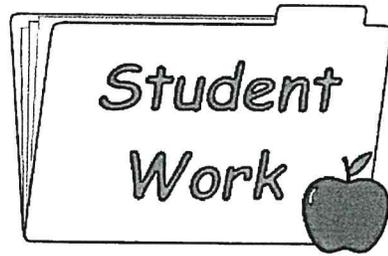


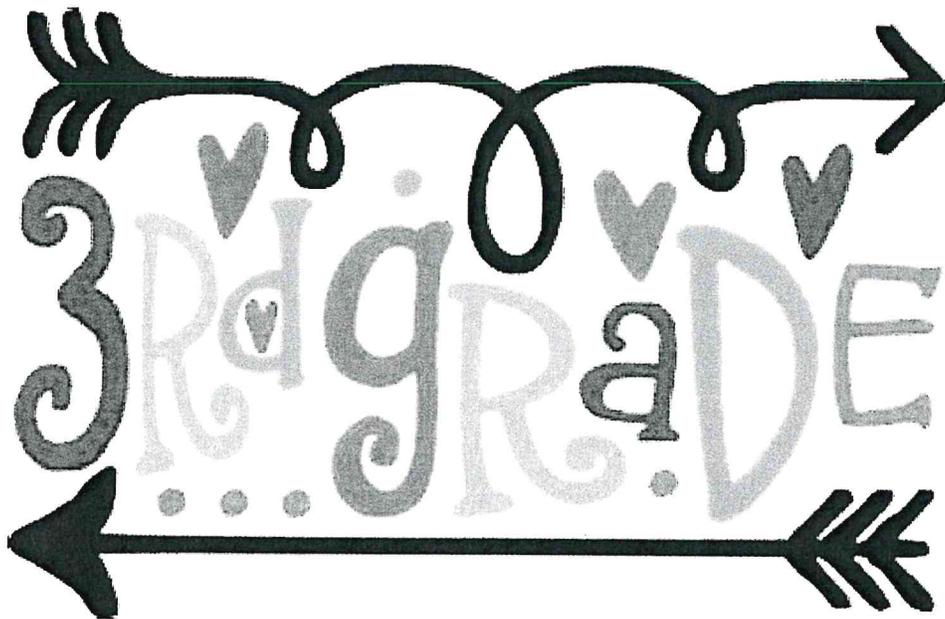
Unity Elementary School



MATH

4/4

Con't



Mass



Getting the Idea

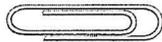
Mass is the measure of the amount of matter in an object.

The table shows two units of mass in the **metric system**.

$$\text{1 kilogram (kg)} = \text{1,000 grams (g)}$$

Use these benchmarks to estimate mass.

A paper clip has a mass of about 1 gram.

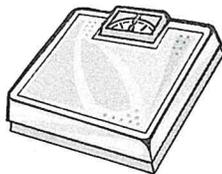


A pair of sneakers has a mass of about 1 kilogram.

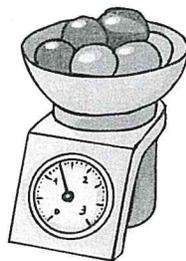


To measure the mass of an object, you can use a **scale** or a balance.

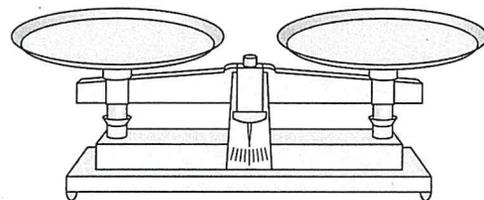
Below are two scales and a balance.



scale



scale

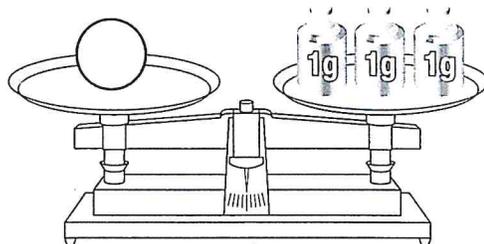


balance

You can measure mass using grams or kilograms.

Example 1

Each mass on the right side of the scale is 1 gram.



What is the mass of the ping-pong ball?

Strategy Use a balance. Experiment with gram masses until the trays are even.

Step 1 Make sure the scale is leveled.

When the scale is leveled, the mass is equal on both sides.

Step 2 Find the total amount of mass on the right side of the scale.

There are 3 masses.

Each is 1 gram.

So, the total mass is 3 grams.

Solution The ping-pong ball has a mass of about 3 grams.

Example 2

Which is the better estimate for the mass of a laptop computer?

2 grams 2 kilograms

Strategy Use benchmarks to find the best estimate.

Step 1

Compare 2 grams to a benchmark.

1 paper clip is about 1 gram.

2 paper clips are about 2 grams.

2 grams is too little mass.

Step 2

Compare 2 kilograms to a benchmark.

A pair of sneakers is about 1 kilogram.

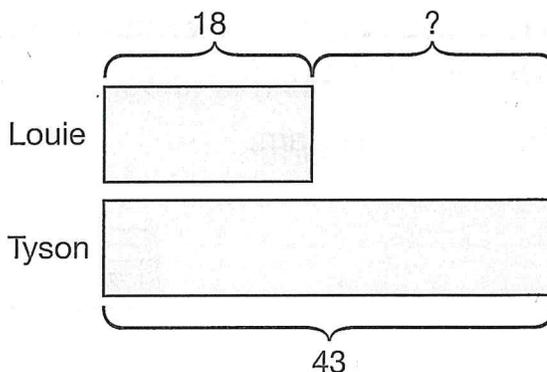
2 pairs of sneakers are about 2 kilograms.

2 kilograms is about right for the mass of a laptop.

Solution A laptop computer has a mass of about 2 kilograms.

Example 3

Tyson, a Rottweiler, has a mass of 43 kilograms. Louie, a bulldog, is 18 kilograms lighter than Tyson. What is Louie's mass, in kilograms?



Strategy Draw a diagram.

Step 1

Draw a diagram.

Step 2

Subtract.

$$\begin{array}{r} 43 \\ - 18 \\ \hline 25 \end{array}$$

Step 3

Use addition to check your answer.

$$25 + 18 = 43$$

The answer is correct.

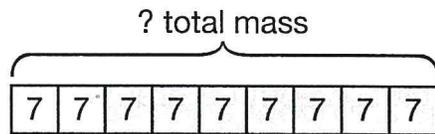
Solution Louie has a mass of 25 kilograms.

Example 4

A cherry has a mass of 7 grams. Pat ate 9 cherries.
How many grams of cherries did Pat eat in all?

Strategy Draw a diagram.

Step 1 Draw a diagram.



Step 2 Multiply.

$$9 \times 7 = 63$$

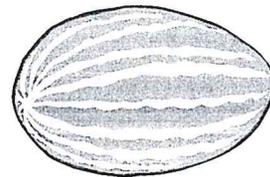
Solution Pat ate 63 grams of cherries in all.



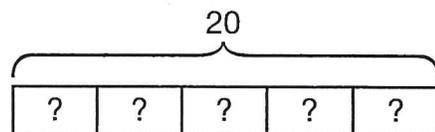
Coached Example

This watermelon has a mass of 20 kilograms.

Mr. Lopez cut the watermelon into 5 equal pieces.
What is the mass, in kilograms, of each piece?



Draw a bar diagram.



To find the mass of each piece, use _____.

Find $20 \div$ _____ $=$.

Divide.

_____ \div _____ $=$ _____

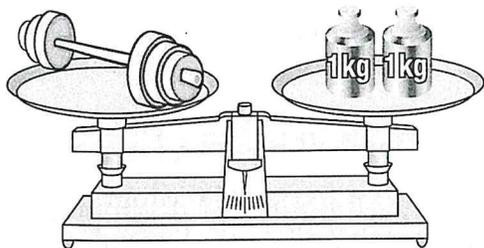
The mass of each piece is _____ kilograms.



Lesson Practice • Part 1

Choose the correct answer.

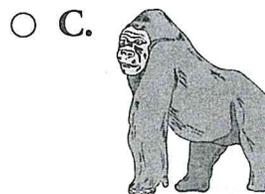
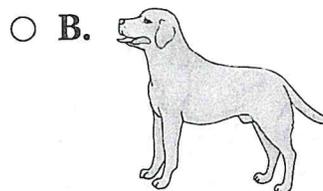
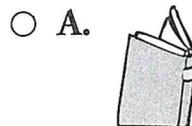
1. Each mass on the right side of the balance is 1 kilogram.



What is the mass of the dumbbell?

- A. 2 grams
- B. 2 kilograms
- C. 20 grams
- D. 20 kilograms

2. Which most likely has a mass of 25 kilograms?



3. Which is the best estimate for the mass of a cotton ball?

- A. 1 gram
- B. 10 grams
- C. 1 kilogram
- D. 10 kilograms

4. A chair has a mass of 12 kilograms. A table is 24 kilograms more mass than the chair. What is the mass, in kilograms, of the table?
- A. 48 kilograms
 - B. 36 kilograms
 - C. 24 kilograms
 - D. 12 kilograms
5. A box of thumbtacks has a mass of 100 grams. Carolyn bought 2 boxes of thumbtacks. What is the total mass of two boxes of thumbtacks?
- A. 20 grams
 - B. 40 grams
 - C. 200 grams
 - D. 400 grams
6. A pencil has a mass of 5 grams. What is the total mass, in grams, of 8 pencils?
- A. 10 grams
 - B. 13 grams
 - C. 20 grams
 - D. 40 grams
7. Mr. Marshall baked a large apple pie with a mass of 4 kilograms. He cut the pie into 4 equal pieces. What is the mass, in kilograms, of each piece?
- A. 1 kilogram
 - B. 2 kilograms
 - C. 4 kilograms
 - D. 8 kilograms

8. Alex was born at 3 kilograms. On his first birthday, Alex is 8 kilograms.
- A. How many kilograms did Alex gain in the first year? Show your work.

- B. On his second birthday, Alex has 4 kilograms more mass than he was at 1 year. What is Alex's mass, in kilograms, on his second birthday? Show your work.



Lesson Practice • Part 2

Choose the correct answer.

1. Which has a mass of about 10 kilograms?

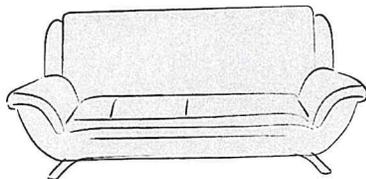
A.



B.



C.



D.



2. Which is the best estimate for the mass of a hardcover dictionary?

A. 2 grams

B. 20 grams

C. 2 kilograms

D. 20 kilograms

3. Since he started training, Travis increased the mass that he can bench press by 25 kilograms. He can now bench press 72 kilograms. What was the mass that Travis could bench press before he started training?

A. 47 kilograms

B. 57 kilograms

C. 97 kilograms

D. 107 kilograms

4. A box of 6 pens has a mass of 60 grams. What is the mass of each pen?

A. 10 grams

B. 54 grams

C. 66 grams

D. 360 grams

5. Each crate on a freight elevator has a mass of 40 kilograms. There are 8 more crates to load. How much more mass will be loaded onto the freight elevator?

