

Important Concepts . . .

Preview Review



Mathematics Grade 4 *TEACHER KEY*

W3 - Lesson 2: Measurement 2

Important Concepts of Grade 4 Mathematics

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Materials Required

Mathematics Grade 4

Version 5

Preview/Review W3 - Lesson 2 TEACHER KEY

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Preview/Review Concepts for Grade Four Mathematics

TEACHER KEY



*W3 - Lesson 2:
Measurement 2*

OBJECTIVES

By the end of this lesson, you should

- explain the meaning of *perimeter* and *area*
- find the perimeter of regular and irregular polygons
- use the formula, $\text{Area} = \text{Length} \times \text{Width}$, to find the area of squares and rectangles
- select the most appropriate unit to measure an area (such as cm^2 or m^2)
- calculate the area of irregular polygons
- explain the meaning of capacity and mass
- use the standard units for measuring capacity and mass
 - millilitres (mL) and litres (L)
 - kilograms (kg) and grams (g)
- compare and order
 - the capacity of containers (mL, L)
 - the mass of objects (g, kg)
- explain units of time and how they relate: year, decade, century, millennium
- make correct change on purchases up to \$50

GLOSSARY

area - the amount of space covered by a shape

century - a time period of 100 years

change - the money returned to a customer if he or she pays more money than is due at the time of purchase

decade - a time period of ten years

mass - the amount of matter in an object measured in grams or kilograms

millennium - a time period of 1000 years

perimeter - the distance around the outside of a shape or figure

square centimetre (cm^2) - a unit of measurement (1 cm by 1 cm) used to calculate area

square metre (m^2) - a unit of measurement (1 m by 1 m) used to calculate area

W3 - Lesson 2: Measurement 2

A. Perimeter

Perimeter is the distance around the outside of any shape. How large the shape is will help you determine which unit of measurement to use. The perimeter of small objects might be measured in decimetres, centimetres, or even millimetres. The perimeter of large objects could be measured in metres or even kilometres.

1. Measure the perimeters of the following figures. First, measure the perimeter in centimetres. Then change the measurement to millimetres.

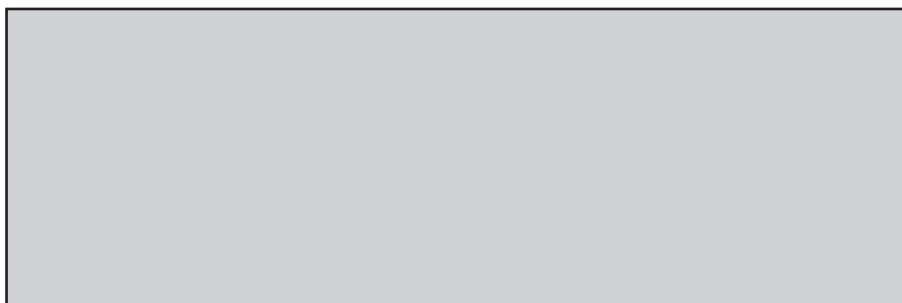
- a. The perimeter is: 12 cm or 120 mm.



- b. The perimeter is: 20 cm or 200 mm.



- c. The perimeter is: 32 cm or 320 mm.



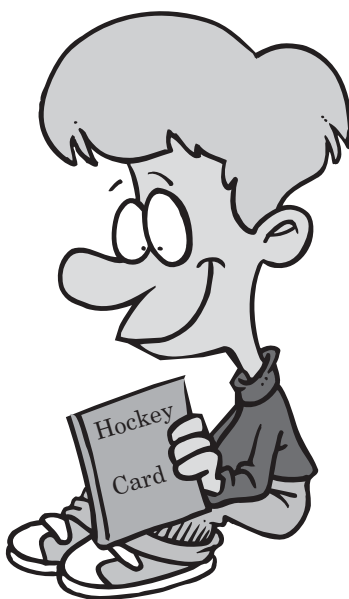
2. To find the perimeter of the square in question 1a, **you added the lengths of the 4 sides**. Because the sides are all equal in length, there is another way to calculate the perimeter. Can you think of an easier way to find the perimeter of a square?

