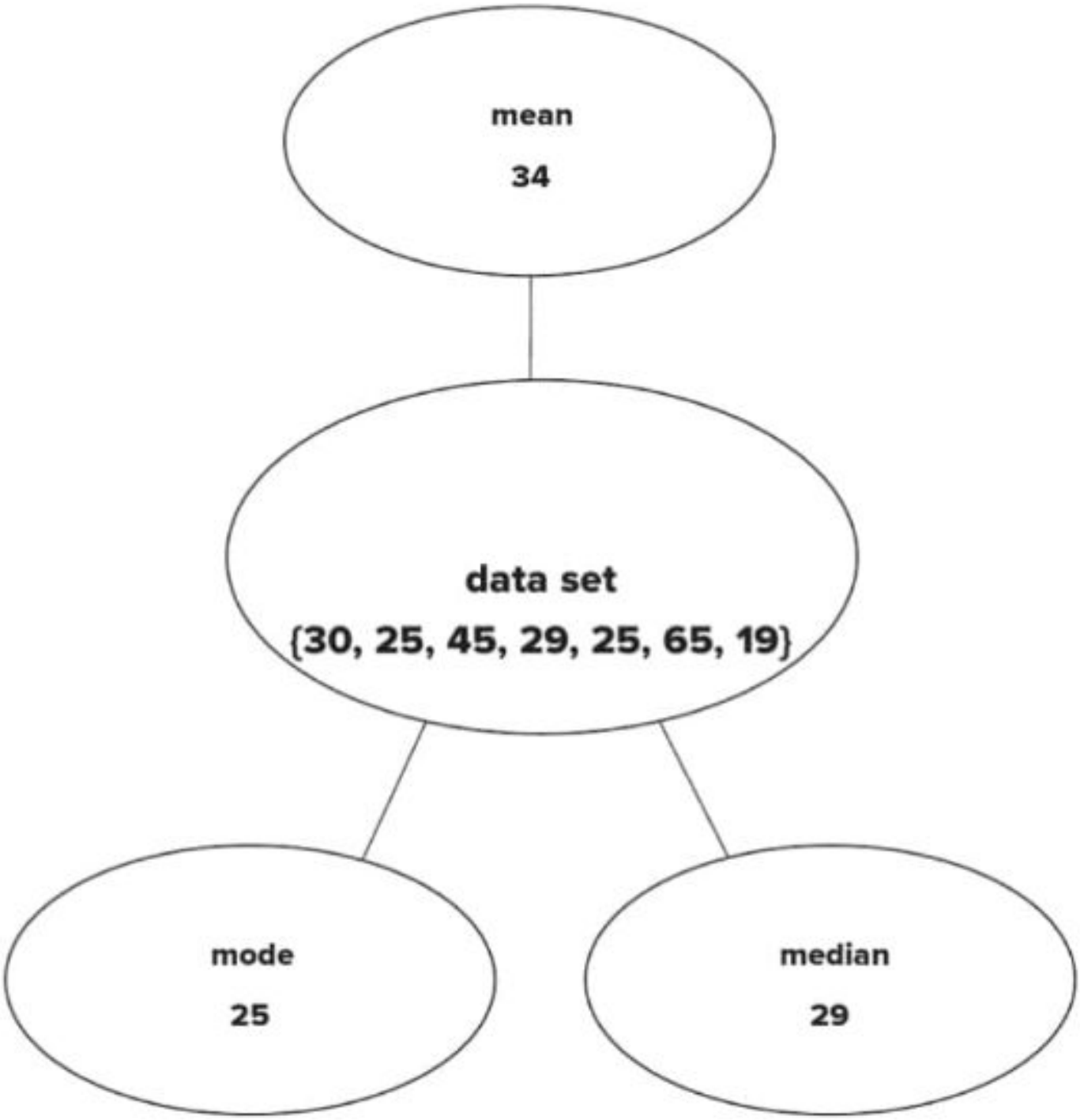


NAME _____ DATE _____ PERIOD _____

Lesson 5 Review Vocabulary

Appropriate Measures

Use the concept web to describe the data set using the measures of center. Sample answers are given.



Which measure of center best describes the data set? **median**

NAME _____ DATE _____ PERIOD _____

Lesson 1 Vocabulary

Line Plots

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

line plot

Characteristics: What it is.

- also called a dot plot
- usually a dot or an X are used as the marks
- shows the frequency of data

Description

visual display of data values where each data value is shown as a mark about a number line

Number of Cars			
2	3	2	1
0	4	2	0
0	1	2	3
1	3	1	2

Draw a line plot for the given data.

NAME _____ DATE _____ PERIOD _____

Lesson 2 Vocabulary

Histograms

Use the word cards to define each vocabulary word or phrase and give an example. Sample answers are given.

Word Cards

histogram

Definition

a type of bar graph used to display numerical data organized into equal intervals

Example Sentence

The temperatures were displayed in a histogram with intervals of ten degrees.

Word Cards

frequency distribution

Definition

the quantity of pieces of data that are in each interval

Example Sentence

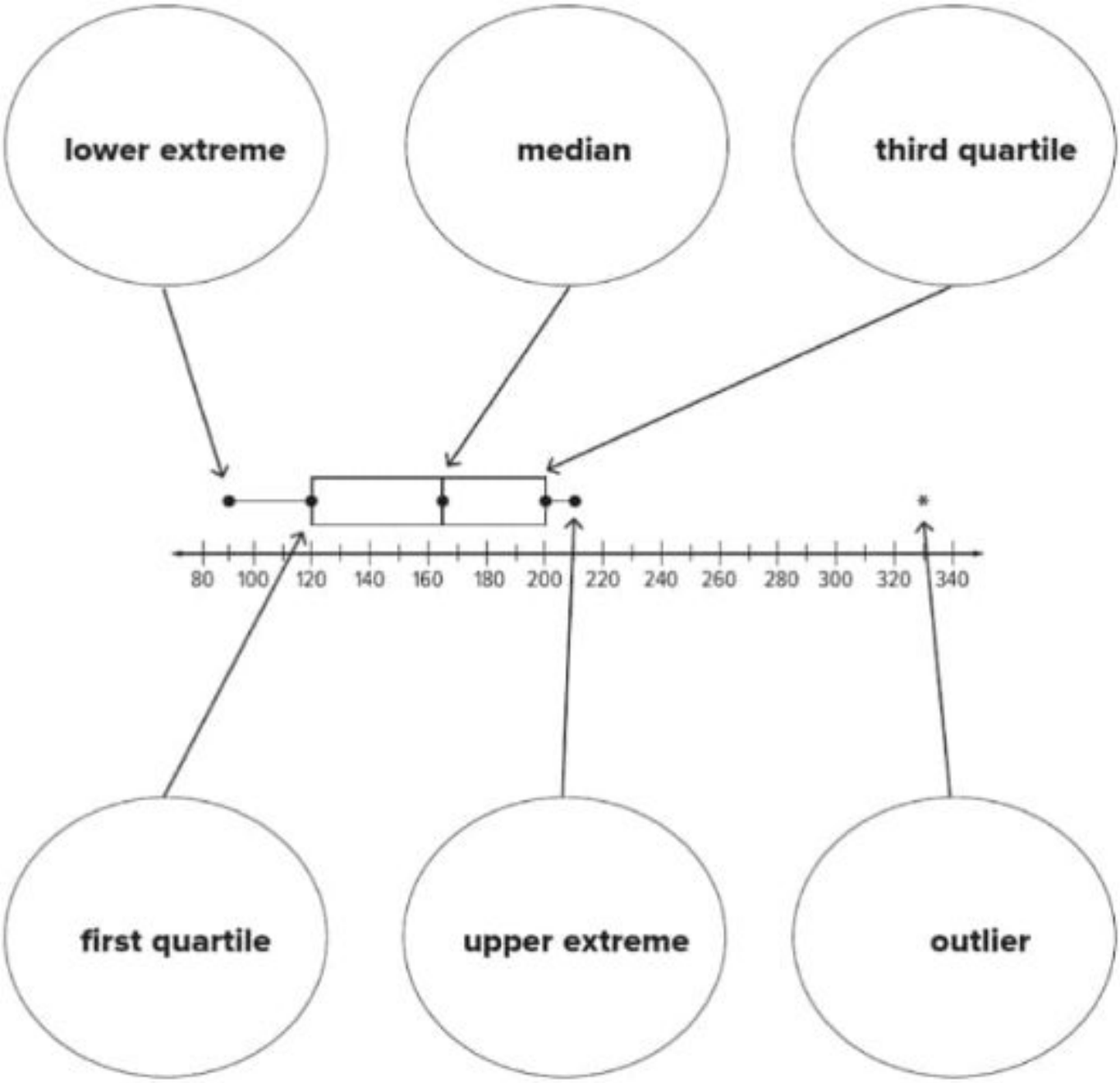
The frequency distribution showed that most temperatures were in the interval 70 – 79.

NAME _____ DATE _____ PERIOD _____

Lesson 3 Review Vocabulary

Box Plots

Use the concept web to identify the parts of a box plot.



NAME _____ DATE _____ PERIOD _____

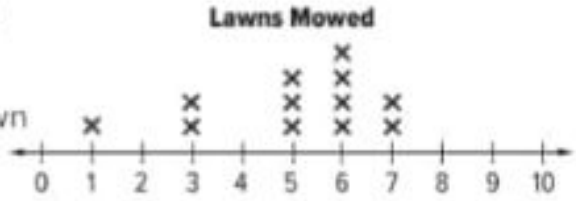
Problem-Solving Investigation

Use a Graph

Case 3 Lawn Mowing

Jamal mowed lawns over the summer to earn extra money.

The number of lawns he mowed each week is shown in the line plot.

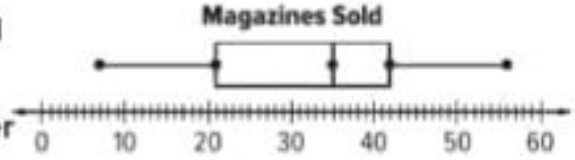


What is the **mean number of lawns he mowed**?

- Understand:
- Plan:
- Solve:
- Check:

Case 4 Magazines

The **box plot** shows the **number of magazines sold** for a club fundraiser.



What is the **difference** between the **median number** of magazines sold and **the most** magazines sold?

- Understand:
- Plan:
- Solve:
- Check:

NAME _____ DATE _____ PERIOD _____

Lesson 4 Vocabulary

Shape of Data Distributions

Use the two column chart to organize the vocabulary in this lesson. Then write the definition of each wor **Sample answers are given.**

Term	Definition
distribution	the arrangement of data values
symmetric distribution	data that are evenly distributed
cluster	data that are grouped closely together
gap	an empty space or interval in a set of data
peak	the most frequently occurring value in a line plot

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 1 Guided Writing

Collect Data

HOW do you answer a statistical question?

Use the exercises below to help answer the Inquiry question. Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
   See students' work.

2. What key words do you see in the question?
   answer, statistical question

3. When do you use a statistical question?
   collecting data; conducting a survey

4. Fill in the blanks to explain the steps of answering a statistical question:

   a. Create a plan to collect **data** .

   b. Conduct a **survey** to collect data from a group of people.

   c. Create a table or graph to **display** the data.

5. Name some ways you can display data.
   line plot, histogram, bar graph, box plot

HOW do you answer a statistical question?

Create a data collection plan. Next, collect data from as many people as possible. Finally, create and share an organized display of the data.

NAME _____ DATE _____ PERIOD _____

Lesson 5 Vocabulary

Interpret Line Graphs

Use the definition map to list qualities about the vocabulary word or phrase.
Sample answers are given.

Vocabulary

line graph

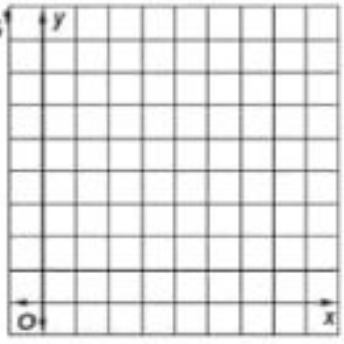
Characteristics: What it is.

- graph has a scale and interval
- pairs of data are graphed
- line is drawn to connect data points

Description

shows how a set of data changes over a period of time

See students' work.



Create a data set in the table. Then draw a line graph of the data.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Review Vocabulary

Select an Appropriate Display

Use the two column chart to organize the vocabulary in this lesson. Then write the definition of each word. Sample answers are given.

Term	Definition
bar graph	a graph that compares data by using bars of different lengths or heights to show the values
box plot	a diagram that is constructed using five values: median, first and third quartiles, and lower and upper extreme values
histogram	a type of bar graph used to display numerical data that have been organized into equal intervals
line graph	a graph used to show how a set of data changes over a period of time
line plot	a diagram that shows the frequency of data on a number line; also known as a dot plot

NAME _____ DATE _____ PERIOD _____

Inquiry Lab 2 Guided Writing

Use Appropriate Units and Tools

HOW do you determine a measureable attribute?

Use the exercises below to help answer the Inquiry Question.
Write the correct word or phrase on the lines provided. Sample answers are given.

1. Rewrite the question in your own words.
See students' work.

2. What key words do you see in the question?
measureable attribute

3. Name some features of a box that you can measure.
length, height, width, weight, capacity

4. What tool would you use to measure length? **ruler or meter stick**

5. What tool would you use to measure weight? **balance scale**

For Exercises 6–8, list units you could use to measure each attribute.