- A. 5 kilograms
- B. 32 kilograms
- C. 48 kilograms
- D. 320 kilograms

6. A cheetah at a zoo has a mass of 54 kilograms. It is trained with a dog that a mass of 35 kilograms. How much more mass does the cheetah have than the dog?

- A. 99 kilograms
- B. 89 kilograms
- C. 29 kilograms
- D. 19 kilograms

7. Which object's mass is best measured in grams?

- A. computer
- B. chair
- C. cell phone
- D. door

8. Which is the best estimate for the mass for a house cat?

- A. 5 grams
- B. 50 grams
- C. 5 kilograms
- D. 50 kilograms

9. Stan said that the mass of a teddy bear is 300 without giving the units.

A. Stan meant to say grams or kilograms. Which do you think he meant?

B. Explain your answer to Part A.

Capacity



Getting the Idea

Capacity is the measure of how much a container can hold.
The table shows two units of capacity in the metric system.

Metric Units of Capacity
1 liter (L) = 1,000 milliliters (mL)

Use these benchmarks to estimate capacity.

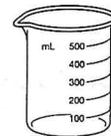
A dropper has a capacity of about 10 milliliters.

A beaker has a capacity of 500 milliliters, or $\frac{1}{2}$ liter.

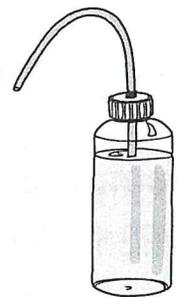
A sports bottle has a capacity of about 1 liter.



Dropper

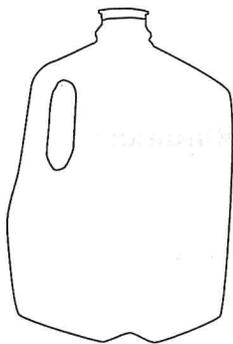


Beaker



Sports Bottle

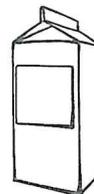
Below are some containers with different capacities.



4 liters



2 liters



1 liter



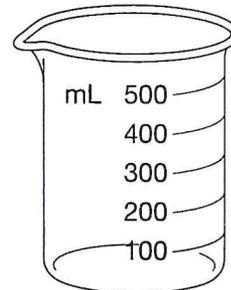
250 milliliters

You can measure capacity using milliliters or liters.

Example 1

Jill put water in the beaker.

How much water is in the beaker?



Strategy Find the amount of water in the beaker.

Step 1

Look at the marks on the beaker.

Each mark is 100 milliliters.

Step 2

Read the mark that the water comes up to.

The water stops at the 300-milliliter mark.

Solution There are 300 milliliters of water in the beaker.

Example 2

Which is the better estimate for the capacity of a can of juice?

300 liters

300 milliliters



Strategy Look at the units in the choices.
Compare the units to the juice can.

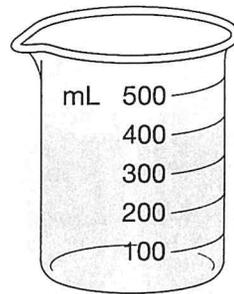
A can of juice holds less than 1 liter.

So, the units must be milliliters.

Solution The capacity of a can of juice is about 300 milliliters.

Example 3

Dina has 400 milliliters of water in a beaker.

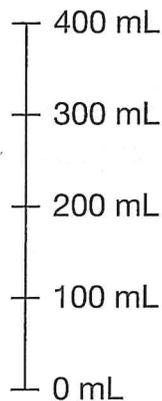


She poured some of the water out and now she has 100 milliliters left. How much water was poured out of the beaker?

Strategy Draw a number line.

Step 1

Draw a number line and count down from 400 to 100.



Step 2

Draw arrows from 400 to 100 by 100s. Count down.

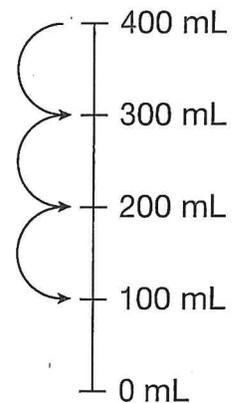
$$400 - 100 = 300$$

$$400 - 200 = 200$$

$$400 - 300 = 100$$

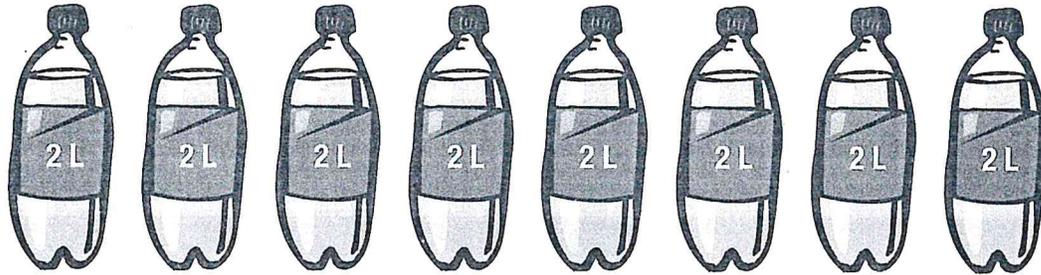
There were 300 milliliters of water poured.

Solution Dina poured out 300 milliliters of water.



Example 4

Erica bought 8 bottles of lemonade for a party.
Each bottle contains 2 liters (L) of lemonade.

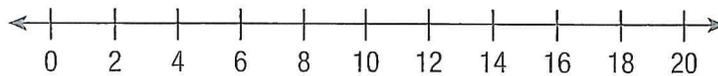


How many liters of lemonade did Erica buy in all?

Strategy Draw a number line.

Step 1

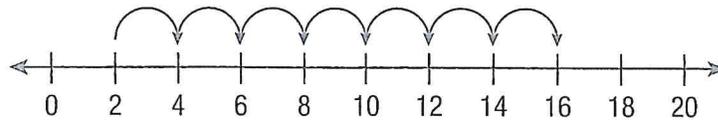
Draw a number line.



Step 2

Draw arrows for every 2 liters.

Draw 8 arrows, one for each bottle.



There are 16 liters of lemonade.

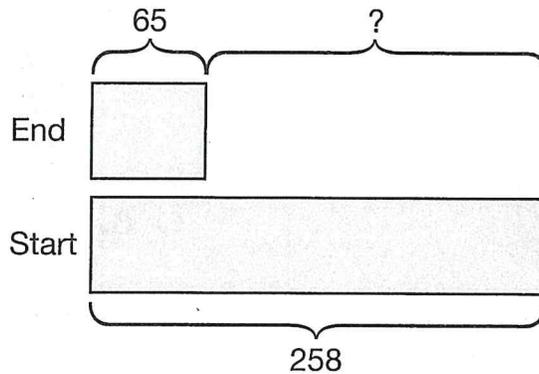
Solution Erica bought 16 liters of lemonade in all.



Coached Example

Jared's fish tank has 258 liters of water.
 He pumped out 65 liters to do a water change.
 How much water is left in the fish tank now?

Draw a bar model.



Write a subtraction sentence. Use \square for the difference.

$$\underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \square$$

Find the difference.

Use addition to check your answer.

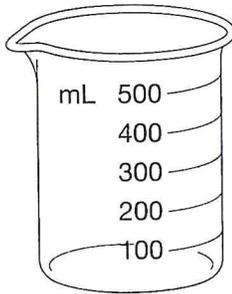
The fish tank has liters of water left.



Lesson Practice Part 1

Choose the correct answer.

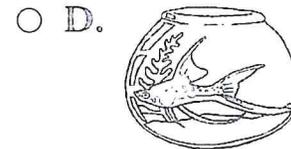
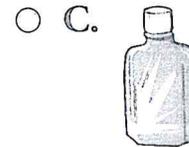
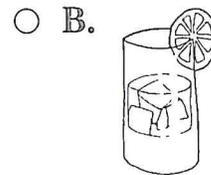
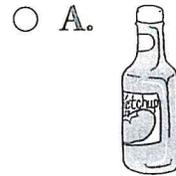
1. Marco filled this beaker with a liquid.



How much liquid is in the beaker?

- A. 100 milliliters
 - B. 200 milliliters
 - C. 400 milliliters
 - D. 500 milliliters
2. Harold poured some milk into a bowl with cereal. Which measure is most likely the amount of milk that Harold poured into the bowl?
- A. 25 milliliters
 - B. 25 liters
 - C. 250 milliliters
 - D. 250 liters

3. Which container could have a capacity of 10 liters?



4. A bathtub has 145 liters of water in it. Cindy drained 38 liters of water. How much water is in the bathtub now?
- A. 107 liters
 - B. 113 liters
 - C. 117 liters
 - D. 183 liters

5. Before lunch, Mr. Jones filled the kiddie pool with 350 liters of water. After lunch, he filled the pool with 585 liters of water. How much water did Mr. Jones fill in the pool?
- A. 235 liters
- B. 700 liters
- C. 835 liters
- D. 935 liters
6. Chuck drank a total of 7 liters of water in 7 days. If he drank the same amount of water each day, How much water did he drink each day?
- A. 1 liter
- B. 7 liters
- C. 14 liters
- D. 49 liters
7. Shannon used 67 liters of water in the shower. Nathan used 58 liters of water in the shower. How much water did they use in all?
- A. 115 liters
- B. 125 liters
- C. 155 liters
- D. 161 liters
8. Michael has to take 8 milliliters of medicine each night. How much medicine does Michael take in all for 7 nights?
- A. 1 milliliter
- B. 15 milliliters
- C. 56 milliliters
- D. 78 milliliters

9. Jasmine bought 10 bottles of soda for a barbeque at the park. Each bottle has 2 liters of soda.

A. How many liters of soda did Jasmine buy in all? Show your work.

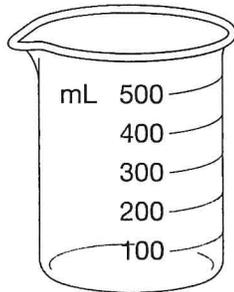
B. Jasmine will put the same amount of soda on each table. There are 5 tables. How many liters of soda does each table get? Show your work.



Lesson Practice • Part 2

Choose the correct answer.

1. There were 300 milliliters of water in the beaker. Some water was poured out.



How much water was poured out?