Measure one side. Then multiply by 4.

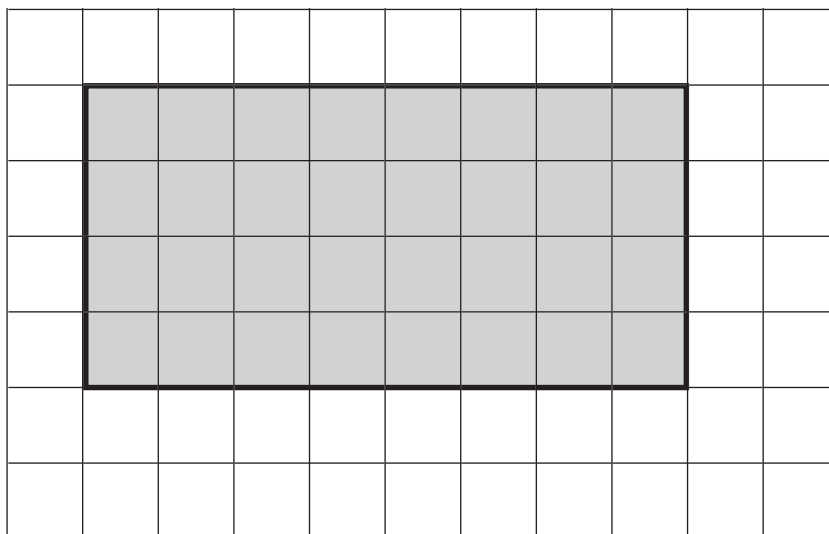
3. To find the perimeter of the rectangular shapes in question 1b, you **added the 4 sides**. The two longer sides are the same length. The two shorter sides are also equal. Describe a faster way of finding the perimeter of a rectangle.

Measure the length and width. Add the two numbers.

Then multiply by 2.

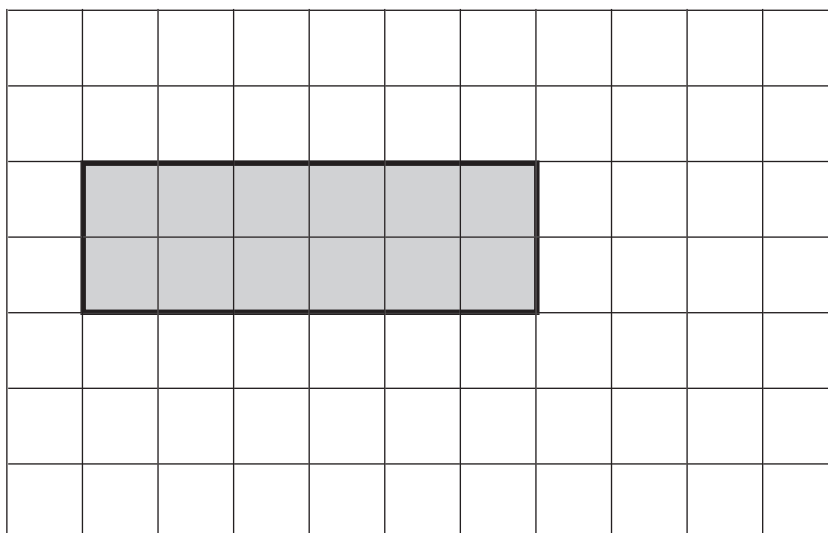


4. The squares on the grid below are each 1 cm by 1 cm. Draw a rectangle on the grid that is 8 cm long and 4 cm wide.



The perimeter of this rectangle is 24 cm.