6. capacity or volume **liters, milliliters**

7. length **meters, centimeters, kilometers**

8. weight or mass **grams, kilograms**

9. Would you use centimeters, meters, or kilometers to record the length of a pencil?
centimeters

10. What interval would you use for a graph scale that shows lengths of pencils?
$\frac{1}{2}$-centimeter or 1-centimeter

HOW do you determine a measureable attribute?

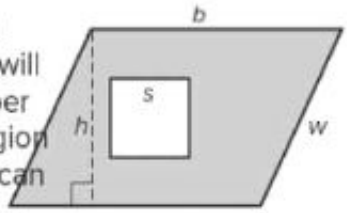
First, examine the attributes of an object and select an attribute that can be measured. Use an appropriate tool to measure and select the scale you will us

NAME _____ DATE _____ PERIOD _____

Lesson 1 Multi-Step Problem Solving

Multi-Step Example

Bilal is designing a flower bed for a school project. His design consists of a square inside a parallelogram. The shaded area will be planted with small shrubs. In order to get the correct number of shrubs, Bilal needs to determine the area of the shaded region once he has the dimensions. Which of the following formulas can be used to find the area of the shaded region? MP 1



Ⓐ $A = b \times h - s^2$

Ⓑ $A = b \times w - s^2$

Ⓒ $A = b \times w + s^2$

Ⓓ $A = b \times h + s^2$

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know. Underline what the problem is asking you to find.

Read to Succeed!

Be careful when finding the area of a parallelogram that the slant height is not used. The height of the parallelogram is perpendicular to the base.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the formula for the area of the parallelogram and square.

Step 2 Subtract the area of the square from the area of the parallelogram.

3 Solve

Use your plan to solve the problem. Show your steps.

Area of Parallelogram − Area of Square = Area of Shaded Region

$b \times h \quad - \quad s^2 \quad = \quad b \times h - s^2$

The formula is $A = b \times h - s^2$, so choice **A** is correct. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

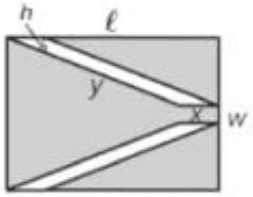
Sample answer: Choices C and D include addition, which would not give the area of the shaded region. Choice B uses the wrong measurement of the parallelogram.

NAME _____ DATE _____ PERIOD _____

Lesson 1 *(continued)*

Use a problem-solving model to solve each problem.

1 Amal is creating a flag for an art project. The flag is rectangular with two parallelograms of the same dimensions as seen in the diagram. Which formula can be used to find the area of the shaded region? MP 1

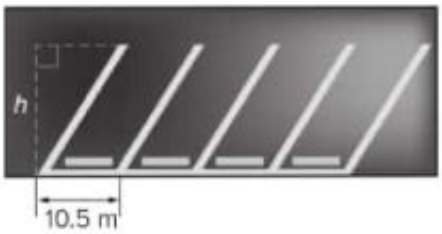


Ⓐ $A = \ell \times w - y \times h$
Ⓑ $A = \ell \times w - x \times h$
Ⓒ $A = \ell \times w - 2 \times x \times h$
Ⓓ $A = \ell \times w - 2 \times y \times h$

2 The side of an office building is made of mirrored glass panels in the shape of parallelograms. If one parallelogram-shaped piece of glass has a base of 8.5 m and a height of 4 m, determine how many windows there are in an 850 m^2 area. MP 2

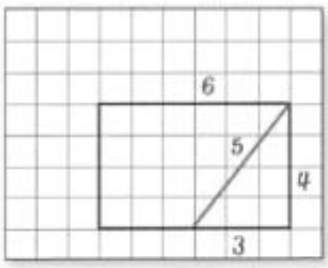
25 windows

3 An area of 861 m^2 is used for 4 identical parking spaces as seen in the diagram below. Use the information in the diagram to find the height of one parallelogram-shaped parking space, *h*. MP 2



20.5 m

4 **H.O.T. Problem** A rectangle is drawn with dimensions 6 units long and 4 units wide. Then a triangle is cut from the rectangle with dimensions shown, and placed on the left side of the rectangle to form a parallelogram. MP 7



What are the area and perimeter of the original rectangle? What are the area and perimeter of the parallelogram formed by cutting and moving the triangle?

rectangle: $A = 24$ sq units, $P = 20$ units,

parallelogram: $A = 24$ sq units,

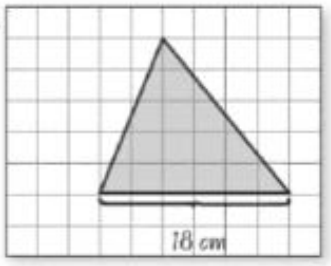
$P = 22$ units

NAME _____ DATE _____ PERIOD _____

Lesson 2 Multi-Step Problem Solving

Multi-Step Example

The triangle on the grid represents a triangular-shaped pillow. What is the area of the triangle? MP 1



Ⓐ 270 cm^2
Ⓑ 135 cm^2
Ⓒ 45 cm^2
Ⓓ 15 cm^2

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the height of the triangle.

Step 2 Use the formula $A = \frac{1}{2}bh$ to find the area of the triangle.

3 Solve

Use your plan to solve the problem. Show your steps.

Each square on the grid represents 18 [6] ÷ [3] = [2] centimeters.

The height of the triangle is [5] × [3] = [15] centimeters.

The area of the triangle is $\frac{1}{2}bh$ or $\frac{1}{2} \times$ [18] × [15].

The area is [135] square centimeters.

Choice [B] is correct. Fill in that answer choice.

Read to Succeed!
Remember to determine the scale of the grid.

4 Check

How do you know your solution is accurate?

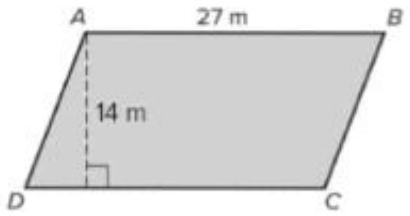
Sample answer: Each square on the grid represents 9 square centimeters. The triangle covers about 15 squares. Since 15 × 9 is 135, the answer is accurate.

NAME _____ DATE _____ PERIOD _____

Lesson 2 *(continued)*

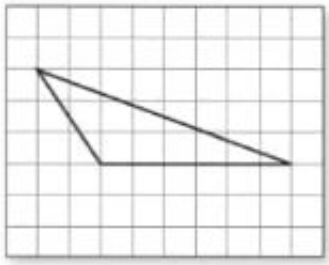
Use a problem-solving model to solve each problem.

1 The figure below represents a swimming pool. A rope is attached from point *A* to *C*, and triangle *ABC* will be a designated adult swimming area. What is the area of the adult swimming region? MP 1



Ⓐ 41 m²
Ⓑ 82 m²
Ⓒ 189 m²
Ⓓ 378 m²

2 The triangle on the grid outlines the border of a town. Each square on the grid represents a side length of 1.5 km. What is the area of the town in square kilometers? MP 4



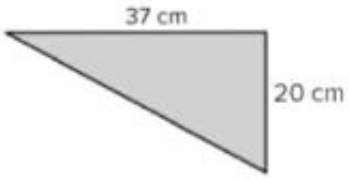
20.25 km²

3 The table shows the dimensions of three triangles. How much greater is the area of triangle C than triangle A, in square centimeters? MP 7

Triangle	Base	Height
A	8.5 cm	6 cm
B	7 cm	7 cm
C	9 cm	6.5 cm

3.75 cm²

4 **H.O.T. Problem** Rasheed is going to paint 30% of the triangle. How many square centimeters will he paint? MP 2



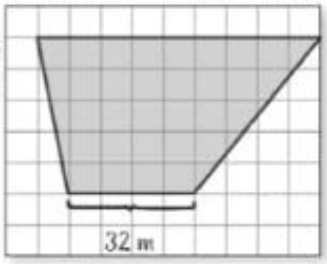
111 cm²

NAME _____ DATE _____ PERIOD _____

Lesson 3 Multi-Step Problem Solving

Multi-Step Example

The figure on the grid represents a parking lot. Asphalt for the parking lot costs AED 8.95 per square meter. How much will it cost to asphalt the parking lot, to the nearest ? MP5



Ⓐ AED 290.88
Ⓑ AED 805.50
Ⓒ AED 18,616.00
Ⓓ AED 37,232.00

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the area of the trapezoid.

Step 2 Multiply to determine the cost of the asphalt.

Read to Succeed!
The height of a trapezoid is perpendicular to the two bases.

3 Solve

Use your plan to solve the problem. Show your steps.

Each square on the grid represents a length of 32 ÷ 4 or 8 m.
The two bases are 32 m and 72 m. The height is 40 m.

$A = \frac{1}{2}h(b_1 + b_2)$ Area of a trapezoid

$A = \frac{1}{2}(40)(72 + 32)$ Replace h with 40, with 72, and b with 32.

$A = 2{,}080$ Multiply.

So, the cost of the asphalt is AED 8.95 × 2,080 or AED 18,616. Choice C is correct. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

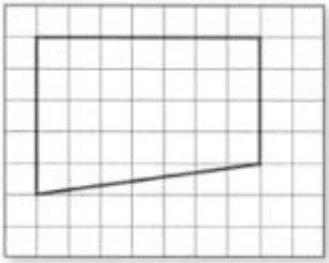
Sample answer: The area of the trapezoid is about 30 squares. Each square is 64 m². So, the area is about 1,920 m². The cost of the asphalt is about AED 10. So, the cost for the parking lot is about 1,920 × AED 10 or AED 19,200. The answer is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 3 *(continued)*

Use a problem-solving model to solve each problem.

1 The figure on the grid represents the floor of an office. Each square on the grid represents 2 units. Which expression represents an area of a floor that is twice this size? MP 1



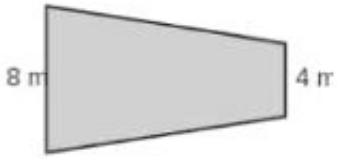
Ⓐ $\frac{1}{2}(7)(4+5)$

Ⓑ $7(4+5)$

Ⓒ $\frac{1}{2}(14)(8+10)$

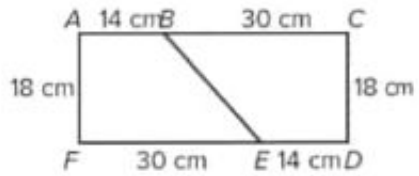
Ⓓ $(14)(8+10)$

2 A farmer spread fertilizer onto the plot of land shown below. He uses 4 scoops of fertilizer per square meter. If he used 312 scoops, what is the height of the trapezoid in meters? MP 2



13 m

3 In the figure below, the area inside *ABEF* will be colored red. What will be the red area, in square meters? MP 2



2.75

4 **H.O.T. Problem** Suppose the bases and height of a trapezoid are all multiplied by 3. How will the area change? MP 7

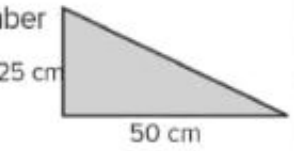
The area will be multiplied by 9.

NAME _____ DATE _____ PERIOD _____

Lesson 4 Multi-Step Problem Solving

Multi-Step Example

The side lengths of the smaller triangle are multiplied by the same number to create a larger triangle with a base of 1 m and height of $\frac{1}{2}$ m. How many times greater is the area of the larger triangle? MP 1



Ⓐ 2
Ⓑ 3
Ⓒ 4
Ⓓ 20

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the **area** of the smaller triangle.

Step 2 Convert the dimensions of the larger triangle to **centimeters**, determine the area, then compare the **areas**.

3 Solve

Use your plan to solve the problem. Show your steps.

Determine the area of the smaller triangle.

$\frac{1}{2} \times 25 \times 50 =$ **625 cm²**

Determine the area of the larger triangle in centimeters.

1 m = **100 cm** $\frac{1}{2}$ m = **50 cm** $\frac{1}{2} \times 100 \times 50 =$ **2500 cm²**

2500 ÷ **625** = **4**

The area of the larger triangle is **4** times larger.

So, the correct answer is **C**. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

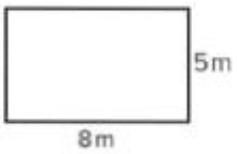
Sample answer: You can use the area of the smaller triangle, 625 cm², to determine the area of the larger triangle by multiplying by 4. The area of the larger triangle is 2500 cm², which is 4 times greater.

NAME _____ DATE _____ PERIOD _____

Lesson 4 *(continued)*

Use a problem-solving model to solve each problem.

1 The side lengths of the rectangle below are multiplied by $\frac{3}{4}$. What effect would this have on the perimeter? MP 1



Ⓐ The perimeter will be $\frac{3}{4}$ times greater.

Ⓑ The perimeter will be $\frac{3}{4}$ times greater.

Ⓒ The perimeter will be $\frac{5}{8}$ times greater.

Ⓓ The perimeter will be 3 times greater.