- A. 100 milliliters
- B. 200 milliliters
- C. 300 milliliters
- D. 400 milliliters
2. Which is the best estimate for the capacity of a soup bowl?
- A. 1 milliliter
- B. 1 liter
- C. 10 milliliters
- D. 10 liters
3. Each bottle of iced tea contains 3 liters. If there are 6 bottles of iced tea, how much iced tea is there?
- A. 2 liters
- B. 3 liters
- C. 9 liters
- D. 18 liters
4. Which is the best estimate for the capacity of a kitchen sink?
- A. 15 milliliters
- B. 15 liters
- C. 150 milliliters
- D. 150 liters
5. A total of 80 liters of water is being poured in a spa each minute. How much water was put into the spa after 5 minutes?
- A. 16 liters
- B. 75 liters
- C. 85 liters
- D. 400 liters

6. Larry said that the capacity of a large pot was 10. Which best explains the units Larry should have used?
- A. milliliters because a large pot holds less than an eyedropper
 - B. milliliters because a large pot holds more than a sports bottle
 - C. liters because a large pot holds more than a sports bottle
 - D. liters because a large pot holds less than an eyedropper
7. Which object's capacity is best measured in liters?
- A. bucket
 - B. teaspoon
 - C. bottle cap
 - D. juice glass
8. There are 10 liters of bottled water in a cooler. Each bottle contains 2 liters. How many bottles are there?
- A. 5
 - B. 8
 - C. 12
 - D. 20
9. Which measurement best describes the capacity of a can of soup?
- A. 5 milliliters
 - B. 5 liters
 - C. 500 milliliters
 - D. 500 liters

10. There are 625 milliliters of orange juice and 285 milliliters of grape juice remaining after a brunch.

A. How many milliliters of juice remained after brunch? Show your work.

B. How many more milliliters of orange juice were left than grape juice? Show your work.

Perimeter



Getting the Idea

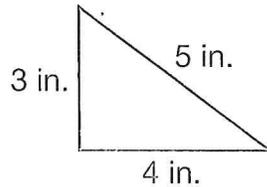
Perimeter is the distance around a figure. Perimeter is measured in units.

Some units for measuring perimeter are inches, centimeters, feet, yards, and meters.

You can add the lengths of the sides to find the perimeter of a figure.

Example 1

What is the perimeter of this triangle?



Strategy Use addition.

Step 1 Add the lengths of the sides.

$$3 + 4 + 5 = 12$$

Step 2 Look at the units labeled on the triangle.

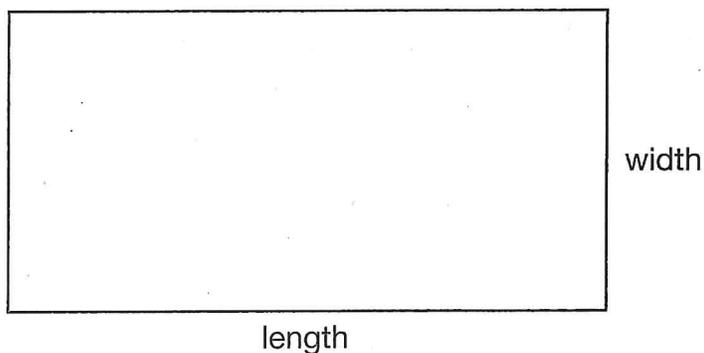
The units are inches.

Solution The perimeter of the triangle is 12 inches.

Some problems may not give the measurements of a figure.
You will need to measure the lengths of the sides.
Then add the lengths to find the perimeter.

Example 2

Laida used this figure to trace rectangles on a poster.



What is the perimeter of this rectangle, in centimeters?

Strategy Use a centimeter ruler to measure each side.
Then add the measurements.

Step 1

Measure the length of the rectangle.

The length is 8 centimeters.

Two sides of the rectangle are 8 centimeters long.

Step 2

Measure the width of the rectangle.

The width is 4 centimeters.

Two sides of the rectangle are 4 centimeters long.

Step 3

Add the measurements.

$$8 + 8 + 4 + 4 = 24$$

Solution The perimeter of the rectangle is 24 centimeters.

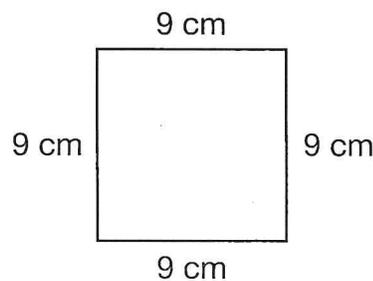
You can also use multiplication to find the perimeter of a figure with equal side lengths.

A square is a figure with 4 equal sides. To find the perimeter of a square, you can multiply 4 by the length of one side.

$$\text{Perimeter of a square} = 4 \times \text{length of side}$$

Example 3

What is the perimeter of this square?



Strategy Use multiplication.

Step 1 Multiply 4 by the length of one side.

$$4 \times 9 = 36$$

Step 2 Look at the units labeled on the square.

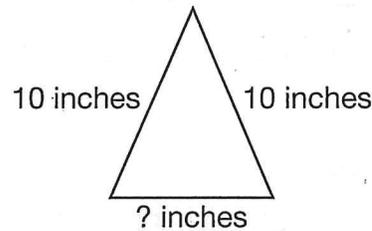
The units are centimeters.

Solution The perimeter of the square is 36 centimeters.

You can write a number sentence to help you find the missing length in a perimeter problem.

Example 4

The triangle below has a perimeter of 26 inches.



What is the unknown side length?

Strategy Write a number sentence. Then substitute the numbers you know.

Step 1

Use \square to represent the missing side length.

side length + side length + side length = Perimeter

$$10 + 10 + \square = 26$$

Step 2

Find the missing side length.

$$10 + 10 + \square = 26$$

$$20 + \square = 26$$

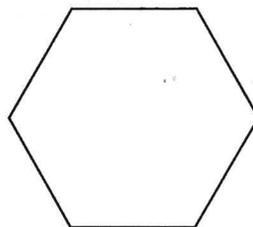
$$20 + 6 = 26$$

Solution The missing side length is 6 inches.

Example 5

This hexagon has 6 equal sides. It has a perimeter of 42 meters.

Perimeter = 42 meters



What is the side length of the hexagon?

Strategy Write a number sentence. Then substitute the numbers you know.

Step 1

Write a number sentence.

Use \square to represent the missing side length.

The hexagon has 6 equal sides.

So, the perimeter is $6 \times$ the length of one side.

$$\text{Perimeter} = 6 \times \square$$

Step 2

Find the side length.

Substitute the numbers you know.

$$42 = 6 \times \square$$

$$\text{Think: } 6 \times ? = 42$$

$$6 \times 7 = 42$$

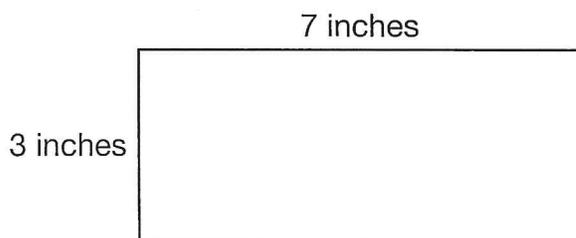
The side length is 7 meters.

Solution The side length of the hexagon is 7 meters.



Coached Example

What is the perimeter of this rectangle?



The rectangle has _____ sides.

Two sides of the rectangle are _____ inches long.

The other two sides of the rectangle are _____ inches long.

Add the measurements.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

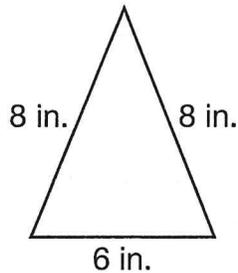
The perimeter of the rectangle is _____ inches.



Lesson Practice • Part 1

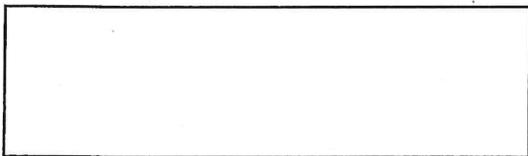
Choose the correct answer.

1. What is the perimeter of this triangle?



- A. 18 inches
 B. 20 inches
 C. 22 inches
 D. 24 inches

2. Use a centimeter ruler to measure the side lengths.

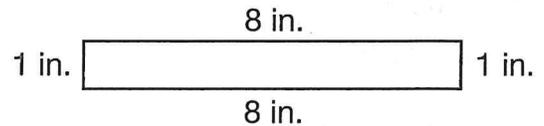


What is the perimeter of this rectangle?

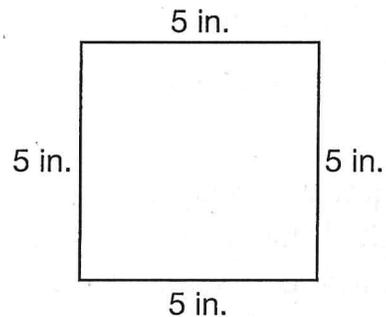
- A. 18 centimeters
 B. 14 centimeters
 C. 9 centimeters
 D. 7 centimeters

3. Which rectangle has a different perimeter than the others?

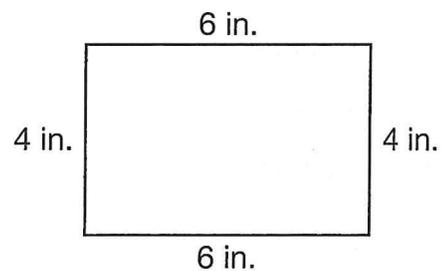
A.



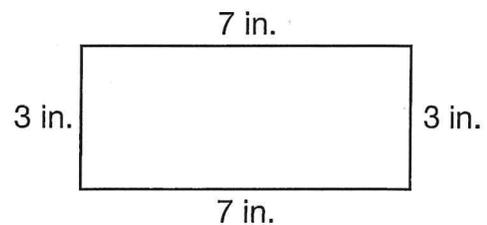
B.



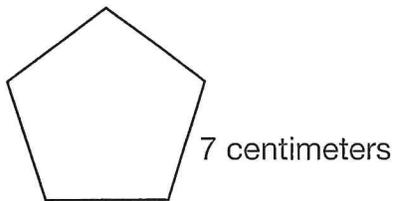
C.



D.



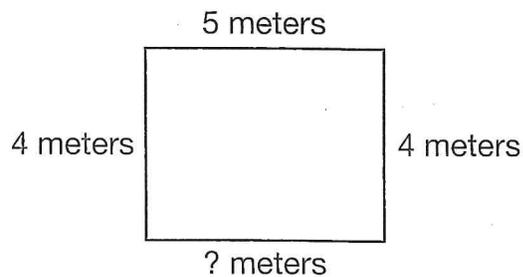
4. The pentagon below has sides of equal length.



What is the perimeter of the pentagon?

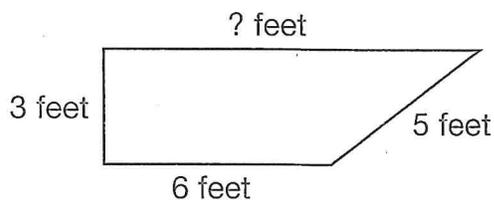
- A. 14 centimeters
 - B. 21 centimeters
 - C. 35 centimeters
 - D. 42 centimeters
5. A playground is shaped like a rectangle. It has a length of 9 yards and a width of 8 yards. What is the perimeter of the playground?
- A. 18 yards
 - B. 32 yards
 - C. 34 yards
 - D. 36 yards

6. The perimeter of this rectangle is 18 meters.



Which number sentence can be used to find the missing side length?