5. Draw a rectangle on the grid that is 6 cm long and 2 cm wide.



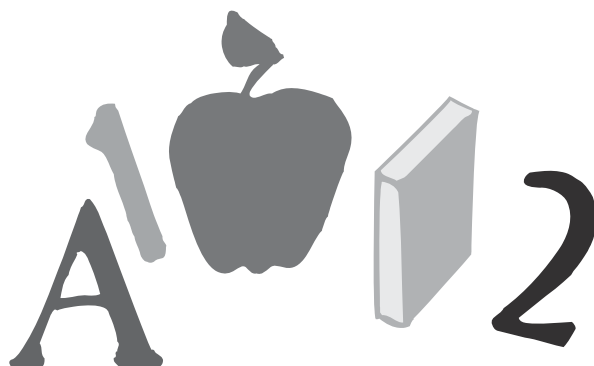
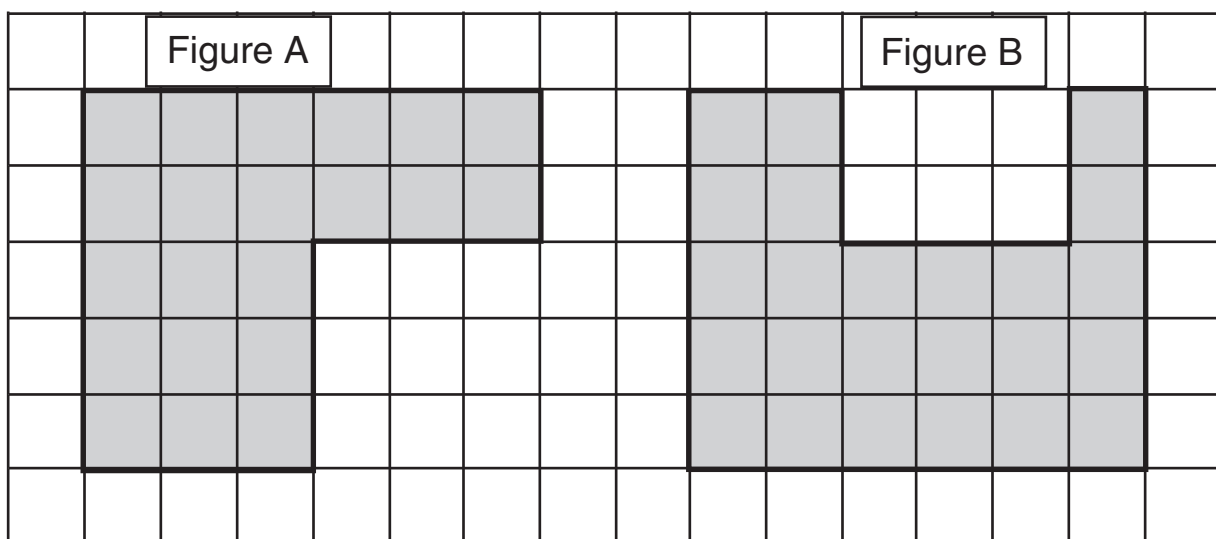
The perimeter of this rectangle is 16 cm.

6. On each of the grids below, there are two irregular shapes. First, measure the perimeter of each figure using the 1 cm grid as a measuring tool. Then, decide whether Figure A or B has the larger perimeter.

a. The perimeter of Figure A is 22 cm.

The perimeter of Figure B is 26 cm.