2 The dimensions of the rectangles listed in the table will all be multiplied by 3. What is the combined area of the enlarged rectangles in square meters? MP 8

Rectangle	Length (cm)	Width (cm)
Rectangle A	4	5
Rectangle B	6	6
Rectangle C	7	9

0.1071 m²

3 **H.O.T. Problem** The area of Rectangle B is 5 times greater than the area of Rectangle A. Give possible dimensions for each rectangle. Justify your answer. MP 3

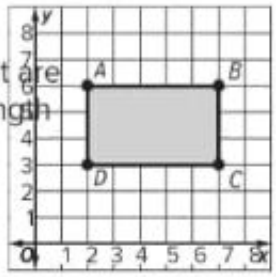
Sample answer: Rectangle A is 2 by 5, and Rectangle B is 10 by 5. When both sides of a rectangle are multiplied by the same number, the area is multiplied by that number squared. But if only one side of a rectangle is multiplied by a number, the area is multiplied by that number.

NAME _____ DATE _____ PERIOD _____

Lesson 5 Multi-Step Problem Solving

Multi-Step Example

Asma drew this diagram of her rectangular vegetable garden. What are the coordinates of the vertices of the rectangle she drew? If the length of each grid square on the diagram is 2 meters, what is the area of Asma's garden? MP 1



Use a problem-solving model to solve this problem.

Read to Succeed!

Remember, when x-coordinates are the same, you can subtract y-coordinates to find distance. And, when y-coordinates are the same, you can subtract x-coordinates to find distance.

1 Understand

Read the problem. Circle the information you know. Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Write the coordinates of the vertices of the rectangle and then determine the length of each side.

Step 2 Multiply the length and the width of the rectangle by 2 meters to find the length and the width of the garden.

Step 3 Multiply the length by the width to find the area of the garden.

3 Solve

Use your plan to solve the problem. Show your steps.

The coordinates of the vertices are A(**2**, **6**), B(**7**, **6**), C(**7**, **3**), D(**2**, **3**).

Length: Subtract *x*-coordinates $\overline{AB}$: 7 − 2 = **5** and $\overline{CD}$: **7 − 2 = 5**

Width: Subtract *y*-coordinates $\overline{AD}$: 6 − 3 = **3** and $\overline{BC}$: **6 − 3 = 3**

Multiply the length and the width by 2 meters: 5 × 2 **10** . 3 × 2 **6**

Find the area: **10 × 6 = 60**. The area of the garden is **60** square meters.

4 Check

How do you know your solution is accurate?

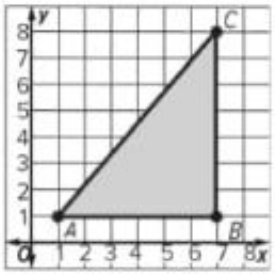
Sample answer: I know that the area of each grid square is 4. There are 15 squares in the rectangle. 4 × 15 = 60 m

NAME _____ DATE _____ PERIOD _____

Lesson 5 *(continued)*

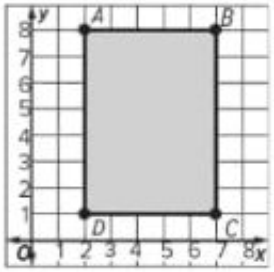
Use a problem-solving model to solve each problem.

1 Khaled drew this diagram of the triangular pen he wants to build for his pet rabbits. What are the coordinates of the vertices of the triangle he drew? If the length of each grid square on the diagram is 1.5 m, what is the area of the pen? MP 1



***A*(1, 1), *B*(7, 1), *C*(7, 8); 47.25 m^2**

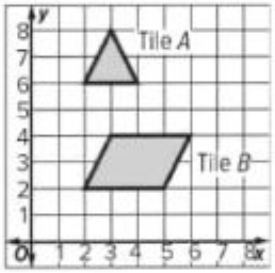
2 Hussam drew a diagram of his rectangular pool. What are the coordinates of the vertices of the pool he drew? The length of each grid square on the diagram is 1 m. Hussam wants to put a deck around the outside of his pool that is 5 m wide on all sides. What will be the perimeter of the outside of the deck? MP 2



***A*(2, 8), *B*(7, 8), *C*(7, 1), *D*(2, 1)**

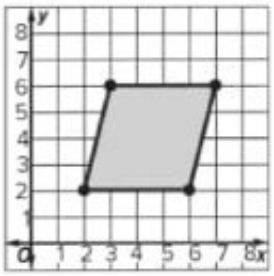
64 m

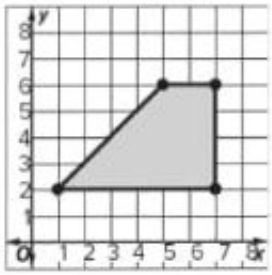
3 The diagram shows the shape and size of two different tiles that Zayed wants to use to cover a wall. He wants to cover 72 m^2 with each kind of tile. If the length of each grid square on the diagram is 1 m, how many of each tile does Zayed need? MP 2



Tile A: 36; Tile B: 12

4 **H.O.T. Problem** Lamia drew two diagrams for flower gardens. The length of each grid square on the diagrams is 2 m. Lamia wants a flower garden that is 64 m. Which diagram should she use for her garden? Explain. MP 3





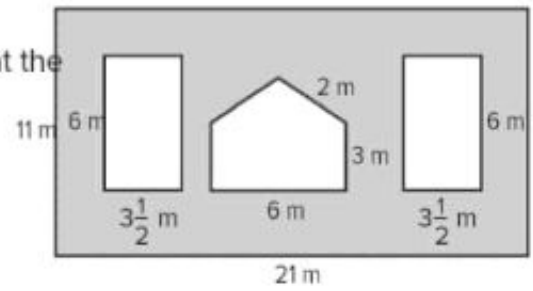
She can use either diagram. Both diagrams show gardens that are 64 m.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Multi-Step Problem Solving

Multi-Step Example

The diagram shows a wall in a shopping mall that the owner wants to paint. Find the total area to be painted. MP 1



Ⓐ 165 m²
Ⓑ 189 m²
Ⓒ 207 m²
Ⓓ 231 m²

Use a problem-solving model to solve this problem.

Read to Succeed!

The window in the center of the wall is a composite figure. You can find the area of a composite figure by separating it into figures for which you know how to find the area.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Find the area of the wall including the windows.

Step 2 Find the areas of the three windows.

Step 3 Subtract the areas of the windows from the total area of the wall.

3 Solve

Use your plan to solve the problem. Show your steps.

$21 \times 11 =$ **231** The area of the wall including the windows is **231** m^2

Window on the left	Middle window	Window on the right
$6 \times 3\frac{1}{2} =$ **21**	$3 \times 6 = 18$, $\frac{1}{2}(6)(2) = 6$, $18 + 6 =$ **24**	$6 \times 3\frac{1}{2} =$ **21**

$21 + 24 + 21 =$ **66** The total area of the windows is **66** m^2

$231 - 66 =$ **165** The total area to be painted is **165** m^2

So, **A** is the correct answer. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

Sample answer: I can work backward and use addition to check:

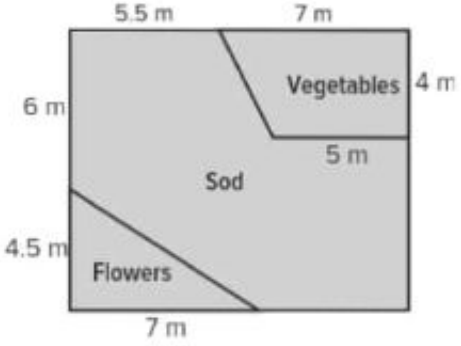
165 + 21 + 24 + 21 = 231.

NAME _____ DATE _____ PERIOD _____

Lesson 6 *(continued)*

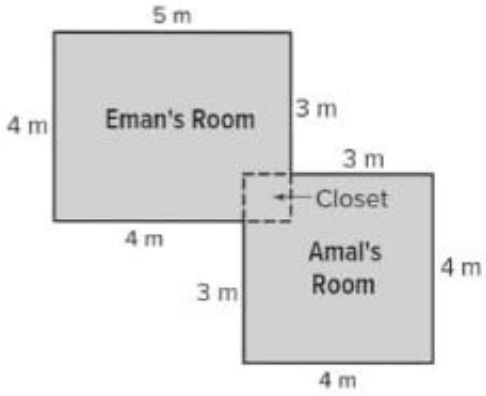
Use a problem-solving model to solve each problem.

1 The diagram shows where Fatima plans to plant flowers and vegetables and place sod in her rectangular backyard. How many square meters of sod does she need? MP 1



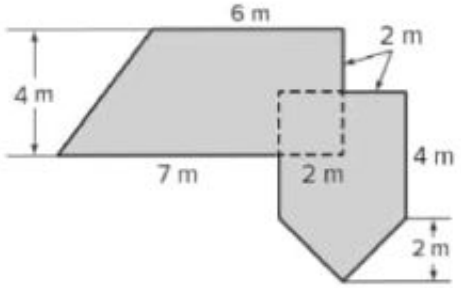
Ⓐ 131.25 m²
Ⓑ 107.25 m²
Ⓒ 91.5 m²
Ⓓ 75.5 m²

2 There are doors into the closet from both Eman's bedroom and Amal's bedroom. How many square meters of carpet will it take to cover the floors in the two bedrooms and the closet? MP 2



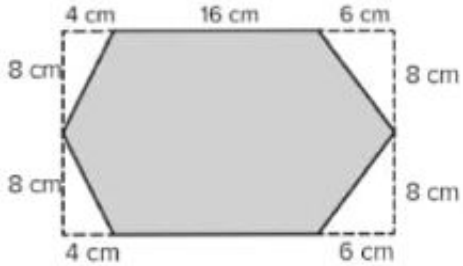
35 m²

3 Houria drew a diagram of a pen she fenced in for her rabbits. What is the area of the pen? MP 2



46 m²

4 **H.O.T. Problem** To find the area of the shaded composite figure below, you can find the sum of the areas of the two shaded triangles and the shaded square. Describe another way you can find the area of the shaded composite figure. Then use one of the ways to find the area. MP 3



Sample answer: Find the area of the rectangle that encloses the shaded figure and then subtract the sum of the areas of the four small white triangles. 26 × 16 = 416; 416 − (16 + 16 + 24 + 24) = 336. So the area of the shaded figure is 336 cm².

NAME _____ DATE _____ PERIOD _____

Lesson 1 Multi-Step Problem Solving

Multi-Step Example

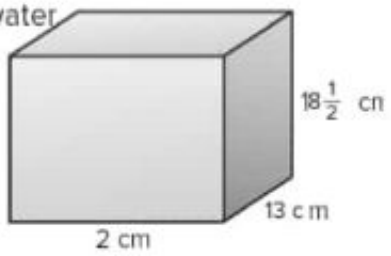
If the fish tank shown is 80% filled with water, how much water is in the tank? MP 1

Ⓐ 5,772 cm^3

Ⓑ 4,617.6 cm^3

Ⓒ 1,154.4 cm^3

Ⓓ 384.8 cm^3



Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the volume of the tank.

Step 2 Multiply to determine the volume of water in the tank.

3 Solve

Use your plan to solve the problem. Show your steps.

$V = \ell \times w \times h$ Volume of a rectangular prism

$V = 24 \times 13 \times 18.5$ $\ell = 24$ cm, $w = 13$ cm, $h = 18.5$ cm

$V = \underline{5{,}772}$ Multiply.

To find 80% of the volume, multiply by 0.80. The volume of water is **5,772** × 0.80 or **4,617.6** cm^3. Choice **B** is correct. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

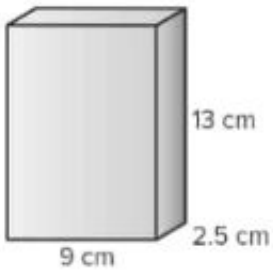
Sample answer: The volume of the tank is about 25 cm × 10 cm × 20 cm, or 5,000 cm^3. 80% is $\frac{4}{5}$ and $\frac{4}{5}$ of 5,000 is 4,000. The answer is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 1 *(continued)*

Use a problem-solving model to solve each problem.

1 The figure is a box full of cereal. If a case of 24 boxes are filled, how much cereal is there in all? MP 1

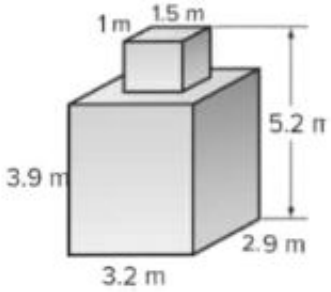


Ⓐ 292.5 cm^3
Ⓑ 588 cm^3
Ⓒ 1,176 cm^3
Ⓓ 7,020 cm^3

2 A storage cube that has an edge length of 16 cm is being packed in a cardboard box with a length of 28 cm, a width of 18 cm, and a height of 22 cm. The extra space is being filled with packing peanuts. How many cubic centimeters of peanuts are needed to fill the space? MP 2

6,992 cm^3

3 What is the volume of the statue in cubic meters? Round to the nearest hundredth. MP 7



38.14 m^3

4 H.O.T. Problem One cube has a side length of 1 mL, and another cube has a side length of 1 cm. What is the ratio of the smaller volume to the greater volume? Express the numerator and denominator using the same units. Explain how you found your answer. MP 3

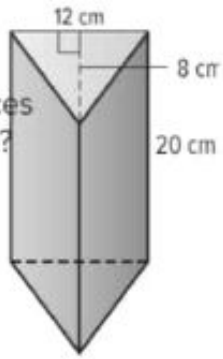
$\frac{1}{1,000}$; Since there are 10 mm in 1 cm, the dimensions of the cubic cm are 10 mm by 10 mm by 10 mm, so the volume is 1,000 cubic mm. The volume of the cube with side length 1 mm is 1 cubic mm.