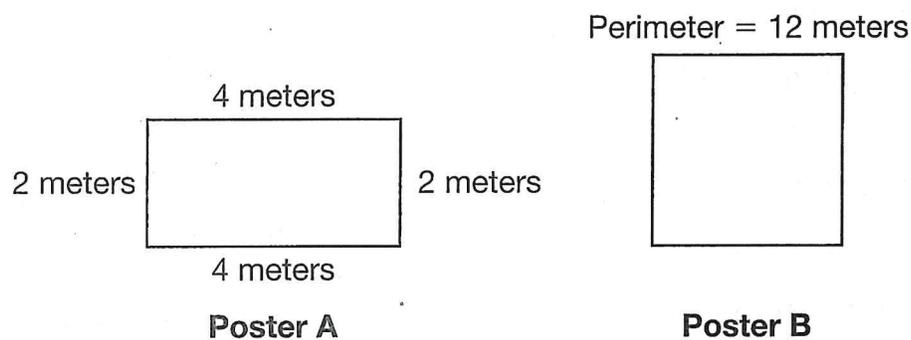
- A. $4 + 5 + \square = 18$
 - B. $4 + 4 + 4 + \square = 18$
 - C. $5 + 5 + 5 + \square = 18$
 - D. $4 + 5 + 4 + \square = 18$
7. This figure has a perimeter of 24 feet.



What is the missing side length?

- A. 6 feet
- B. 10 feet
- C. 11 feet
- D. 12 feet

8. A square rug has a perimeter of 8 yards. What is the length of one side of the rug?
- A. 2 yards
- B. 3 yards
- C. 4 yards
- D. 12 yards
9. Adam has these two posters. Poster A is a rectangle. Poster B is a square.



- A. What is the perimeter of poster A? Show your work.

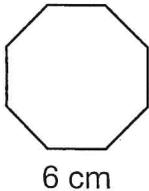
- B. What is the length of each side of poster B? Explain your answer.



Lesson Practice Part 2

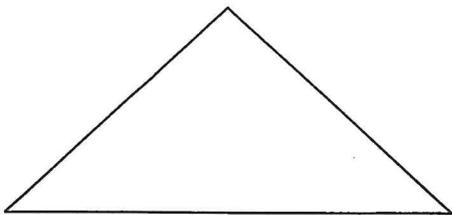
Choose the correct answer.

1. The octagon below has sides of equal length.



What is the perimeter of the octagon?

- A. 24 centimeters
 - B. 36 centimeters
 - C. 42 centimeters
 - D. 48 centimeters
2. Use a centimeter ruler to measure the side lengths.



What is the perimeter of this triangle?

- A. 18 centimeters
- B. 16 centimeters
- C. 14 centimeters
- D. 12 centimeters

3. The perimeter of a rectangle is 20 inches. The length of the rectangle is 6 inches. What is the width of the rectangle?

- A. 4 inches
- B. 6 inches
- C. 8 inches
- D. 14 inches

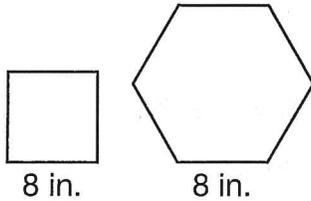
4. A triangle with sides of equal lengths has a perimeter of 15 centimeters. What is the length of each side?

- A. 5 centimeters
- B. 12 centimeters
- C. 18 centimeters
- D. 45 centimeters

5. Gretchen drew a square with 3-inch sides. She will draw a second square with sides that are doubled. What is the perimeter of the second square?

- A. 6 inches
- B. 12 inches
- C. 24 inches
- D. 48 inches

6. Both figures have sides all with equal lengths.



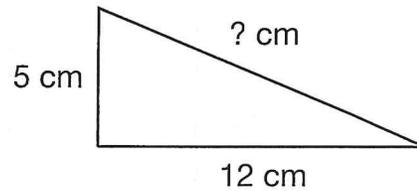
Which sentence is true?

- A. The two figures have the same perimeter.
 B. The hexagon has a perimeter that is 16 inches greater.
 C. The hexagon has a perimeter that is 2 inches greater.
 D. The square has a perimeter that is 8 inches greater.

7. A rectangular print has a width of 6 inches and a perimeter of 28 inches. What is the length of the print?

- A. 8 inches C. 16 inches
 B. 11 inches D. 22 inches

8. This triangle has a perimeter of 30 centimeters.

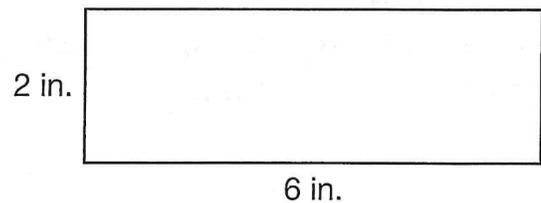


What is the unknown side length?

- A. 47 centimeters
 B. 23 centimeters
 C. 17 centimeters
 D. 13 centimeters

9. Ling drew this rectangle.

- A. Draw a rectangle with the same perimeter and a different length and width.



- B. Draw a square with the same perimeter.

Understand Area



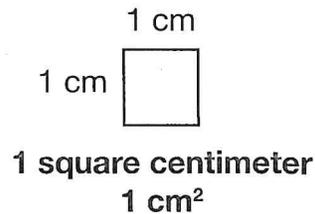
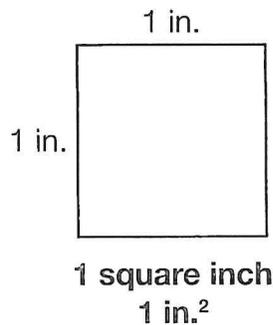
Getting the Idea

Area is the number of **square units** needed to cover a figure.

A square with a side length of 1 unit is a **unit square**.

For example, 1 square inch is a square with side lengths of 1 inch.

A square that has an area of 1 square centimeter has side lengths of 1 centimeter.

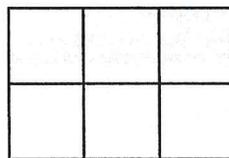


Other examples of square units are square feet and square meters.

To find the area, you can count the number of square units that cover the figure with no overlaps.

Example 1

Arthur used square tiles to make a rectangle. Each is a square with side lengths of 1 centimeter.



What is the area of the rectangle?

Strategy Count the number of square units that make up the rectangle.

Step

The rectangle is made up of 6 square tiles.

Step 2

Find the area.

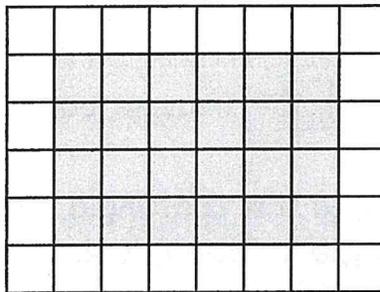
Each  is 1 square centimeter.

So, 6  are 6 square centimeters.

Solution The area of the rectangle is 6 square centimeters.

Example 2

What is the area of the shaded rectangle?



Key:  = 1 square foot

Strategy Count the number of shaded squares in each row. Then add.

Step 1

Count the number of rows and the shaded squares in each row.

There are 4 rows of shaded squares.

Each row has 6 shaded squares.

Step 2

Multiply.

$$4 \times 6 = 24$$

Step 3

Write the units.

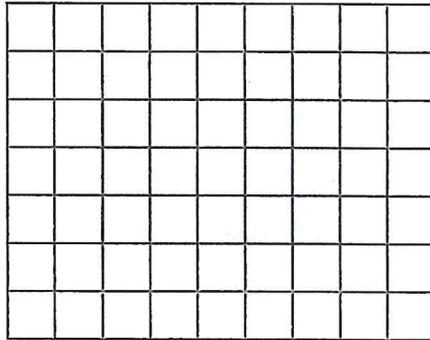
Each  = 1 square foot.

So, 24  equal 24 square feet.

Solution The area of the shaded rectangle is 24 square feet.

Example 3

How much greater is the area of the shaded rectangle in Example 2 than the area of the shaded rectangle below? The area of the shaded rectangle in Example 2 is 24 square feet.



Key:  = 1 square foot

Strategy First, find the area of this rectangle. Then subtract from the area of the rectangle in Example 2.

Step 1 Count the number of rows and the shaded squares in each row.

There are 3 rows of 5 shaded squares.

$$3 \times 5 = 15$$

Step 2 Find the area and label the units.

Each  = 1 square foot.

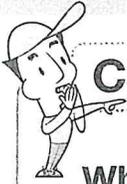
15  equal 15 square feet.

Step 3 Subtract 15 square feet from the area of the rectangle in Example 2.

The area of the rectangle in Example 2 is 24 square feet.

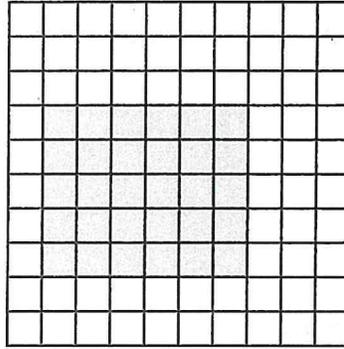
$$24 - 15 = 9 \text{ square feet}$$

Solution The area of the rectangle in Example 2 is 9 square feet greater than the area of the rectangle above.



Coached Example

What is the area of the shaded figure?



Key: $\square = 1$ square meter

Count the number of rows and the shaded squares in each row.

There are _____ rows of shaded squares.

Each row has _____ shaded squares.

Multiply.

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

What are the units for the area? _____

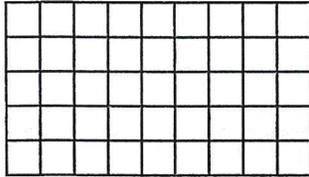
The area of the shaded figure is _____ square meters.



Lesson Practice Part 1

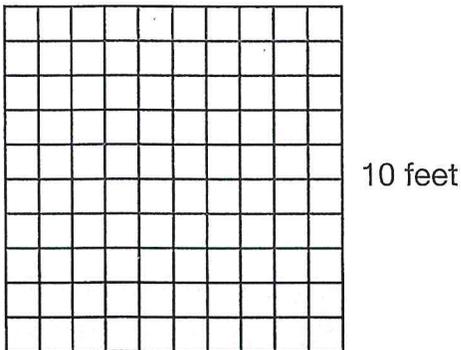
Choose the correct answer.

1. Each \square equals 1 square inch.



What is the area of the rectangle?

- A. 45 square inches
 - B. 40 square inches
 - C. 36 square inches
 - D. 28 square inches
2. Chloe's playroom is a square with side lengths of 10 feet.

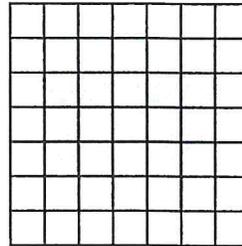


Key: \square = 1 square foot

What is the area of the playroom?

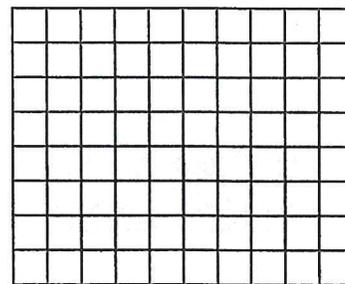
- A. 10 square feet
- B. 20 square feet
- C. 40 square feet
- D. 100 square feet

3. What is the area of the shaded figure?



Key: \square = 1 square centimeter

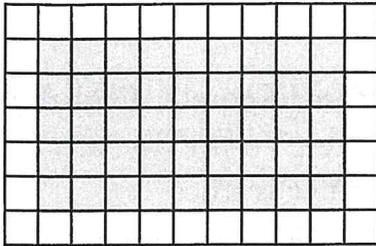
- A. 5 square centimeters
 - B. 25 square centimeters
 - C. 35 square centimeters
 - D. 49 square centimeters
4. What is the area of the shaded rectangle?