NAME _____ DATE _____ PERIOD _____

Lesson 2 Multi-Step Problem Solving

Multi-Step Example

Muna has a candle in the shape of a triangular prism with the dimensions shown in the drawing. If she burns the candle and reduces the volume by 25%, what will be the volume of the candle that is left?
Extension of MP 1



Use a problem-solving model to solve this problem.

Read to Succeed!
Remember, the formula for the volume of a triangular prism is $V = Bh$, where B is the area of the base and h is the height.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the volume of the candle.

Step 2 Subtract the percent that has burned from 100% to find the percent that will be left.

Step 3 Multiply to determine the volume of the candle that will be left.

3 Solve

Use your plan to solve the problem. Show your steps.

$V = Bh$
$V = \left(\frac{1}{2} \times 12 \times 8\right)20$
$V =$ **960** cm^3

$100 - 25 =$ **75**
75 % of the volume will be left.

To find 75% of the volume, multiply by 0.75.
$960 \times 0.75 = 720$ cm^3

So, **720** cm^3 will be left.

4 Check

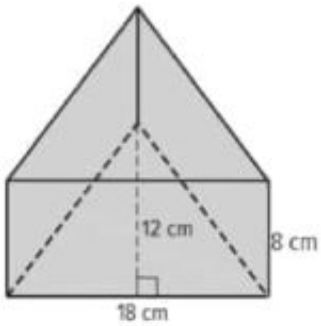
How do you know your solution is reasonable?
Sample answer: The volume of the candle is $\left(\frac{1}{2}\right)$ x 10 x 1020, or 1,000 cm^3.
75% is $\frac{3}{4}$, and $\frac{3}{4}$ of 1,000 is 750. The answer is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 2 *(continued)*

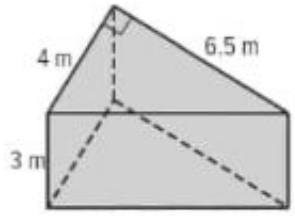
Use a problem-solving model to solve each problem.

1 Jamaal has a carton in the shape of a triangular prism with the dimensions shown in the diagram. He packs a gift in the carton that takes up $\frac{2}{3}$ of the volume of the carton. What is the volume of the space that is left in the carton after the gift is packed inside? *Extension of* MP 1



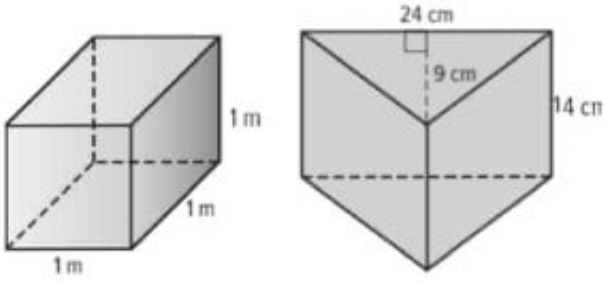
Ⓐ 216 cm³
Ⓑ 288 cm³
Ⓒ 648 cm³
Ⓓ 864 cm³

2 The diagram shows the dimensions of a fish pond that is in the shape of a triangular prism. Sultan wants to build a fish pond with a depth that is $\frac{1}{2}$ times greater than the depth of the fish pond shown in the diagram. How many cubic meters of water will be needed to fill Sultan's pond to the top? *Extension of* MP 2



58.5 m³

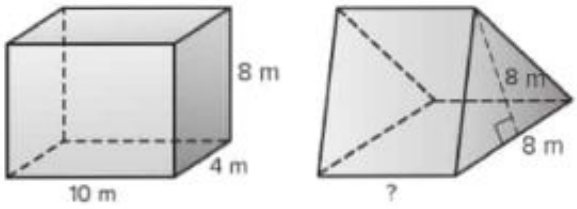
3 The diagram shows the dimensions of two vases. Which vase holds the greater volume of water? How much greater? *Extension of* MP 2



Vase A Vase B

Vase A; 216 cm³

4 **H.O.T. Problem** The diagrams show the dimensions of two sheds. If both sheds have the same volume, what is the missing dimension of the shed on the right? Explain. *Extension of* MP 3



10 m; The volume of the shed that is a rectangular prism is 10 × 4 × 8, or 320 cubic meters. Divide the volume of the shed on the left by the area of the base of the triangular prism to find the height of the triangular prism. 320 ÷ 32 = 10.

NAME _____ DATE _____ PERIOD _____

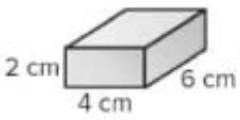
Lesson 3 Multi-Step Problem Solving

Multi-Step Example

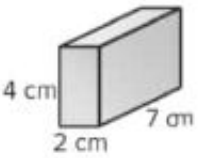
Determine the surface area for each package. How much greater is the surface area of package A? MP 1

Ⓐ 10 cm²
Ⓑ 12 cm²
Ⓒ 20 cm²
Ⓓ 24 cm²

Package A



Package B



Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the **surface area** for each prism.

Step 2 **Subtract** the surface areas.

Read to Succeed!

You may need to draw a net of each prism to help you visualize the area of each face.

3 Solve

Use your plan to solve the problem. Show your steps.

Package A surface area:

front and back: 2(2 × 4) **16**

top and bottom: 2(6 × 4) **48**

sides: 2(2 × 6) **24**

16 + **48** + **24** = **88** Add.

Package B surface area:

front and back: 2(2 × 4) **16**

top and bottom: 2(2 × 7) **28**

sides: 2(7 × 4) **56**

16 + **28** + **56** = **100** Add.

100 − **88** = **12** cm² greater Subtract.

So, the correct answer is **B**. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

Sample answer: Draw a net of each rectangular prism to determine the area of each face. The surface area for package A is 88, which is 12 cm² less than package B, or 100 cm².

NAME _____ DATE _____ PERIOD _____

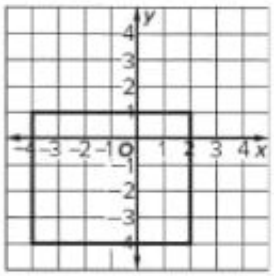
Lesson 3 *(continued)*

Use a problem-solving model to solve each problem.

1 Omar wants to build a storage box that will exactly fit his 6 reference books that are each 20 cm wide and 27.5 cm long. If half of his books are 2.5 cm thick, and half are 5 cm thick, how much material, in square meters, will he need to make the storage box? Round your answer to the nearest thousandth. MP 1

Ⓐ 0.324 m^2
Ⓑ 0.329 m^2
Ⓒ 0.426 m^2
Ⓓ 0.484 m^2

2 The coordinate grid shows the base of a rectangular prism. If the prism has a surface area of 170 units, what is its height, in units? MP 7

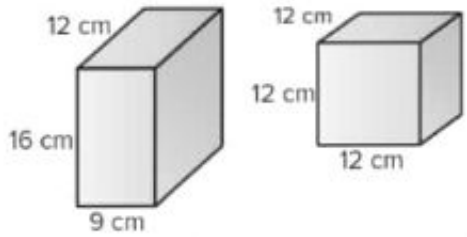


5 units

3 Each side length of a unit cube measures 2 units and increases by 50% every minute. What is the ratio of the surface area after 3 minutes to the original surface area? Write your answer as a decimal rounded to the nearest tenth. MP 2

11.4

4 **H.O.T. Problem** A chemical company wants to reduce the cost of their shipping containers. The measurements of the containers are shown. They pay for the containers by the amount of material required to make them. If they want to ship the greatest volume of chemicals at the lowest cost, which container should they use? Justify your answer. MP 3



Sample answer: The volumes of both containers are 1,728 cm^3. The surface area of the left container is 888 cm^2 and the surface area of the right container is 864 cm^2. Since 864 < 888, they should use the right container.

NAME _____ DATE _____ PERIOD _____

Chapter 10

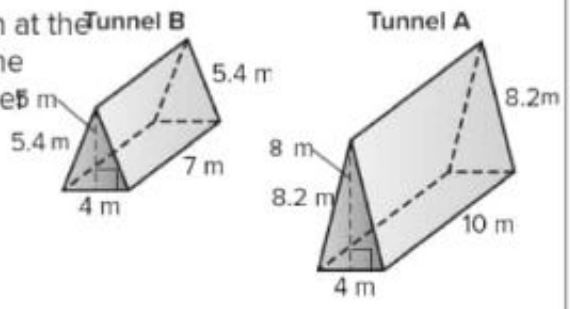
Lesson 4 Multi-Step Problem Solving

Multi-Step Example

Two play houses at a children's gym are shown at the right. How much greater, in square meters, is the surface area of the larger house than the smaller house? MP 1

Ⓐ 112.4 m^2 Ⓑ 123.6 m^2

Ⓒ 224 m^2 Ⓓ 236 m^2



Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the **surface area** for each triangular prism.

Step 2 **Subtract** the surface areas.

Read to Succeed!

You may need to draw a net of each prism to help you visualize the area of each face.

3 Solve

Use your plan to solve the problem. Show your steps.

House A surface area:

triangular bases $\frac{1}{2}(4 \times 8)(2) = \mathbf{32}$

faces: $2(8.2 \times 10)$ **164**

$4 \times 10 = \mathbf{40}$

32 + **164** **40** = **236** square meters Add.

House B surface area:

triangular bases $\frac{1}{2}(4 \times 5)(2) = \mathbf{20}$

faces: $2(5.4 \times 7)$ **75.6**

$4 \times 7 = \mathbf{28}$

20 + **75.6** + **28** = **123.6** square meters Add.

236 − **123.6** = **112.4** square meters Subtract.

So, the correct answer **A**. Fill in that answer choice.

4 Check

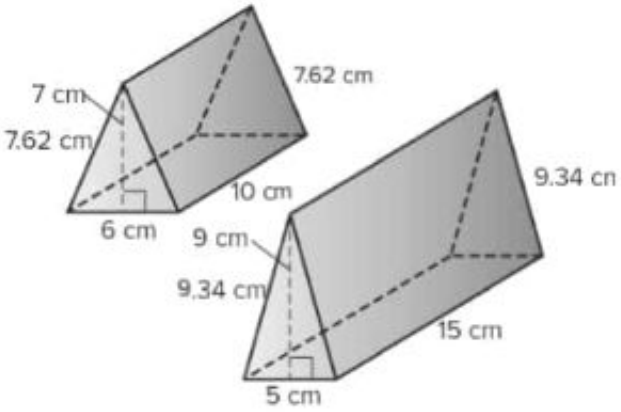
Sample answer: Draw nets to determine the area of each face. The surface area for tunnel A is 236 m^2, which is 112.4 m^2 more than tunnel B.

NAME _____ DATE _____ PERIOD _____

Lesson 4 *(continued)*

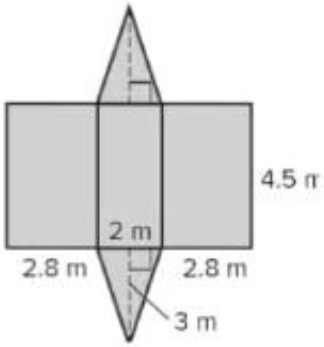
Use a problem-solving model to solve each problem.

1 In science class, Fahed compares the two light prisms shown below. How much larger, in square centimeters, is the surface area of the larger light prism than the smaller light prism? MP 1



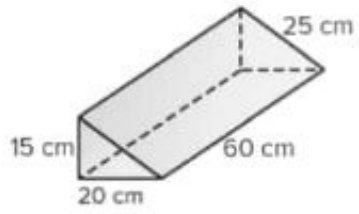
Ⓐ 20,563 cm²
Ⓑ 20,995 cm²
Ⓒ 30,586 cm²
Ⓓ 81,734 cm²

2 The net below represents a portion of a mural on a park sidewalk. If the dimensions are doubled, how many times greater is the surface area of the similar net, in square meters? MP 7



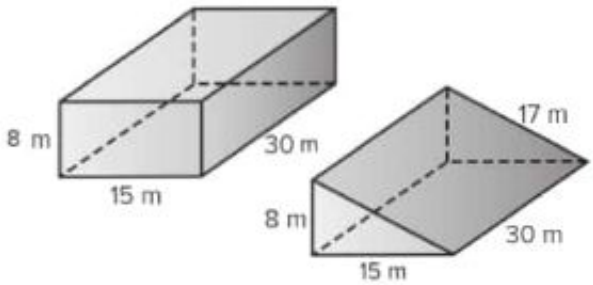
4 times

3 Maha purchased a wedge pillow as shown below. She wants to make a pillow case for it. She has 3,125 cm² of fabric. How many more square centimeters of fabric does she need for the pillow case? MP 7



775 cm²

4 **H.O.T. Problem** The rectangular prism shown is cut in half diagonally to create the triangular prism. Is the surface area of the right triangular prism equal to one-half the surface area of the rectangular prism? Explain. MP 3



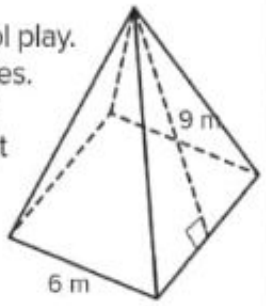
No; Sample answer: The surface area of the triangular prism is 1,320 cm² and the surface area of the rectangular prism is 1,620 cm².