Key: \square = 1 square foot

- A. 28 square feet
- B. 32 square feet
- C. 40 square feet
- D. 48 square feet

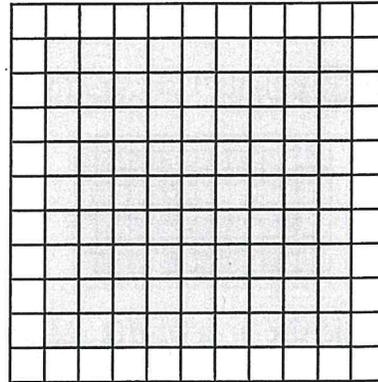
5. What is the area of the shaded figure?



Key: $\square = 1$ square meter

- A. 36 square meters
- B. 40 square meters
- C. 45 square meters
- D. 77 square meters

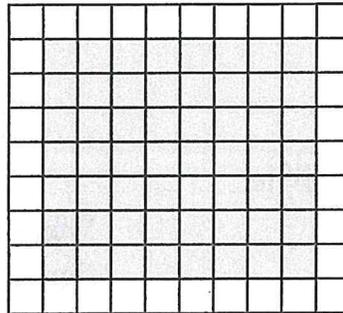
6. What is the area of the shaded figure?



Key: $\square = 1$ square centimeter

- A. 9 square centimeters
- B. 18 square centimeters
- C. 27 square centimeters
- D. 81 square centimeters

7. Thad drew a rectangle on the grid.



Key: $\square = 1$ square inch

- A. What is the area of the rectangle?

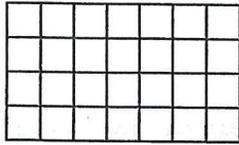
- B. Explain how you found the area of the rectangle in Part A.



Lesson Practice Part 2

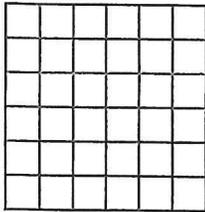
Choose the correct answer.

1. Each \square equals 1 square inch.



What is the area of the rectangle?

- A. 11 square inches
 - B. 22 square inches
 - C. 28 square inches
 - D. 35 square inches
2. Each \square equals 1 square inch.



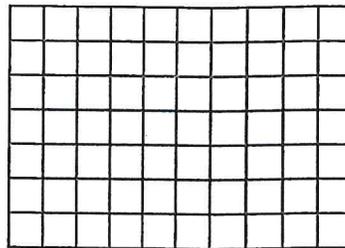
What is the area of the rectangle?

- A. 12 square inches
- B. 18 square inches
- C. 24 square inches
- D. 36 square inches

3. A closed figure is divided into unit squares. To find the area, which sentence is true?

- A. The figure cannot have gaps or overlaps.
- B. The figure can have gaps, but not overlaps.
- C. The figure can have overlaps, but not gaps.
- D. The figure can have gaps and overlaps.

4. Each \square equals 1 square centimeter.



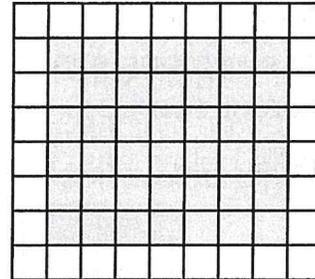
What is the area of the shaded figure?

- A. 70 square centimeters
- B. 40 square centimeters
- C. 34 square centimeters
- D. 26 square centimeters

5. A closed figure is divided into unit squares. To find the area, which sentence is true?

- A. The unit squares can be in different units.
- B. The unit squares must be in the same units.
- C. The unit squares must be in different units.
- D. The unit squares can be different sizes.

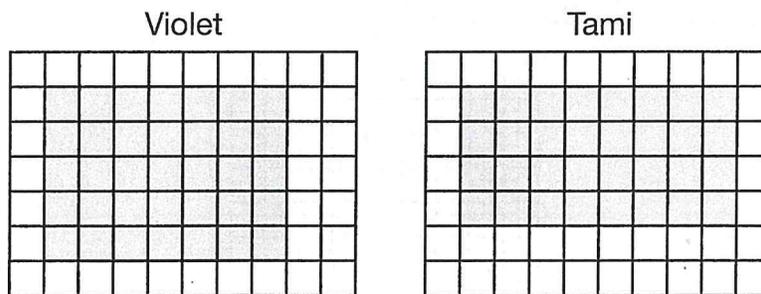
6. How much greater is the area of the entire figure than of the shaded figure?



Key: Each \square = 1 square meter

- A. 30 square meters
- B. 42 square meters
- C. 60 square meters
- D. 72 square meters

7. Violet and Tami each drew a shaded rectangle.



Key: Each \square = 1 square inch

A. Whose shaded rectangle has the greater area?

B. How much greater is the shaded rectangle with the greater area than the other one? Show your work.

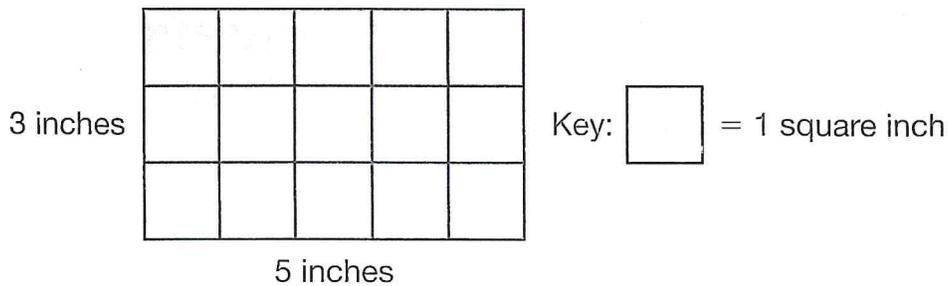
Area of Rectangles



Getting the Idea

The area of a **rectangle** is the number of square units that cover the rectangle with no gaps or overlaps.

The rectangle below has 3 rows of squares.

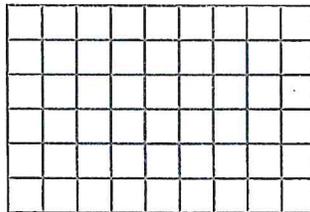


You can multiply the length and the width to find the area.

$$5 \text{ inches} \times 3 \text{ inches} = 15 \text{ square inches}$$

Example 1

What is the area of the shaded rectangle?



Key:  = 1 square centimeter

Strategy Use multiplication.

Step

Count the number of rows and the number in each row.

There are 4 rows of 7 squares.

Step 2

Multiply.

$$4 \times 7 = 28$$

Step 3

Use the scale key to find what each \square represents.

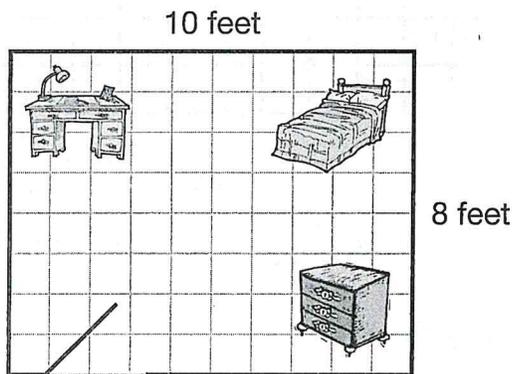
Each \square equals 1 square centimeter.

So, $28 \square = 28$ square centimeters.

Solution The area of the rectangle is 28 square centimeters.

Example 2

The diagram below shows Toni's bedroom floor. She is getting wall-to-wall carpet to cover the bedroom floor.



How many square feet of carpet does Toni need to cover her bedroom floor?

Strategy Find the length and the width. Then multiply.

Step 1

Find the length.

The length is 10 feet.

Step 2

Find the width.

The width is 8 feet.

Step 3

Multiply the length times the width.

$$10 \text{ feet} \times 8 \text{ feet} = 80 \text{ square feet}$$

Solution Toni needs 80 square feet of carpet for her bedroom floor.

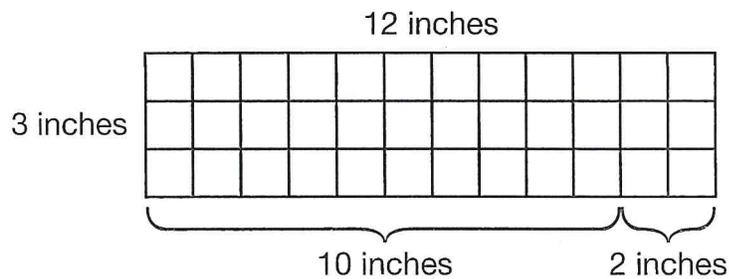
You can use the **distributive property** to find the area of a rectangle. Remember, the distributive property says that multiplying a sum by a factor is the same as multiplying each addend by the factor and adding the products.

Example 3

What is the area of a rectangle with width 3 inches and length 12 inches?

Strategy Break the rectangle into two smaller rectangles and use the distributive property.

Step 1 Break the rectangle into two smaller rectangles.



Key: $\square = 1$ square inch

Step 2 Rename one of the factors.

$$3 \times (10 + 2)$$

Step 3 Multiply the other factor by each addend.

$$(3 \times 10) + (3 \times 2)$$

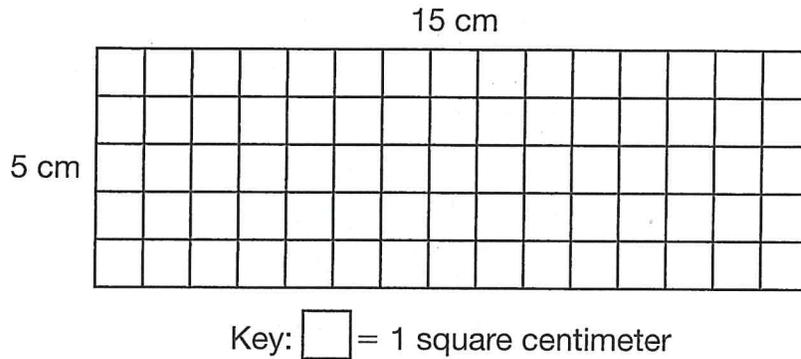
Step 4 Add the products.

$$30 + 6$$

Solution The area of the rectangle is 36 square inches.

Example 4

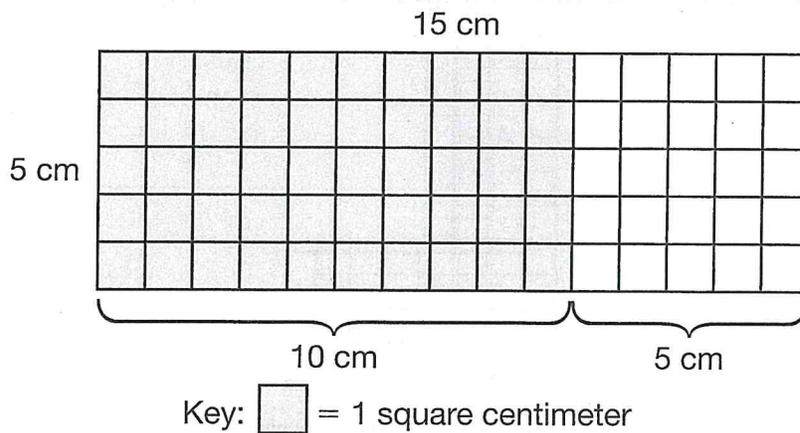
What is the area of a rectangle with width 5 centimeters and length 15 centimeters?