NAME _____ DATE _____ PERIOD _____

Lesson 5 Multi-Step Problem Solving

Multi-Step Example

A team of students will make a square pyramid, for the set for the school play. They will paint every surface, and then paste glitter on the lateral surfaces. Ten liters of paint costs AED 62 and will cover about 75 m^2. A 5-kilogram bag of glitter costs AED 5 and will cover about 38 m^2. About how much will it cost to paint and glitter the pyramid? MP 4



Ⓐ AED 139
Ⓑ AED 144
Ⓒ AED 191
Ⓓ AED 195

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Find the surface area that will be **glittered** and its cost.

Step 2 Find the surface area that will be **painted** and its cost.

Step 3 Find the total cost.

Read to Succeed!

They will paint the entire pyramid but will put glitter on the sides only. Use different areas to find the cost of the paint and the glitter.

3 Solve

Use your plan to solve the problem. Show your steps.

Glittered area: *L.A.* $= \frac{1}{2}P\ell = \frac{1}{2}($ **24** $\times$ **9** $=$ **108** m^2

108 m^2 ÷ **38** m^2 per bag ≈ **2.8** bags

(**3**)(AED **5**) = (AED **15**) cost of glitter

Painted area: *L.A.* + *B* = 108 + **36** = **144** m^2

144 m^2 ÷ **75** m^2 per can ≈ **1.9** cans (**2**)(AED **62**) = AED **124** cost of paint

Total cost: AED **139** , so, **A** is the correct answer. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

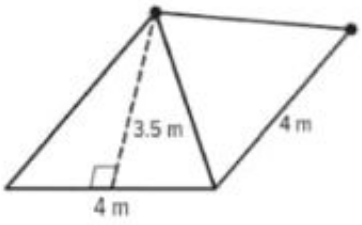
Sample answer: I can work backward: Three bags of glitter cover 114 m^2 > 108 m^2. Twenty liters of paint cover 150, 150 > 144. AED 15 + AED 124 = AED 139

NAME _____ DATE _____ PERIOD _____

Lesson 5 *(continued)*

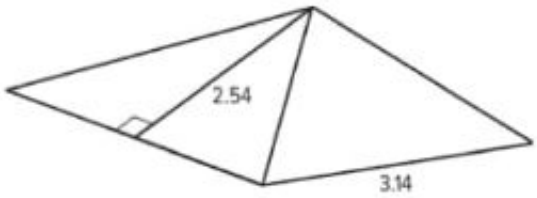
Use a problem-solving model to solve each problem.

1 Omar has a small garden for lettuce that measures 4 m by 4 m, as shown. He placed a pyramid-shaped net tent over it to keep the rabbits out. The netting cost AED 1.40/m² and the framework to support it cost AED 12. How much did Omar spend to build the net tent? MP 4



Ⓐ AED 32.80
Ⓑ AED 39.20
Ⓒ AED 51.20
Ⓓ AED 73.60

2 The Great Pyramid in Egypt was built using a measure called a *royal cubit*, which is about 0.52 m. Its apex, or capstone, is missing so it does not come to a point. The diagram shows some suggested dimensions of the missing capstone in royal cubits. What is the lateral surface area of the missing capstone in square meters? Round to the nearest tenth. MP 1



about 4.2 m²

3 A garden ornament is shaped like a square pyramid with a base that measures 17 cm. Its slant height is 15 cm. Amna orders 24 of the ornaments and plans to completely cover $\frac{2}{3}$ of them with a waterproof covering. She should buy enough spray to cover how many square meters? Round to the nearest tenth. MP 4

1.3 m²

4 **H.O.T. Problem** Suppose you have a regular triangular pyramid with base sides of 2 units and a slant height of 1.5 units. Without using the formula $L.A. = \frac{1}{2}P\ell$, describe another way to find the lateral surface area of the pyramid. Support your method by using the given dimensions, then check using the standard formula. MP 3

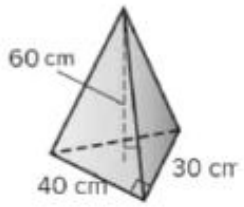
Sample answer: I could apply the formula for the area of a triangle to find the area of each triangular side, $\frac{1}{2}bh$, and then multiply the area by the number of sides. $\frac{1}{2}(2)(1.5)(3) = 4.5$. To check, I could use the formula for the lateral area of a pyramid: $\frac{1}{2}(2)(1.5)(3) = (1.5)(3) = 4.5$, so my method works.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Multi-Step Problem Solving

Multi-Step Example

Wafa has 10,000 cm^3 of sand. She pours it into the pyramid shown. What fraction of the pyramid can she fill with sand? MP 4



Ⓐ $\frac{1}{2}$ Ⓒ $\frac{3}{4}$

Ⓑ $\frac{5}{9}$ Ⓓ $\frac{5}{6}$

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the **volume** of the triangular pyramid.

Step 2 Determine the **fraction** of the pyramid that is filled.

Read to Succeed!

The pyramid shown is a triangular pyramid. Use the formula for the triangle with determining the base B.

3 Solve

Use your plan to solve the problem. Show your steps.

Determine the volume.

$V = \frac{1}{3}Bh$ $V = \frac{1}{3}\left(\frac{1}{2} \times 40 \times 30\right) \times 60$ $V =$ **12,000** cm^3

Write the volume of sand Wafa has over the volume of the pyramid.

$\frac{\textbf{10,000}}{\textbf{12,000}}$ or $\frac{\textbf{5}}{\textbf{6}}$

The pyramid will be $\frac{\textbf{5}}{\textbf{6}}$ full.

So, the correct answer **D**. Fill in that answer choice.

4 Check

How do you know your solution is accurate?

Sample answer: Determine $\frac{5}{6}$ of the volume of the pyramid, or 12,000 cm^3.

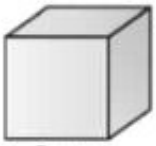
The result is 10,000, which is the amount of sand that Wafa has to fill the pyramid. So, my solution is accurate.

NAME _____ DATE _____ PERIOD _____

Lesson 6 *(continued)*

Use a problem-solving model to solve each problem.

1 The solid cube below fits inside a hollow triangular pyramid. The triangular base of the pyramid has a base of $\frac{1}{2}$ cm and a height of 4 cm. The height of the pyramid is 5 cm. What percent of the pyramid's volume is filled by the cube? Round your answer to the nearest thousandth, if necessa MP 2

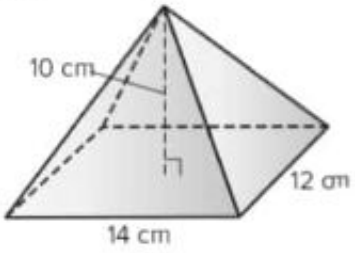


Ⓐ 5%
Ⓑ 16.7%
Ⓒ 25%
Ⓓ 32%

2 A square pyramid trophy is being shipped in a rectangular prism shaped package. The square pyramid has a base edge of 15 cm and height of 20 cm. What is the minimum volume that the package must be in order for the trophy to fit inside? MP 1

4,500 cm³

3 The rectangular pyramid block shown was cut in half. What is the volume of each half of the pyramid block? MP 4



280 cm³

4 **H.O.T. Problem** A triangular pyramid is placed on top of a triangular prism with a congruent base. If the volumes are equal, and the height of the prism is 1 unit, what is the total height of the both figures? Explain. MP 6

4 units; Sample answer: Since the bases are congruent, their areas are equal. For the volumes to be equal, one-third of the pyramid height must equal the prism height. The pyramid height must be 3 units, or 3 times the prism height. So, the total height is 4 units.

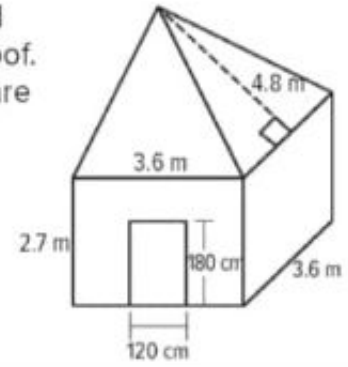
NAME _____ DATE _____ PERIOD _____

Lesson 7 Multi-Step Problem Solving

Multi-Step Example

Hamad's family built the garden shed shown. The frame and walls cost AED 368. Now they will paint it and shingle the roof. Mr. Hamad estimates that it will cost about AED 1.11 per square meter for the paint. A bundle of shingles costs AED 20 and covers about 3 m². What is the approximate total cost of the project? Round to the nearest ten dirhams. MP.1

Ⓐ AED 630
Ⓑ AED 640
Ⓒ AED 650
Ⓓ AED 670



Use a problem-solving model to solve this problem.

Read to Succeed!
Think of the shed as a composite figure. The top is a square pyramid and the bottom is a square prism.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan steps.

Step 1 Determine the total surface area of the **sides** that will be painted and the total surface area of the **roof**.

Step 2 Determine the total cost of the **paint** and **shingles**.

3 Solve

Use your plan to solve the problem. Show your steps.

The surface area of the sides is **9.72** m² − **2.16** m² = **36.72** m².

The area of the roof is $\frac{1}{2}P\ell = \frac{1}{2} \times 14.4 \times 4.8 =$ **34.56** m².

The cost of the paint will be about AED **40.80**. He will need **42** bundles of shingles.

The total cost of the shed is AED 40.80 + AED 240 + **368** = **648.80**. So, **C** is the correct answer. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

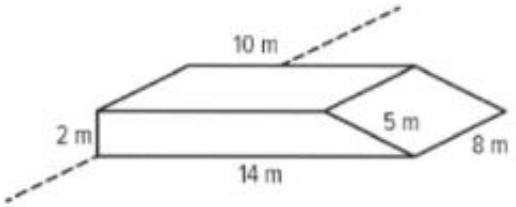
Sample answer: AED 650 − AED 368 = AED 282 for the paint and shingles. Twelve bundles of shingles cover about 34.56 sq m and cost AED 240. The area of the sides shows AED 40.80 is reasonable. AED 240 + AED 40 = AED 280, so my solution is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 7 *(continued)*

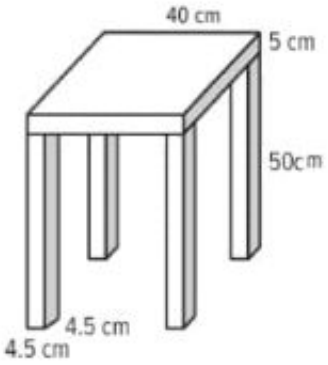
Use a problem-solving model to solve each problem.

1 The structure shown is used in a performance. It backs up against a solid wall, and all the visible parts are covered with burlap. The burlap costs AED 2.61 per square meter. To the nearest dirham, what was the cost of covering the structu MP 1



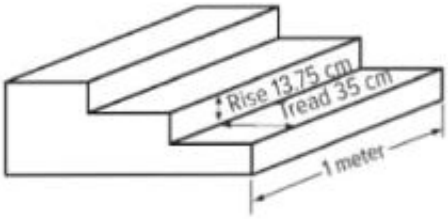
Ⓐ AED 125
Ⓑ AED 128
Ⓒ AED 376
Ⓓ AED 438

2 Houriyya makes tables from several types of wood. The diagram shows the design for a square-topped model. Curly maple weighs 720 kg/m³ and cherry weighs 600 kg/m³. How much more will this table weigh in curly maple than cherry? Round to the nearest tenth. MP 2



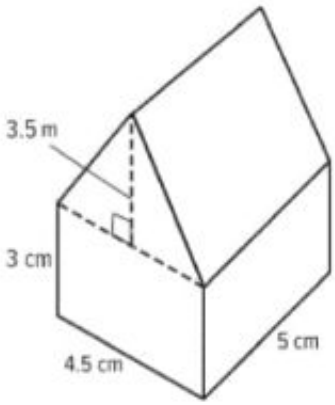
about 1.1 kg more

3 Steps are made up of a *tread* that you step on, and a *rise*, which is the height. On the steps shown, the depth of the tread is 35 cm and the rise is 13.75 cm. If the concrete used to make the steps cost AED 9.36/m³, what was the cost of the concrete for these steps to the nearest dirham MP 7



AED 27

4 **H.O.T. Problem** The diagram shows a composite solid figure. If each length is multiplied by 2, the volume of the figure is multiplied by what scale factor? Support your answer MP 5



a factor of 8; Sample answer: The volume of the figure is 106.875 cm³. If each length is doubled, the volume is 855 cm³.

NAME _____ DATE _____ PERIOD _____

Lesson 1 Multi-Step Problem Solving

Multi-Step Example

Ismail's family owns a tree farm, which is open every day of the week except Monday. Ismail kept track of how many trees were sold each day for two weeks. How much greater was the mean number of trees for Week 2 than for Week 1? MP 1

Week 1	
Day	Trees
Tuesday	7
Wednesday	12
Thursday	6
Friday	14
Saturday	22
Sunday	17

Week 2	
Day	Trees
Tuesday	10
Wednesday	8
Thursday	12
Friday	17
Saturday	31
Sunday	18

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the mean for each week.

Step 2 Subtract to find how much greater the mean for Week 2 is than Week 1.

Read to Succeed!

To determine the mean, add each value in the set and divide by the number of values in the set.

3 Solve

Use your plan to solve the problem. Show your steps.

Week 1: $\frac{7 + 12 + 6 + 14 + 22 + 17}{6} = \mathbf{13}$

Week 2: $\frac{10 + 8 + 12 + 17 + 31 + 18}{6} = \mathbf{16}$

So, Week 2's mean is 16 − 13 or **3** trees greater.

4 Check

How do you know your solution is reasonable?

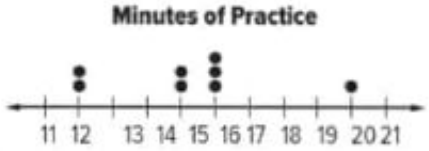
Sample answer: The values for Week 2 are generally greater than the values for Week 1. The answer is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 1 *(continued)*

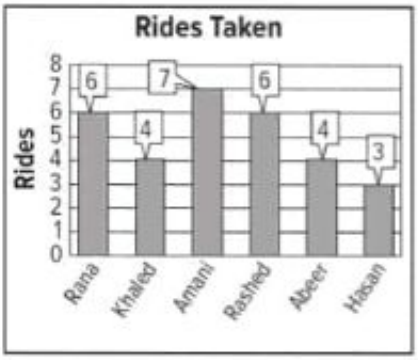
Use a problem-solving model to solve each problem.

1 The dot plot shows how many minutes Mr. Tariq's piano students said they practiced on the day before their lessons. Abeer practiced 31 minutes but forgot to tell Mr. Tariq. If Abeer's time were included, by how much time (in minutes) would the mean increase? MP 1



1.75 min

2 The graph shows how many rides a group of friends went on at the fair. Each ride costs AED 2.75. What was the mean amount of money, in dirhams, spent per person to go on the rides? MP 2



AED 13.75

3 For Sultan's first six quizzes, he had a mean score of 33 points. After the seventh quiz, his mean score was 32 points. After the eighth quiz, the mean was 34. What was the difference in scores between his seventh and eighth quizzes? MP 8

22 points

4 **H.O.T. Problem** Create a list of 8 values with a mean of 26. Justify your response. MP 3

Sample answer: 14, 20, 22, 24, 30, 31, 33, 34; 14 + 20 + 22 + 24 + 30 + 31 + 33 + 34 = 208; 208 ÷ 8 = 26

NAME _____ DATE _____ PERIOD _____

Lesson 2 Multi-Step Problem Solving

Multi-Step Example

Four students kept track of how long they did homework for five nights. For which student do the mean, median, and mode all have the same value?

MP 1

Ⓐ Buthaina
Ⓑ Jasim
Ⓒ Jamal
Ⓓ Halima

Day	Buthiana	Jamal	Jasim	Halima
1	1.25	1.25	1	0.75
2	0.75	2.25	1.75	2.5
3	1	1.5	1	1.5
4	1.25	2	0.5	0.75
5	2	0.75	1.5	2

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the mean, median, and mode for each student.

Step 2 Compare the measures.

Read to Succeed!

Mean - divide the sum of the values by the number of values
Median - the middle value when the data are ordered
Mode - most occurring number

3 Solve

Use your plan to solve the problem. Show your steps.

	Mean	Median	Mode
Buthaina	**1.25**	**1.25**	**1.25**
Jamal	**1.55**	**1.5**	**none**
Jasim	**1.15**	**1**	**1**
Halima	**1.5**	**1.5**	**0.75**

Since **Buthaina** has all three measures the same, choice **A** is correct.
Fill in that answer choice.

4 Check

How do you know your solution is accurate?

Sample answer: By comparing the other students' measures, Buthaina is the only student with all three measures the same.

NAME _____ DATE _____ PERIOD _____

Lesson 2 *(continued)*

Use a problem-solving model to solve each problem.

1 Four drivers recorded the distance they drove each day for a week. Which driver's data set has a mode that is greater than the mean or median AND a median with the lowest value of the three measures? MP 1

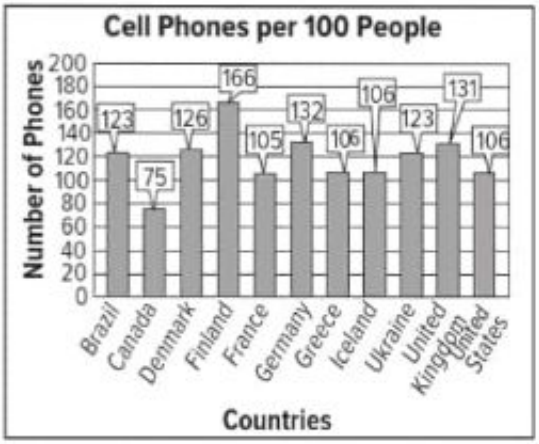
Ⓐ Salem: 8, 17, 23, 16, 17, 18, 125

Ⓑ Amer: 14, 26, 34, 22, 47, 22, 45

Ⓒ Tarek: 7, 12, 11, 23, 13, 23, 30

Ⓓ Obaid: 52, 36, 41, 31, 31, 37, 59

2 The graph shows the number of cell phones per 100 people in certain countries. How much would the difference between the median and the mode change if Finland phones were not included in the da MP 7



8.5

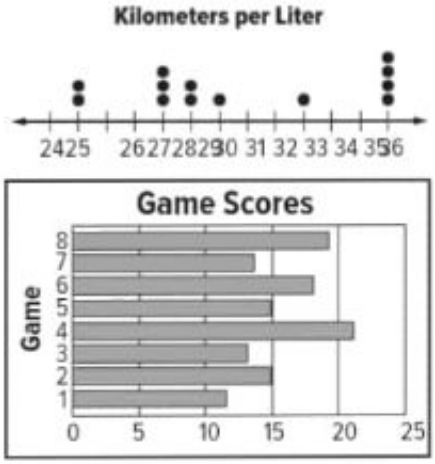
3 What is the difference between the medians of Zayed's sprint times and Rashid's sprint times? MP 2

Zayed's Sprint Times (seconds)			
12	14	11	13
15	13	15	14
11	14	17	12

Rashid's Sprint Times (seconds)			
11	11	15	13
14	16	15	14
13	15	12	16

0.5

4 **H.O.T. Problem** For which data set is the median a better predictor of the rest of the data than the mode? Explain your answer. MP 3



Kilometers per Liter dot plot; The mode is 36, which is a lot higher than the rest of the data. In game scores, the mode and median are both more similar to the mean.

NAME _____ DATE _____ PERIOD _____

Lesson 3 Multi-Step Problem Solving

Multi-Step Example

Manal and Mohammed are running for president of the middle school student government. Votes are counted by classroom. What is the difference between the interquartile ranges for the two candidates? MP 1

Voting Results						
Room Number	Number of Votes		Room Number	Number of Votes		
	Manal	Mohammed		Manal	Mohammed	
1	12		9	5	8	17
2		6	18	6	2	13
3	14		8	7	18	7
4	20		6	8	12	12

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

Read to Succeed!

Interquartile range is the difference between the third quartile and the first quartile.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Order the values for each person from least to greatest.

Step 2 Determine the IQR for each data set.

Step 3 Subtract to find the difference.

3 Solve

Use your plan to solve the problem. Show your steps.

Manal: 2, 6, 8, 12, 12, 14, 18, 20 IQR **16 − 7 or 9**

Mohammed: 6, 7, 8, 9, 12, 13, 17, 18 IQR **15 − 7.5 or 7.5**

The difference between the interquartile ranges is **9 − 7.5 or 1.5** .

4 Check

How do you know your solution is reasonable?

Sample answer: Represent each data set on a dot plot to check the median, first, and third quartiles.

NAME _____ DATE _____ PERIOD _____

Lesson 3 *(continued)*

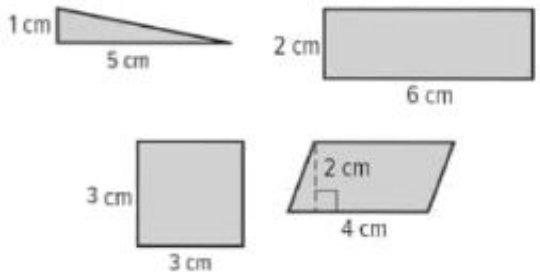
Use a problem-solving model to solve each problem.

1 Maysa is keeping track of the temperature in her town at noon each day. She has recorded the temperature for six days so far. How much greater will the interquartile range be if Saturday's temperature is 21°C than if it is 14°C MP 1

Temperature at Noon	
Day	Temperature (°C)
Sunday	18
Monday	22
Tuesday	14
Wednesday	12
Thursday	15
Friday	16
Saturday	?

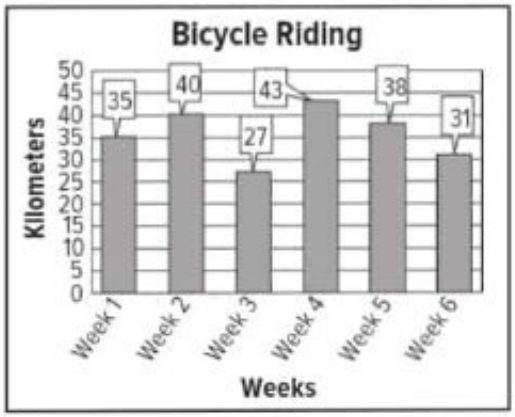
6

2 Jamal cut out these shapes from construction paper. What is the interquartile range for the areas of the shapes? MP 7



5.25

3 Najat is training for a bicycle race. She made a graph of the number of kilometers she rode each week for 6 weeks. If the median at Week 7 increases by 1.5, how many kilometers did she ride in Week 7? MP 7



38 (Accept any number 38 or greater)

4 **H.O.T. Problem** Describe the measures of spread for the data set. Change the data set by adding an outlier. Describe the new measures of spread MP 3

1,124	465	
	650	976
	840	711
	712	925

range: 659; median: 776; first quartile: 680.5; third quartile: 950.5; IQR: 270. Answers will vary for new data set; the new data value should be less than 275.5 or greater than 1,355.5. The range will increase, the median will be 712 or 840, the first quartile will be 557.5 or 680.5, the third quartile will be 950.5 or 1,050, and the IQR will be 393 or 369.5.

NAME _____ DATE _____ PERIOD _____

Lesson 4 Multi-Step Problem Solving

Multi-Step Example

The table shows the number of hours various students worked on a school project. The students want to compare measures of spread. What is the difference between the interquartile range and mean absolute deviation? MP 1

Hours Worked			
Obaid	0.5	Mona	3.5
Adnan	2.5	Hiyam	1.0
Saeed	2.5	Hana	3.5
Abdulah	2.0	Nabilah	0.5

Ⓐ 0.25
Ⓑ 1.25
Ⓒ 2.00
Ⓓ 5.75

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the **mean absolute deviation** and **interquartile** range.

Step 2 Determine the **difference** between the two values.

3 Solve

Use your plan to solve the problem. Show your steps.

The mean absolute deviation is **1** . The interquartile range is **2.25** The difference between the interquartile range and the mean absolute deviation **2.25** **−1** , or **1.25** .
So, the correct answer is **B** . Fill in that answer choice.

Read to Succeed!

Remember to take the absolute value of the differences between each value and the mean when finding the mean absolute deviation.

4 Check

How do you know your solution is accurate?

I used technology tools to check my calculations. I used the graphing calculator stat menu to check the interquartile range and an online calculator to check the mean absolute deviation.

NAME _____ DATE _____ PERIOD _____

Lesson 4 *(continued)*

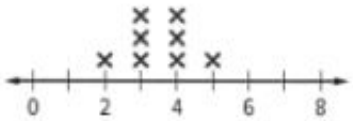
Use a problem-solving model to solve each problem.

1 The table shows the quiz scores of various students. The students want to compare the measures of spread. What is the difference between the interquartile range and mean absolute deviation? MP 1

Quiz Scores				
95	100	50	75	60
100	100	60	100	60

Ⓐ 20
Ⓑ 21
Ⓒ 31
Ⓓ 40

2 Eight students were asked how many persons live in their home. The results of the survey are shown in the line plot. What is the mean absolute deviation of the data? MP 2



0.75

3 Some students were asked how much they spent on their last trip to the mall. The results of the survey are shown in the stem-and-leaf plot. What is the mean absolute deviation of the data? MP 7

Money Spent at Mall

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

1 | 5 = AED 15

8

4 **H.O.T. Problem** The mean number of points scored by eight players in a basketball game is 6. Use the table to determine mean absolute deviation of the data. Justify your answer. MP 3

Points Scored			
Abdi	4	Mahmoud	4
Mohammed	0	Khalaf	10
Hamdan	0	Rashid	8
Majed	2	Yousef	?

5; Sample answer: The mean is 6, so I let x represent Yousef's score and solved the equation $\frac{4+0+0+2+4+10+8+x}{8} = 6$ to find that $x = 20$. Then I found the mean absolute deviation:

$$\frac{2+6+6+4+2+4+2+14}{8} = \frac{40}{8} = 5.$$

NAME _____ DATE _____ PERIOD _____

Lesson 5 Multi-Step Problem Solving

Multi-Step Example

The table shows the ages of the people at a family dinner. Identify the outlier in the data set. Then determine how the outlier affects the mean of the data. MP 1

Age of Family Members (years)							
39	47	38	39	48	41	84	

Ⓐ outlier: 48; mean age with the outlier decreased by 48

Ⓑ outlier: 84; mean age with the outlier decreased by 6

Ⓒ outlier: 84; mean age with the outlier increased by 6

Ⓓ outlier: 48; mean age with the outlier increased by 48

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your steps.

Step 1 Determine the outlier, or deviation from the majority of the data set.