Strategy Use the distributive property.

Step 1

Break the rectangle into 2 rectangles.



$$5 \times 15 = 5 \times (10 + 5)$$

Step 2

Use the distributive property.

$$5 \times (10 + 5)$$

$$(5 \times 10) + (5 \times 5)$$

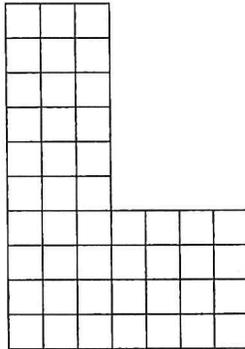
$$50 + 25 = 75$$

So, the area of the rectangle is 75 square centimeters.

Solution The area of a rectangle with width 5 centimeters and length 15 centimeters is 75 square centimeters.

Example 5

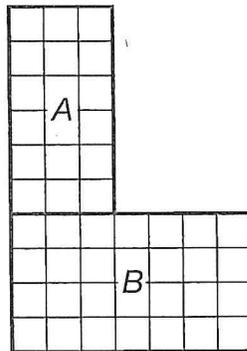
What is the area of the figure below?



Key: $\square = 1$ square inch

Strategy Break the figure into 2 rectangles. Find the area of each rectangle. Add to find the total area.

Break the figure into rectangle *A* and rectangle *B*.



Key: $\square = 1$ square inch

Multiply to find the area of each rectangle.

Rectangle A has a length of 3 inches and a width of 6 inches.

$$3 \text{ inches} \times 6 \text{ inches} = 18 \text{ square inches}$$

Rectangle B has a length of 7 inches and a width of 4 inches.

$$7 \text{ inches} \times 4 \text{ inches} = 28 \text{ square inches}$$

Add to find the total area.

$$18 \text{ square inches} + 28 \text{ square inches} = 46 \text{ square inches}$$

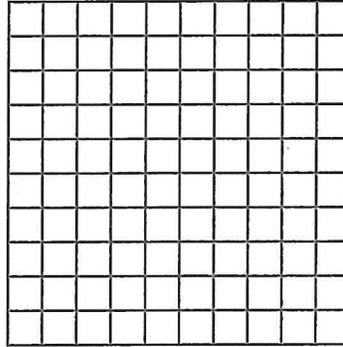
Solution The area of the figure is 46 square inches.



Coached Example

Angelo wants to buy linoleum flooring for his rectangular kitchen. The kitchen is 5 meters long and 4 meters wide. How many square meters of flooring does Angelo need?

Draw and shade a rectangle on the grid to represent the kitchen floor.



Key: $\square = 1$ square meter

How many squares did you shade? _____

Use multiplication to find the area.

You need to multiply the _____ times the _____.

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

The units for the area of the floor are _____.

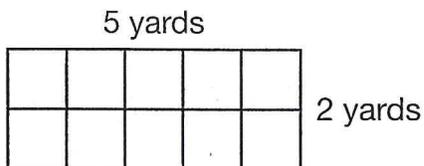
Angelo needs _____ square meters of flooring.



Lesson Practice Part 1

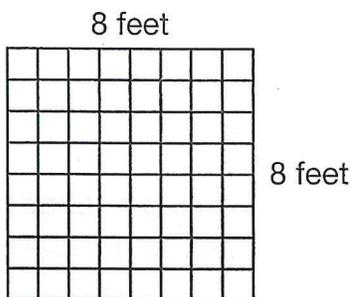
Choose the correct answer.

1. Kenny made a drawing of the garden he is planning.



What is the area of Kenny's garden?

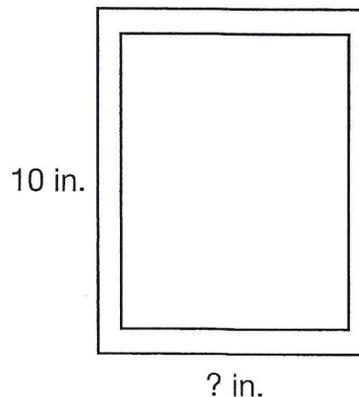
- A. 3 square yards
 - B. 7 square yards
 - C. 10 square yards
 - D. 14 square yards
2. Ratisha marked an area for a handball court in her driveway.



What is the area of Ratisha's handball court?

- A. 32 square feet
- B. 64 square feet
- C. 88 square feet
- D. 100 square feet

3. Lorenzo has a photo frame with an area of 80 square inches. The width of the frame is 10 inches.



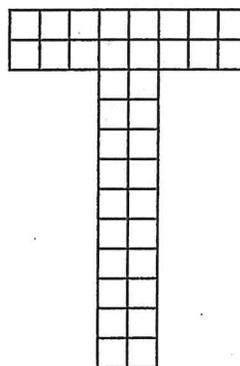
What is the length of the frame?

- A. 4 inches
 - B. 8 inches
 - C. 30 inches
 - D. 40 inches
4. A room is 6 yards long and 5 yards wide. What is the area of the room?
- A. 22 square yards
 - B. 26 square yards
 - C. 30 square yards
 - D. 32 square yards

5. A rectangular blacktop has a length of 9 yards and a width of 8 yards. What is the area of the blacktop?

- A. 17 square yards
- B. 34 square yards
- C. 72 square yards
- D. 98 square yards

6. The ninth hole at Ralph's Mini Golf is shaped like the figure below.

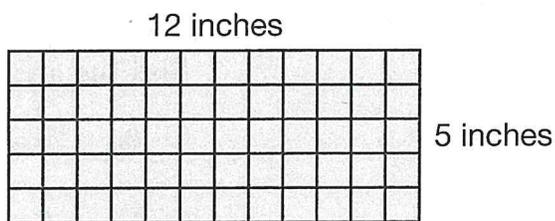


Key: $\square = 1$ square foot

What is the area of the figure?

- A. 34 square feet
- B. 36 square feet
- C. 40 square feet
- D. 80 square feet

7. Carlotta built a flower box for her window.



A. What is the area of the flower box? Use repeated addition to find the area.

B. What is the area of the flower box? Use the distributive property to find the area.



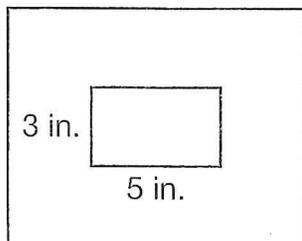
Lesson Practice Part 2

Choose the correct answer.

1. A rectangular vegetable garden is 9 yards long and 2 yards wide. What is the area of the vegetable garden?

- A. 7 square yards
 B. 11 square yards
 C. 18 square yards
 D. 22 square yards

2. A 5-inch-by-3-inch photo is inside a frame that extends the photo 2 inches on all sides.



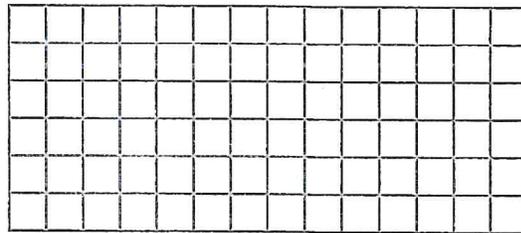
What is the area of the frame?

- A. 63 square inches
 B. 35 square inches
 C. 25 square inches
 D. 21 square inches

3. A rectangular poster has an area of 12 square feet. The length of the poster is 4 feet. What is the width of the poster?

- A. 2 feet C. 4 feet
 B. 3 feet D. 8 feet

4. Raj made a drawing of his basement.

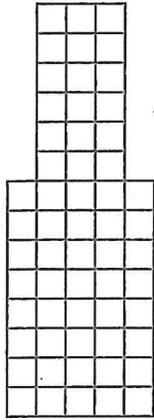


Key: Each \square = 1 square yard

Which equation can be used to find the area of the basement?

- A. $(10 \times 3) + (4 \times 3) = \square$
 B. $(10 + 3) \times (4 + 3) = \square$
 C. $(10 \times 6) + (4 \times 6) = \square$
 D. $(10 + 6) \times (4 + 6) = \square$

5. The front of a building is shown.



Key: Each \square = 1 square meter

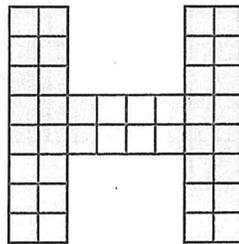
What is the area of the front of the building?

- A. 48 square meters
- B. 58 square meters
- C. 70 square meters
- D. 112 square meters

6. A rectangle has a length of 6 inches and a width of 4 inches. Cassie said that she can multiply 6×4 to find the area in square inches. Paolo said he can add $6 + 4 + 6 + 4$ to find the area in square inches. Who is correct?

- A. Cassie only
- B. Paolo only
- C. Both are correct.
- D. Neither is correct.

7. Harding Middle School has a giant H on its athletic field.



Key: Each \square = 1 square meter

- A. What is the area, in square meters, of the H?

- B. Explain how you found your answer to Part A.

Compare Perimeter and Area



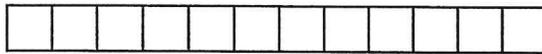
Getting the Idea

Rectangles can have the same perimeter, but different areas.

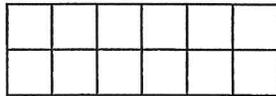
They can also have the same areas, but different perimeters.

These rectangles all have an area of 12 square units, but they have different perimeters.

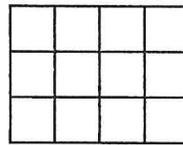
Perimeter = 26 units



Perimeter = 16 units



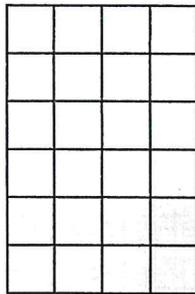
Perimeter = 14 units



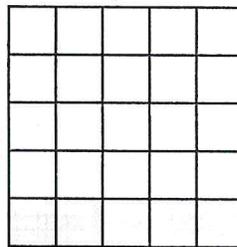
Example 1

What are the perimeters and areas of these two shapes?

Shape A



Shape B



Strategy Add the side lengths to find the perimeter.
Multiply the side lengths to find the area.

Step 1

Find the perimeter and area of Shape A.

It has a length of 4 units. It has a width of 6 units.

The perimeter is $4 + 6 + 4 + 6 = 20$ units.

The area is $4 \times 6 = 24$ square units.

Step 2

Find the perimeter and area of Shape B.

It has a length of 5 units. It has a width of 5 units.

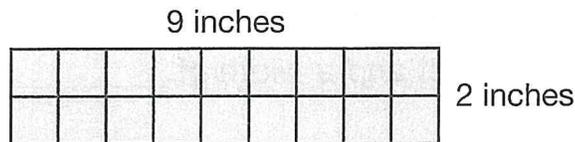
The perimeter is $5 + 5 + 5 + 5 = 20$ units.

The area is $5 \times 5 = 25$ square units.

Solution Both shapes have a perimeter of 20 units. Shape A has an area of 24 square units. Shape B has an area of 25 square units.

Example 2

Janelle labeled the rectangle below.



Make a rectangle with the same area as Janelle's rectangle, but with a different perimeter.

Strategy Use square tiles.

Step 1

Find the perimeter and area of Janelle's rectangle.

It has a length of 9 inches and a width of 2 inches.

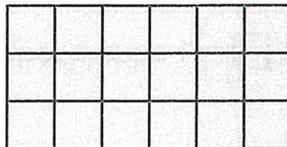
It has a perimeter of $9 + 2 + 9 + 2 = 22$ inches.

It has an area of 9 inches \times 2 inches = 18 square inches.

Step 2

Use 18 square tiles to represent 18 square inches.

Make a different rectangle with 18 square tiles.

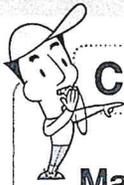
**Step 3**

Check that the perimeter is different.

The shape has a length of 6 inches and a width of 3 inches.

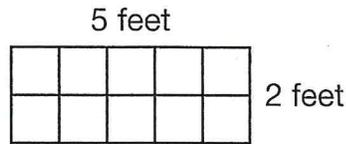
It has a perimeter of $6 + 3 + 6 + 3 = 18$ inches.

Solution A shape with a length of 6 inches and a width of 3 inches has the same area as, but a different perimeter than, Janelle's rectangle.



Coached Example

Mark made a poster for the Science Fair. It was shaped like a rectangle and was 5 feet long and 2 feet wide.



What are the measurements of a rectangle with the same perimeter but different area than Mark's poster?

Find the perimeter and area of Mark's poster.

It has a length of _____ feet and a width of _____ feet.

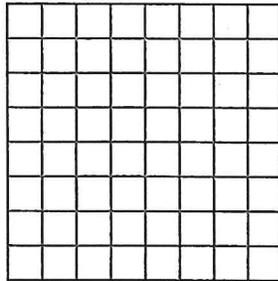
Find the perimeter.

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ feet}$$

Find the area.

$$\underline{\hspace{2cm}} \text{ feet} \times \underline{\hspace{2cm}} \text{ feet} = \underline{\hspace{2cm}} \text{ square feet}$$

Make a rectangle with the same perimeter but with a different area.



Key: $\square = 1$ square foot

Check that the area is different.

Your rectangle has a length of _____ feet and a width of _____ feet.

Find the area.

$$\underline{\hspace{2cm}} \text{ feet} \times \underline{\hspace{2cm}} \text{ feet} = \underline{\hspace{2cm}} \text{ square feet}$$

A rectangle with the same perimeter but different area than Mark's poster has a length of _____ feet and a width of _____ feet.



Lesson Practice • Part 1

Choose the correct answer.

Use the information for questions 1 and 2.

A rectangle has a length of 5 meters and a width of 8 meters.

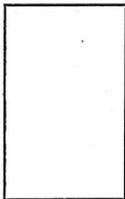
1. What is the perimeter of the rectangle?

- A. 26 m
- B. 30 m
- C. 32 m
- D. 40 m

2. Which rectangle has the same perimeter as the rectangle above but a different area?

- A.

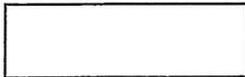
5 meters


- B.

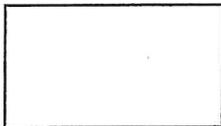
10 meters


- C.

10 meters


- D.

9 meters

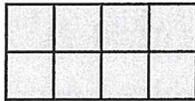


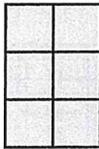
3. This rectangle has a length of 8 units and a width of 1 unit.



Which of these rectangles has the same area, but a different perimeter?

- A.

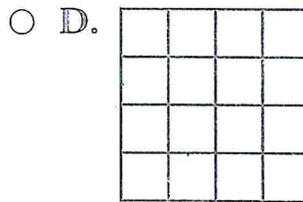
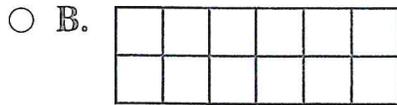
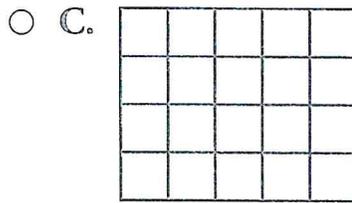
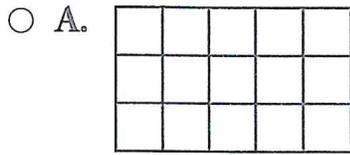

- B.


- C.


- D.

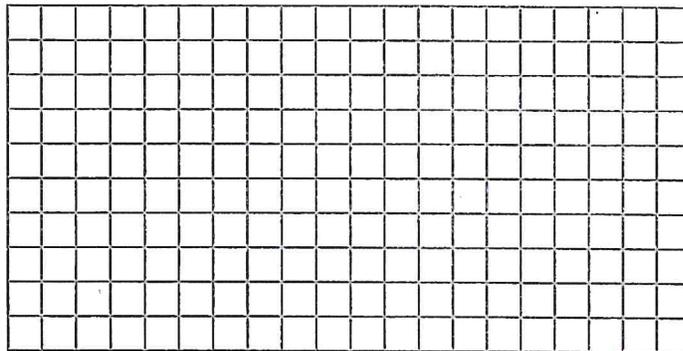


4. Which rectangle does **not** have the same perimeter as the others?



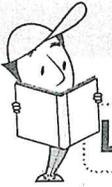
5. Ms. Jensen decides to build a garden with an area of 36 square meters.

A. In the grid below, draw two different rectangular gardens with the same area of 36 square meters.



Key:  = 1 square meter

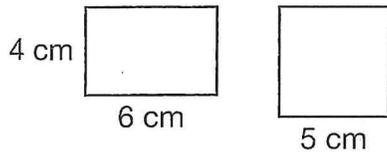
B. What are the length and width of each garden that you drew in Part A?
What is the perimeter of each garden?



Lesson Practice • Part 2

Choose the correct answer.

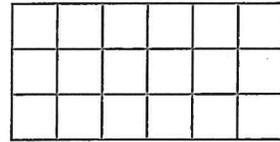
1. Two rectangles are shown.



Which sentence is true?

- A. The rectangles have the same perimeter and area.
 - B. The rectangles have the same perimeter and different areas.
 - C. The rectangles have the same area and different perimeters.
 - D. The rectangles have different perimeters and areas.
2. There are two rectangular guest bedrooms in Emily's grandparents' house. The guest rooms have different lengths and different widths. The length is longer than the width in both rooms. Which sentence can **not** be true?
- A. The rooms have the same area.
 - B. The rooms have the same perimeter.
 - C. The rooms have different areas and perimeters.
 - D. The rooms have the same area and perimeter.

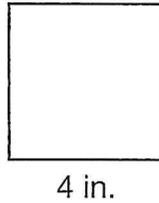
3. A rectangle is shown.



Which of these rectangles has the same area, but a different perimeter?

- A.
- B.
- C.
- D.

4. Janet drew this square.



Which sentence is true?

- A. Janet's square has the same perimeter and area because both are 16.
- B. Janet's square has the same perimeter and area because both are 8.
- C. The perimeter and area of Janet's square are different because they are measured in different units.
- D. The perimeter and area of Janet's square are different because the number of units is different.

5. Will drew a rectangle that has a perimeter of 14 inches. Inez drew a rectangle that has an area of 30 square inches.

A. What are the length and width of two rectangles that Will could have drawn? Give the areas of each.

B. What are the length and width of two rectangles that Inez could have drawn? Give the perimeter of each.

Picture Graphs

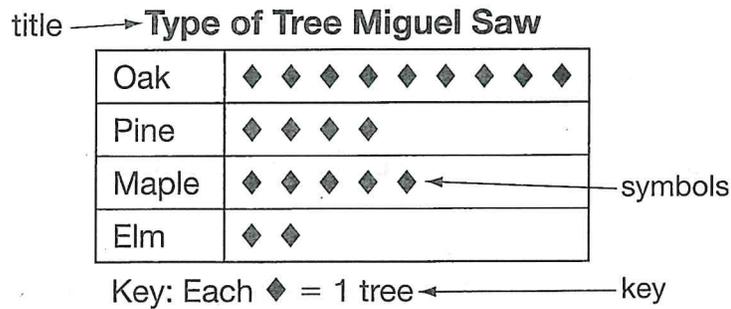


Getting the Idea

A **picture graph** uses pictures or symbols to display and compare **data**.

The key tells how many each symbol represents.

This graph shows the types of trees Miguel saw last week.



Example 1

Use the picture graph above. How many oak trees did Miguel see?

Strategy Look in the row for oak. Use the key.

Step 1

Find the row for oak. Count the symbols.

There are 9 symbols.

Step 2

Use the key to find how many each symbol represents.

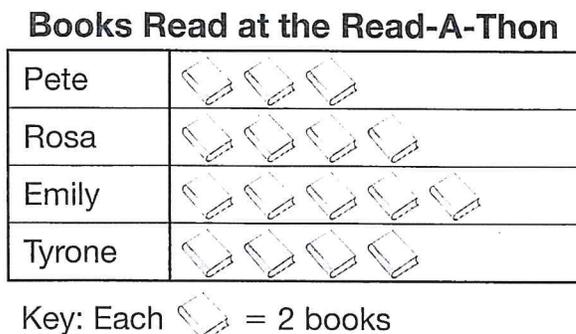
Each symbol equals 1 tree.

So 9 symbols equal 9 trees.

Solution Miguel saw 9 oak trees.

Example 2

The graph shows the number of books that some students read at the Read-A-Thon.



Who read the greatest number of books? How many books did that student read?

Strategy Find the row with the most symbols. Use the key.

Step 1

Find the row with the most symbols.

The row for Emily shows 5 symbols.

Emily read the greatest number of books.

Step 2

Find the number of books Emily read.

Look at the key.

Each symbol equals 2 books.

Step 3

Multiply.

$$5 \text{ symbols} \times 2 \text{ books} = 10 \text{ books}$$

Solution Emily read the greatest number of books.
She read 10 books.

Example 3

Monica asked some students about their favorite time of day. She recorded the data in the tally chart below.

Time of Day	Tally	Number of Votes
Morning		10
Afternoon		6
Evening		14

Make a picture graph to show the same data.

Strategy Choose a key that would work easily with the numbers in the table.

Step 1

Make a chart with 3 rows for the picture graph.

Write the title above the picture graph.

Favorite Time of Day

Key: _____ = _____

Step 2

Decide on a number to use for the key.

Each picture will represent 2 students.

Write the key at the bottom of the picture graph.

Step 3

Think of a picture to use for the key.

Use a ☺ to represent 2 students.

Step 4

Write the time of day in the first column.

Draw the correct number of symbols for each time of day.

Favorite Time of Day

Morning	☺ ☺ ☺ ☺ ☺
Afternoon	☺ ☺ ☺
Evening	☺ ☺ ☺ ☺ ☺ ☺ ☺

Key: Each ☺ = 2 students

Solution The picture graph is shown in Step 4.



Coached Example

Vera enjoys practicing the piano. The picture graph shows the time she spent practicing for 4 days in October.