Step 2 Determine the mean for the data set both with and without the outlier.

Step 3 Subtract to compare the mean age with and without the outlier.

Read to Succeed!

Measures of center are used to summarize a data set. Outliers often make one measure more appropriate to use than others.

3 Solve

Use your plan to solve the problem. Show your steps.

Compared to the other ages, 84 is very old. So, 84 is an outlier.

Mean with the outlier: 39 + 47 + 38 + 39 + 48 + 41 + 84 ÷ 48 =

Mean without the outliner: 39 + 47 + 38 + 39 + 48 + 41 ÷ 42 =

Compare: 48 − 42 = 6. So, the correct answer is C. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

Sample answer: Because the outlier is a greater number than the other numbers in the data set, the mean with the outlier is going to increase. The answer is reasonable.

NAME _____ DATE _____ PERIOD _____

Lesson 5 *(continued)*

Use a problem-solving model to solve each problem.

1 The table shows the weekly deposits Ayoub made in his savings account. Identify the outlier in the data set. Then determine how the outlier affects the mean of the data. MP 1

Deposits in Savings Account (AED)							
41	28	26	5	32	41	38	26	36

Ⓐ outlier: 41; mean with the outlier increased by about 3.2

Ⓑ outlier: 5; mean with the outlier increased by about 3.2

Ⓒ outlier: 41; mean with the outlier decreased by about 3.2

Ⓓ outlier: 5; mean with the outlier decreased by about 3.2

2 The scores Khadija received on the science tests are 95, 80, 95, 85, 45, 95, 75, 85, and 90. Identify the outlier in the data set. Determine the mean, median, and mode without the outlier. Then tell which measure of center best describes the data without the outlier. MP 7

outlier: 45; mean: 87.5; median: 87.5; mode: 95; since the mean and the median are both 87.5, either of these measures of center best describes the data.

3 List eight data values for which the median is the best measure of center for the data set. Explain. MP 3

Sample answer: 1, 3, 4, 5, 6, 7, 22, 25; This data set has two extreme values, which will make the mean, 9.125, too great, and there is no mode. So, the median, 5.5, is the best measure of center.

4 **H.O.T. Problem** The table shows the lengths of some rivers in the United States. Identify the outlier. Find the measures of center with and without the outlier. Tell which measure of center best describes the data with and without the outli MP 3

River	Length (km)
Columbia	1,989
Mississippi	3,744
Ohio-Allegheny	2,096
Peace	1,936
Red	2,064

outlier: 3,744; With the outlier, the mean is 2,365, the median is 2,064, and there is no mode. Without the outlier, the mean is 2,021, the median is 2,026, and there is no mode. With the outlier the best measure is the median; without the outlier the best measure is either the mean or the median.

NAME _____ DATE _____ PERIOD _____

Lesson 1 Multi-Step Problem Solving

Multi-Step Example

Which description matches the data in the line plot of U.S. presidents' years in office? (Round decimals to the nearest whole number.) MP 1

Ⓐ mean: 5, mode: 8, median: 7, range: 10, interquartile range: 4, outlier: 12

Ⓑ mean: 6, mode: 8, median: 6, range: 8, interquartile range: 6, outlier: 12

Ⓒ mean: 6, mode: 8, median: 6, range: 10, interquartile range: 4, no outlier

Ⓓ mean: 7, mode: 8, median: 5, range: 12, interquartile range: 4, no outlier

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the measures of center.

Step 2 Determine the measures of spread.

Read to Succeed!

Determine the measures of center and spread and compare your answers to the answer choices, making sure to account for each measure.

3 Solve

Use your plan to solve the problem. Show your steps.

mean: about **6** range: 12 − 2 or **10** mode: **8**

IQR: 8 − 4 or **4** median: **6** outlier: **none**

Choice **C** lists the correct measures. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

Sample answer: After finding mean, only choices B and C will work. After finding the range, choice C is correct.

NAME _____ DATE _____ PERIOD _____

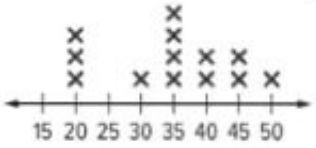
Lesson 1 *(continued)*

Use a problem-solving model to solve each problem.

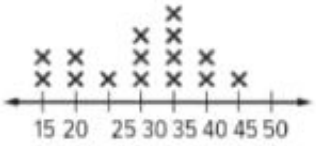
1 Which line plot matches Adnan's description of his quiz scores? MP 1

The mean and range are both 30. The mode is 35. The interquartile range is 15.

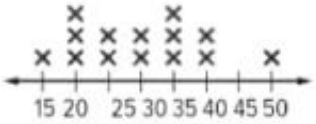
Ⓐ



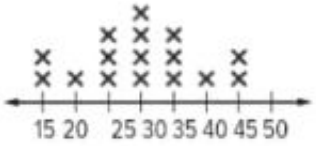
Ⓑ



Ⓒ



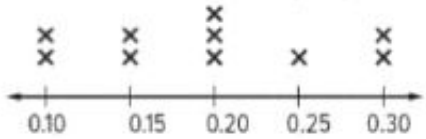
Ⓓ



2 Lamees is shopping for pencils that are sold by the dozen (12). She finds out how much one pencil costs at each price and makes a line plot. Show the line plot. What price should have three marks above it? MP 2

Pencil Prices (per dozen)				
4 for AED 4.80	4 for AED 9.60	1 for AED 2.40	4 for AED 14.40	2 for AED 6.00
2 for AED 3.60	12 for AED 14.40	4 for AED 7.20	1 for AED 3.60	6 for AED 14.40

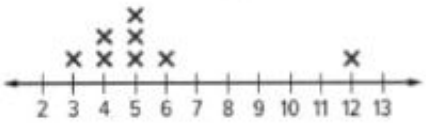
Price for One Pencil (AED)



0.20

3 Yousef asked his friends how many pages of their history book they had read. He made a line plot to show his data and he said that the mean was 6. Then he noticed that he'd forgotten to include one number on the line plot. What number did he forget? MP 4

Number of Pages Read



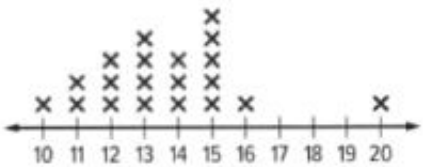
10

4 **H.O.T. Problem** The Math Club has been selling cookies during lunch. Make a line plot to show the number of cookies sold each day. Describe the data's measures of spread and center. MP 3

Number of Cookies Sold

12, 16, 10, 12, 15, 13, 14, 20, 15, 15,
13, 11, 13, 14, 15, 14, 11, 12, 13, 15

Number of Cookies Sold



mean: 13.65; median: 13.5; mode: 15;
first quartile: 12; third quartile: 15; IQR: 3;
range: 10; outlier: 20

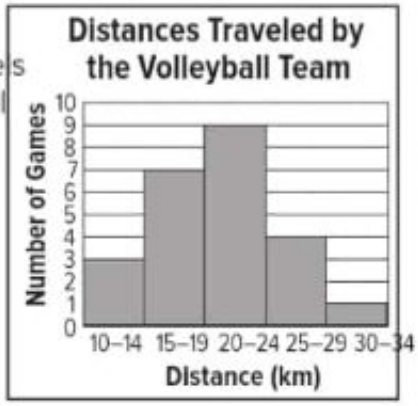
NAME _____ DATE _____ PERIOD _____

Lesson 2 Multi-Step Problem Solving

Multi-Step Example

The histogram shows the distances a volleyball team travels to their games. What percent of the games did they travel more than 24 km? Round to the nearest tenth.

MP 1



Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

Read to Succeed!

The percentage is the number of games greater than 24 km divided by the total number of games. The decimal is then expressed as a percent.

2 Plan

What will you need to do to solve the problem?
Write your plan in steps.

Step 1 Determine how many games were more than 24 km away. Determine the total number of games.

Step 2 Express as a percent.

3 Solve

Use your plan to solve the problem. Show your steps.

Number of games greater than 24 km away: 5

Total number of games: 24

So, 5 out of 24 games were played greater than 24 km away.

This is 5 ÷ 24 or 0.208 or 20.8 % of the games.

4 Check

How do you know your solution is reasonable?

Sample answer: Draw a bar diagram to represent the total number of games.

Label a section as those games traveled greater than 24 kilometers.

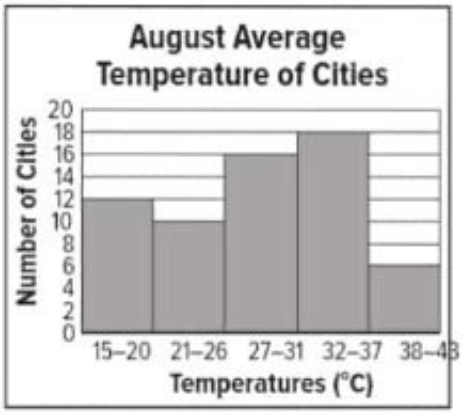
Determine the percent.

NAME _____ DATE _____ PERIOD _____

Lesson 2 *(continued)*

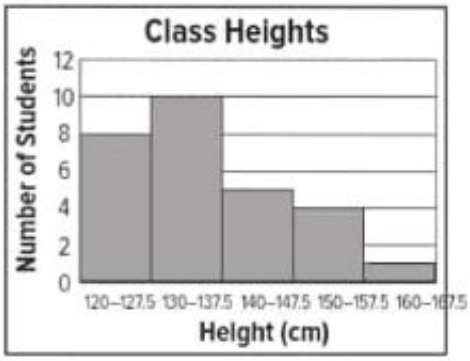
Use a problem-solving model to solve each problem.

1 The histogram shows the average monthly temperature for cities in the United States for the month of August. What percent of cities have a monthly temperature of less than 27°C? Round to the nearest tenth. MP 1



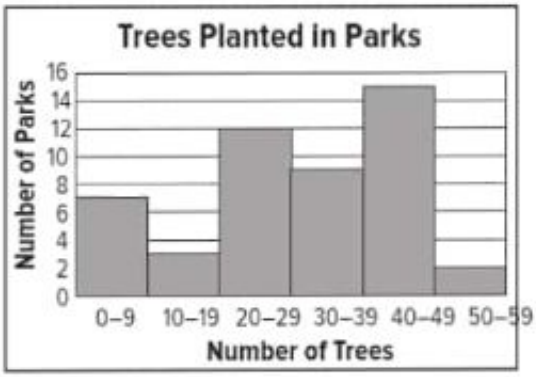
35.5%

2 The students in Mrs. Khadijah's class recorded their heights. The histogram shows the heights of the students. What fraction of the students are taller than 137.5 cm? Simplify your answer. MP 2



$\frac{5}{14}$

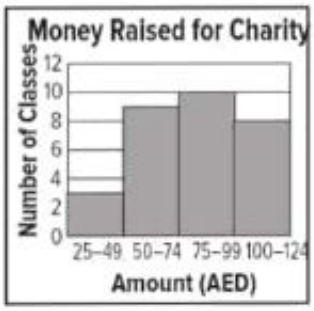
3 A government program plants small trees in parks. The histogram shows the number of trees planted in 48 different parks. What is the difference in the number of parks that had the least trees planted and the most trees planted? MP 2



5 parks

4 **H.O.T. Problem** Al Wadi Middle School is holding a fundraiser for a local charity. The table shows the number of classes that raised money. Create a histogram for the data. Then find the percent of classes that raised AED 75 or more. MP 4

Amount (AED)	Number of Classes
25–49	3
50–74	6
75–99	10
100–124	8



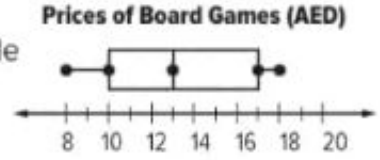
60%

NAME _____ DATE _____ PERIOD _____

Lesson 3 Multi-Step Problem Solving

Multi-Step Example

The box plot shows the range of prices of 50 board games available at a local toy store. About how many of the available board games cost less than AED 10? MP 1



Ⓐ 2 games
Ⓑ 6 games
Ⓒ 13 games
Ⓓ 38 games

Use a problem-solving model to solve this problem.

Read to Succeed!
A box plot shows the data divided into quartiles, or four sections.

1 Understand

Read the problem. Circle the information you know. Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the section of the box plot representing less than AED 10.

Step 2 Determine the approximate number of board games that cost less than AED 10.

3 Solve

Use your plan to solve the problem. Show your steps.

The section of the box plot that represents less than AED 10 is the **left whisker**.

The left whisker represents one **fourth** of the data.

Since one-fourth of the board games cost less than AED 10, about **50** $\div$ **4** or about **13** games cost less than AED 10. Choice **C** is correct. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

Sample answer: A box plot is separated into four sections. If the whole is 50 games, then one-fourth is 12.5 which is about 13, so the answer is reasonable.

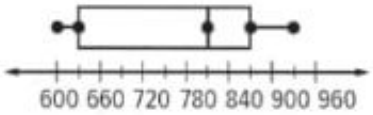
NAME _____ DATE _____ PERIOD _____

Lesson 3 *(continued)*

Use a problem-solving model to solve each problem.

1 The box plot shows the weights, in grams, of 15 different bags of almonds. About how many bags contained less than 800? MP 1

Weights of Bags of Almonds (g)



Ⓐ 11 bags
Ⓑ 8 bags
Ⓒ 4 bags
Ⓓ 0 bags

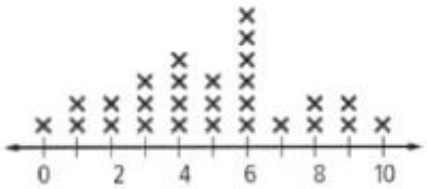
2 The data shows the amounts of flour used in different cookie recipes. What is the third quartile of the data? MP 2

Cups of Flour Used for Cookies						
0.5	1	0.75	1	1.5	1.25	0.75
1.5	0.75	1.75	0.5	0.5	1.5	1

1.5

3 The line plot shows the ages of dogs at a dog park. What is the first quartile of the data? MP 2

Ages of Dogs at a Dog Park

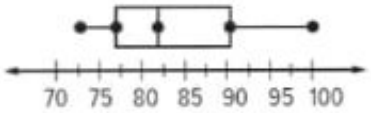


3

4 **H.O.T. Problem** Mr. Osama assigned a quiz to his math students. The data shows all his students' grades. Create a box plot for the data. Then find the percent of students that scored 82 or higher. MP 7

Math Quiz Grades							
75	81		80	94	77	78	80
74	96	87	84	91	90	83	
79	87	100	97	78	76	82	

Math Quiz Grades



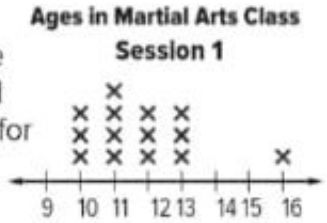
50%

NAME _____ DATE _____ PERIOD _____

Lesson 4 Multi-Step Problem Solving

Multi-Step Example

The line plot shows the ages of the students in Session 1 of Mr. Hussam's martial arts class. For Session 2, the students were the same except that a 12-year old dropped out and a 9-year old enrolled. Which shows the best measures of center and spread for the **Session 2** data distribution? MP 1



Ⓐ mean ≈ 11.6, range = 7

Ⓑ mean ≈ 11.8, range = 6

Ⓒ median = 11, interquartile range = 3

Ⓓ median = 11.5, interquartile range = 2

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know. Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the data set with the values adjusted.

Step 2 Determine the mean, median, range, and interquartile range of the new data set.

Read to Succeed!

List the values in order after replacing the value of 12 with the value of 9.

3 Solve

Use your plan to solve the problem. Show your steps.

The new data set is 9, 10, 10, 10, 11, 11, 11, 11, 12, 12, 13, 13, 13, 16.

The mean is **11.6**, range is **7**, median is **11**, and interquartile range is **3**. Choice **C** is correct. Fill in that answer choice.

4 Check

How do you know your solution is reasonable?

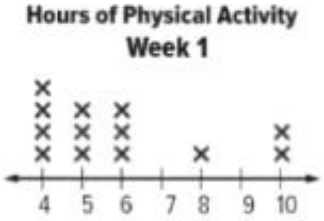
Sample answer: Check each part of the choices. Each measure must be correct for the entire answer choice to be correct.

NAME _____ DATE _____ PERIOD _____

Lesson 4 *(continued)*

Use a problem-solving model to solve each problem.

1 The line plot shows the amount of time students recorded engaging in physical activity for Week 1. For Week 2, $\frac{2}{3}$ as many students recorded 5 hours, $\frac{2}{3}$ as many students recorded 6 hours, and twice as many students recorded 10 hours.



Which option shows the best measures of center and spread for the Week 2 data distribution? MP 1

Ⓐ mean ≈ 5.9, range = 6

Ⓑ mean ≈ 6.6, range = 6

Ⓒ median = 5, interquartile range = 3

Ⓓ median = 6, interquartile range = 6

2 The stem-and-leaf plot shows students' quiz scores in Ms. Manal's math class.

Quiz Scores

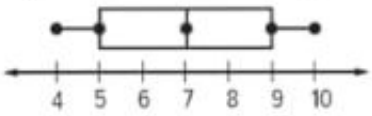
Stem	Leaf
7	5 5 5
8	0 0 0 5 5 5 5
9	0 0 0 0 5 5 5
10	0 0 0

7 | 5 = 75%

Najla found the range and the best measure of center for the data distribution. What two measures did Najla find? What is the sum of the two numbers Najla found? MP 7

Sample answer: range and median; 112.5

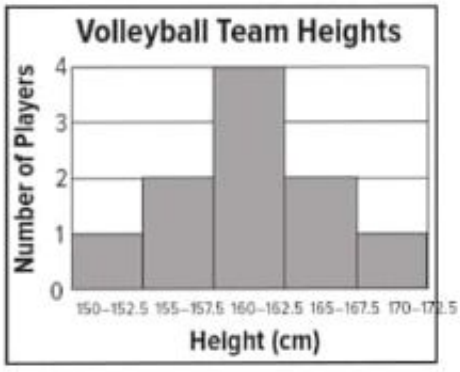
3 Fahed recorded the number of repairs his bicycle shop completed each day for a month. The box plot shows a summary of the data.



Describe the shape of the distribution. MP 4

Sample answer: The shape of the distribution is symmetric. The left side of the data looks like the right side. There are no outliers.

4 **H.O.T. Problem** The histogram summarizes the players' heights on Amani's volleyball team.



a. What are the range and best measure of center if all the heights are even integers?

b. What are the range and best measure of center if all the heights are odd integers? MP 2

a. range = 8, mean = median = 160

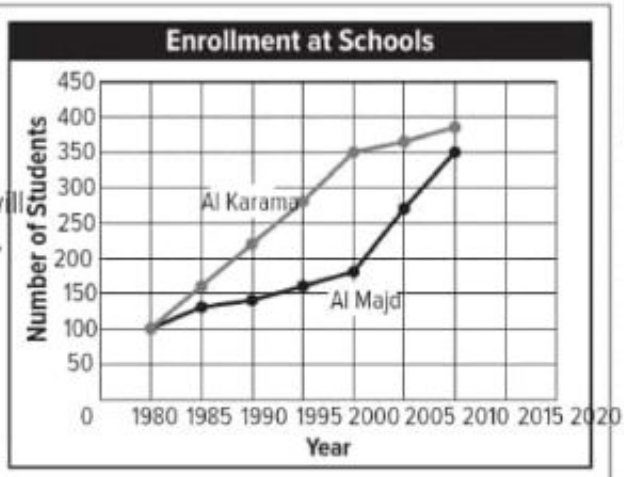
b. range = 8, mean = median = 162.5

NAME _____ DATE _____ PERIOD _____

Lesson 5 Multi-Step Problem Solving

Multi-Step Example

The line graph shows the enrollments at Al Majd School and Al Karama Middle School between the years 1980 and 2010. Based on the graph, predict which school will have a greater enrollment in 2020? Explain. *Extension of* MP 1



Use a problem-solving model to solve this problem.

Read to Succeed!

Line graphs show change over time. You can look at trends shown in a line graph to predict future data.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Observe the slant and the steepness of each line.

Step 2 Look for trends and make predictions based on the trends.

3 Solve

Use your plan to solve the problem. Show your steps.

Al Majd school's enrollment increased slowly between 1980 and 2000, and more quickly between **2000** and **2010**. Al Karama's enrollment increased quickly between 1980 and 2000, and more slowly between **2000** and **2010**.

Al Majd's enrollment in recent years has increased more quickly than Al Karama's enrollment. If the trend continues, the enrollment at **Al Majd** will be greater in 2020.

4 Check

How do you know your solution is reasonable?

Sample answer: Extend each line using the same slant as from 2000 to 2010. Observe which line reaches the horizontal grid line for 450 first.

NAME _____ DATE _____ PERIOD _____

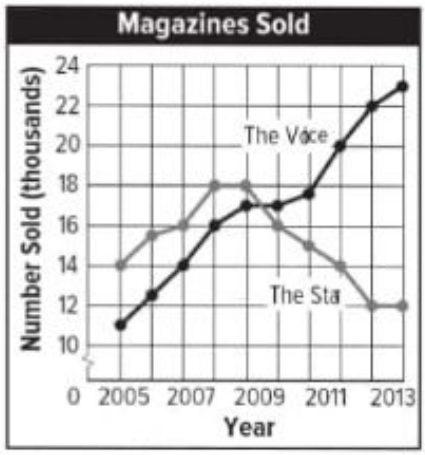
Lesson 5 *(continued)*

Use a problem-solving model to solve each problem.

1 The line graph shows the number of minutes Saleh and his sister Hidaya exercised each week. Based on the graph, predict who will spend more time exercising in Week 7? Explain. *Extension of* MP **1**

Saleh; Sample answer: Saleh has continued to exercise more each week than the week before. His sister Hidayah exercised more for two weeks but since then has exercised less. So, if the trends continue, Saleh will spend more time exercising in Week 7 than Hidaya.

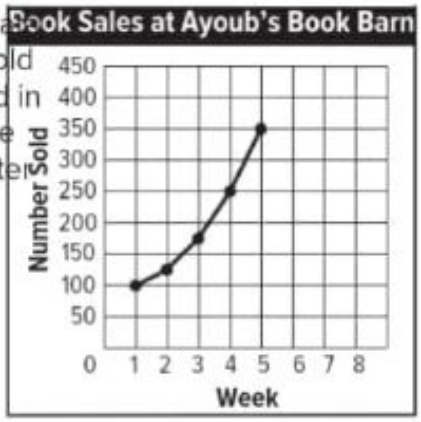
2 The line graph shows the circulation of two magazines for ten years. For what percent of these ten years did *The Voice* have a greater circulation than *The Star*? *Extension of* MP **2**



50%

3 **H.O.T. Problem** Make a line graph of the data in the table. Suppose the number of books sold in Week 6 was 350, in Week 7 it was 375, and in Week 8 it was 400. Would you predict that the number of books sold in Week 9 will be greater than or less than 400? Explain. *Extension of* MP **3**

Books Sales at Ayoub's Book Barn					
Week	1	2	3	4	5
Number Sold	100	125	175	250	350



greater than 400; Sample answer: Sales have continued to increase each week except for one week when they remained the same as for the previous week.

NAME _____ DATE _____ PERIOD _____

Lesson 6 Multi-Step Problem Solving

Multi-Step Example

The table shows the distance 12 students on the track team ran one week. The next week, each student ran exactly twice as far as they did Week 1. Which statement is true about finding the mode of the data for Week 2? *Extension* MP 1

Number of Kilometers Run Week 1			
5	7	4	9
10	4	7	4
8	4	6	4

Ⓐ A dot plot will best show that the mode is 8.
Ⓑ A box plot will best show that the mode is 8.
Ⓒ A dot plot will best show that the mode is 11.
Ⓓ A box plot will best show that the mode is 11.

Use a problem-solving model to solve this problem.

1 Understand

Read the problem. Circle the information you know.
Underline what the problem is asking you to find.

2 Plan

What will you need to do to solve the problem? Write your plan in steps.

Step 1 Determine the values for Week 2.

Step 2 Determine the mode of the Week 2.

3 Solve

Use your plan to solve the problem. Show your steps.

The values for Week 2 are 10, 20, 16, 14, 8, 8, 8, 14, 12, 18, 8, 8

The mode is **8** .

Since a box plot does not show the mode, a dot plot is the best representation to show the mode. Choice **A** is correct. Fill in that answer choice.

Read to Succeed!

Remember to read each statement before deciding on a choice.

4 Check

How do you know your solution is accurate?

Sample answer: Since the new mode is 8, choices C and D are incorrect.

A box plot does not show mode, so choice B is incorrect.

NAME _____ DATE _____ PERIOD _____

Lesson 6 *(continued)*

Use a problem-solving model to solve each problem.

1 The table shows the number of books each student in an afterschool club read in January. In February, each student met the goal of reading one more book than they did in January. Which statement is true about the mode of the data for February? *Extension of* MP 1

Number of Books Read in January			
7	1	4	4
5	6	8	9
4	5	7	3

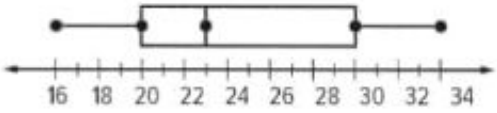
Ⓐ A box plot will best show that the number of books read most is 6 books.

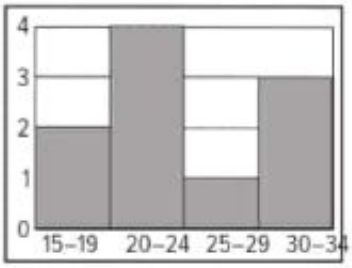
Ⓑ A box plot will best show that the number of books read most is between 5 and 8.

Ⓒ A histogram will best show that the number of books read most is between 4 and 7.

Ⓓ A line plot will best show that the number of books read most is 5.

2 Muna created a histogram and a box plot using the data showing the number of minutes she exercised each day for 10 days.





Which representation can she use to determine how many days she exercised 25 minutes or more? How many days did she exercise for 25 minutes or more? *Extension of* MP 2

histogram; 4 days

3 **H.O.T. Problem** A real estate agent wants to create a display to show the trend in the median sales of houses over the past 6 months. He has 50 data entries for each month for the past 6 months. Explain what two types of displays he can use, one to show the median and one to show the trend in the median over the past 6 months. *Extension of* MP 3

Sample answer: The median for a large number of data entry items can be easily seen in a box plot. A line graph shows change over time and can be used to show the trend of the median over six months.