Piano Practice

October 4	⌚ ⌚
October 5	⌚ ⌚ ⌚ ⌚
October 6	⌚ ⌚ ⌚ ⌚ ⌚ ⌚
October 7	⌚ ⌚ ⌚ ⌚ ⌚ ⌚ ⌚ ⌚

Key: Each ⌚ = 5 minutes

How many more minutes did Vera practice on October 6 than on October 4?

Look at the rows for October 4 and October 6.

There are _____ symbols for October 4.

There are _____ symbols for October 6.

There are _____ more symbols for October 6 than for October 4.

Look at the key. Each symbol represents _____ minutes.

Multiply the number of symbols by the number of minutes each symbol represents.

_____ × _____ = _____

Vera practiced _____ more minutes on October 6 than on October 4.



Lesson Practice • Part 1

Choose the correct answer.

Use the picture graph for questions 1–3.

Bags of Cookies Sold

Chocolate Chip	
Oatmeal Raisin	
Peanut Butter	
Mint	

Key: Each = 5 bags of cookies

- What does each symbol in the picture graph represent?
 - A. 5 jars
 - B. 5 scoops
 - C. 5 cups
 - D. 5 bags
- How many bags of mint cookies were sold?
 - A. 20
 - B. 16
 - C. 9
 - D. 4
- How many fewer bags of oatmeal raisin cookies were sold than bags of chocolate chip cookies?
 - A. 3
 - B. 6
 - C. 15
 - D. 35

Use the picture graph for questions 4–6.

Students' Favorite Music

Pop	
Country	
Blues	
Classical	

Key: Each = 2 students

- How many students chose country as their favorite type of music?
 - A. 4
 - B. 8
 - C. 10
 - D. 14
- Which type of music did 8 students choose?
 - A. pop
 - B. country
 - C. blues
 - D. classical
- R&B had 6 votes. What should the row for R&B look like?
 - A.

R & B	
-------	--
 - B.

R & B	
-------	--
 - C.

R & B	
-------	--
 - D.

R & B	
-------	--

Use the picture graph for questions 7 and 8.

Joyner's Hits in Fall Softball Season

Single	
Double	
Triple	
Home Run	

Key: Each  = 3 hits

7. How many doubles did Joyner hit?

- A. 2 C. 6
 B. 3 D. 9

8. How many more singles than home runs did Joyner hit?

- A. 4 C. 12
 B. 8 D. 15

9. The table shows the animals that Michelle saw at a zoo.

Animals at a Zoo

Animal	Number of Animals
Bears	12
Elephants	6
Giraffes	10
Tigers	8

A. Make a picture graph of the information shown in the table.

Key: _____

B. How many more tigers than elephants did Michelle see at the zoo?



Lesson Practice • Part 2

Choose the correct answer.

Use the picture graph for questions 1–3.

Students Who Bike To School

2nd Grade	
3rd Grade	
4th Grade	
5th Grade	

Key: Each = 2 students

- How many fewer third-grade students ride their bikes to school than fourth-grade students?

A. 3 C. 9
 B. 6 D. 12
- How many fourth- and fifth-grade students ride their bikes to school?

A. 8 C. 18
 B. 12 D. 20
- How many more second- and third-grade students combined ride their bikes than fifth-grade students?

A. 6
 B. 8
 C. 14
 D. 20

Use the picture graph for questions 4–6.

Points Scored

Dave	
Eric	
Francisco	
Gary	

Key: Each = 4 points

- How many points did Francisco and Gary score in all?

A. 36
 B. 28
 C. 20
 D. 9
- How many more points did Francisco score than Eric?

A. 4
 B. 12
 C. 16
 D. 44
- Curt scored 32 points. How many more basketballs would he have in the picture graph than Dave?

A. 1 C. 3
 B. 2 D. 4

Use the picture graph for questions 7 and 8.

Favorite Color

Blue	√ √ √ √ √ √
Green	√ √
Purple	√ √ √ √ √ √ √ √
Red	√ √ √ √

Key: Each √ = 5 votes

7. How many people chose blue or red?
- A. 20 C. 45
 B. 30 D. 50

8. How many people chose a color other than blue?

- A. 100
 B. 70
 C. 60
 D. 30

9. For a class trip, students are selling raffle tickets. Tom sold 28 tickets, Gina sold 20 tickets, Ron sold 36 tickets, and Muna sold 24 tickets.
- A. Make a picture graph of the information shown in the problem.

Key: _____

- B. For this data is a picture graph or a tally table better to use? Explain your reasoning.

Answer Key**Section 1**

1. D
2. D
3. C
4. D
5. B
6. C
7. C
8. A
9. B
10. A
11. C
12. C
13. C
14. D
15. B
16. A
17. B
18. D
19. C
20. B
21. B
22. C
23. B
24. D
25. A
26. C
27. C
28. Part A: B, E
Part B: D
See Item-Specific Scoring Guidelines and Rubrics.
29. See Item-Specific Scoring Guidelines and Rubrics.
30. See Item-Specific Scoring Guidelines and Rubrics.

Section 2

31. A
32. C
33. B
34. D
35. A
36. D
37. See Item-Specific Scoring Guidelines and Rubrics.
38. B
39. B
40. C
41. A
42. D
43. C
44. B
45. B
46. A
47. C
48. D
49. A
50. A
51. C
52. B
53. B
54. D
55. A
56. D
57. A
58. B
59. D
60. A
61. A
62. C
63. C
64. C

Item-Specific Scoring Guidelines and Rubrics

Item 28

Scoring Rubric

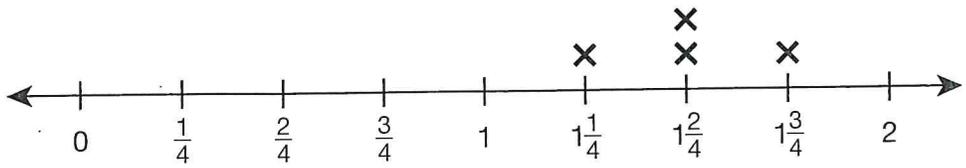
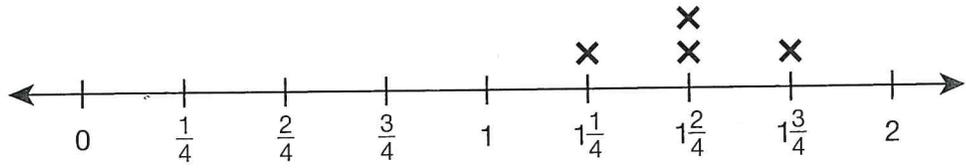
Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 2 demonstrates a complete understanding of writing equations that involve multiplication and subtraction and solving the equations. • Student determines that the correct answers for Part A are choices B and E. AND • Student determines that the correct answer for Part B is choice D.
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 1 demonstrates a partial understanding of writing equations that involve multiplication and subtraction and solving the equations. • Student determines that that the correct answers for Part A are choices B and E. OR • Student determines that the correct choice for Part B is choice D.
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 0 demonstrates limited to no understanding of writing equations that involve multiplication and subtraction and solving the equations.

Item 29

Scoring Rubric

Points	Description
2	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 2 demonstrates a complete understanding of generating measurement data by measuring lengths using rulers marked with halves and fourths and showing data by making a line plot.
1	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 1 demonstrates a partial understanding of generating measurement data by measuring lengths using rulers marked with halves and fourths and showing data by making a line plot. • Give 1 point if the student's line plot is correct OR if the student's explanation is coherent and complete.
0	<p>The response achieves the following:</p> <ul style="list-style-type: none"> • A score of 0 demonstrates limited to no understanding of generating measurement data by measuring lengths using rulers marked with halves and fourths and showing data by making a line plot.

Exemplar Response:

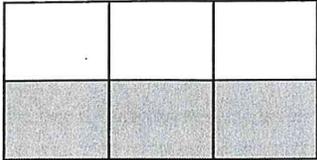
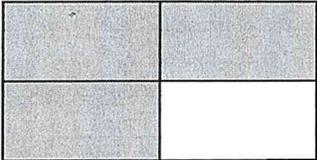
Points Awarded	Response
2	 <p><i>I measured the ribbons with a ruler. I made a number line from 0 to 2, showing quarter-inches. Then I made an X above the measurement for each ribbon.</i></p>
1	 <p><i>OR</i> <i>I measured the ribbons with a ruler. I made a number line from 0 to 2, showing quarter-inches. Then I made an X above the measurement for each ribbon.</i></p>
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 30

Scoring Rubric

Points	Description
4	The response achieves the following: <ul style="list-style-type: none"> • A score of 4 demonstrates that the student completely understands the concept of fractional parts and can use this concept to compare fractions.
3	The response achieves the following: <ul style="list-style-type: none"> • A score of 3 demonstrates that the student mostly understands the concept of fractional parts and can mostly use this concept to compare fractions.
2	The response achieves the following: <ul style="list-style-type: none"> • A score of 2 demonstrates that the student somewhat understands the concept of fractional parts and can somewhat use this concept to compare fractions.
1	The response achieves the following: <ul style="list-style-type: none"> • A score of 1 demonstrates that the student has a limited understanding of the concept of fractional parts and has a limited ability to use this concept to compare fractions.
0	The response achieves the following: <ul style="list-style-type: none"> • A score of 0 demonstrates that the student has no understanding of the concept of fractional parts and cannot use this concept to compare fractions.

Exemplar Response:

Points Awarded	Response
4	<p><i>Part A: Models may vary. Sample model shown.</i></p>  <p><i>AND</i></p> <p><i>Part B: Models may vary. Sample model shown.</i></p>  <p><i>AND</i></p> <p><i>Part C: $\frac{3}{6} < \frac{3}{4}$ or $\frac{3}{4} > \frac{3}{6}$</i></p> <p><i>AND</i></p> <p><i>Part D: The models are the same size, so you can compare parts of whole. Fourths are larger than sixths, so 3 fourths is greater than 3 sixths.</i></p>
3	<i>Any combination of three correct parts</i>
2	<i>Any combination of two correct parts</i>
1	<i>Any one correct part</i>
0	<i>Response is irrelevant, inappropriate, or incomplete.</i>

Item 37

Scoring Rubric

Points	Description
2	The response achieves the following: <ul style="list-style-type: none"> A score of 2 demonstrates a complete understanding of rounding a 4-digit number to the nearest hundred.
1	The response achieves the following: <ul style="list-style-type: none"> A score of 1 demonstrates a partial understanding of rounding a 4-digit number to the nearest hundred.
0	The response achieves the following: <ul style="list-style-type: none"> A score of 0 demonstrates limited to no understanding of rounding a 4-digit number to the nearest hundred.

Exemplar Response:

Points Awarded	Response
2	4,400 AND <i>I looked at the digit to the right of the hundreds place. That digit is 5, so I rounded the hundreds digit up by 1. Then I changed the digits to the right of the hundreds digit to 0.</i> <i>OR other valid explanation</i>
1	4,400 OR <i>I looked at the digit to the right of the hundreds place. That digit is 5, so I rounded the hundreds digit up by 1. Then I changed the digits to the right of the hundreds digit to 0.</i> <i>OR other valid explanation</i>
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