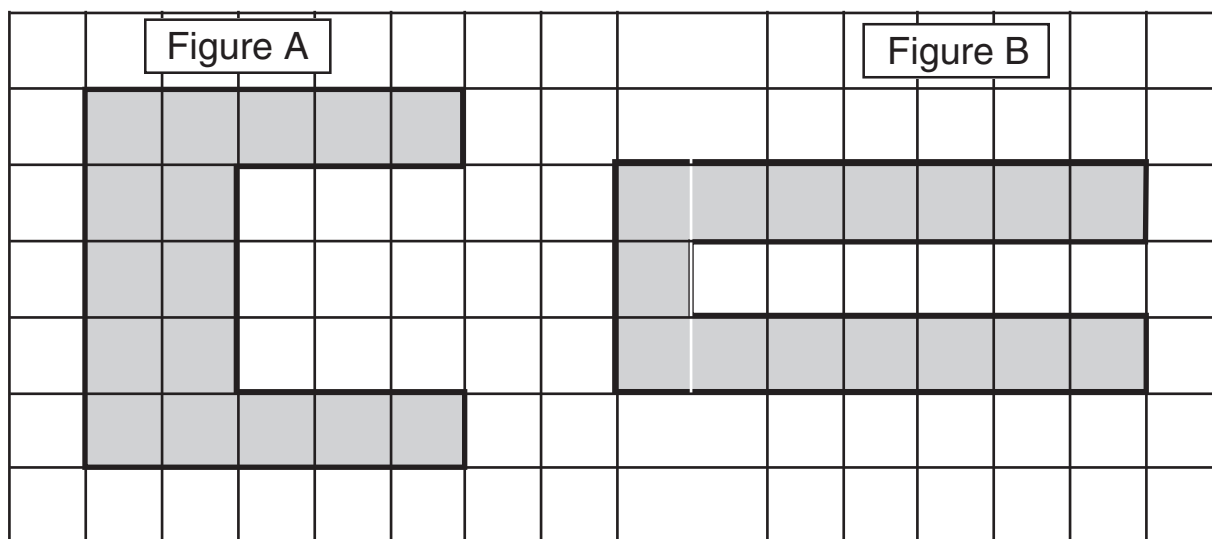
Which figure has the larger perimeter? **Figure B**



b. The perimeter of Figure A is 26 cm.

The perimeter of Figure B is 32 cm.

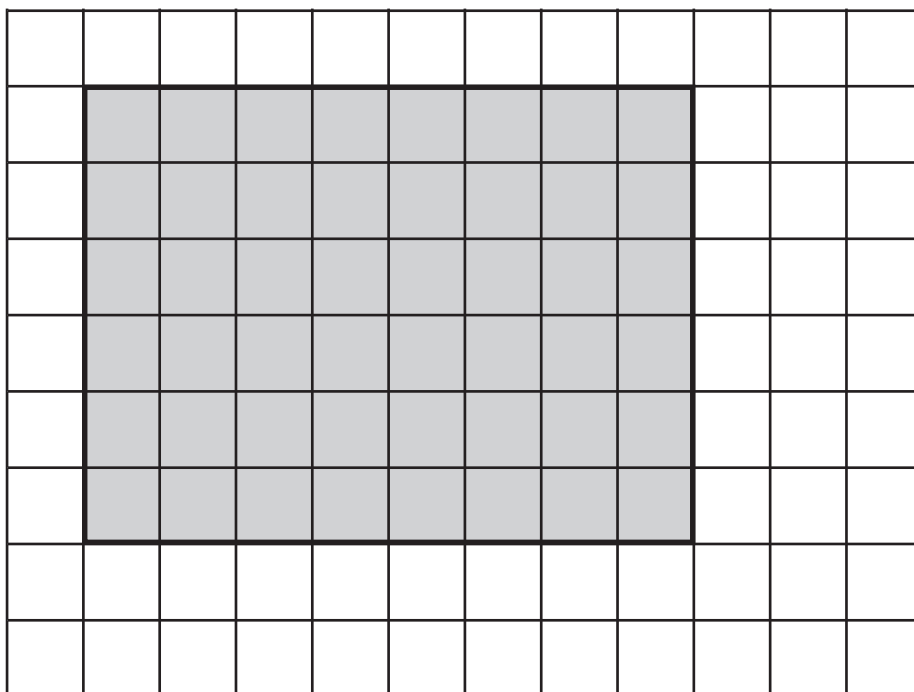
Which figure has the larger perimeter? **Figure B**



7. On the following centimetre grids, draw rectangles according to the directions. For each of the rectangles, you must calculate the length of the missing sides.

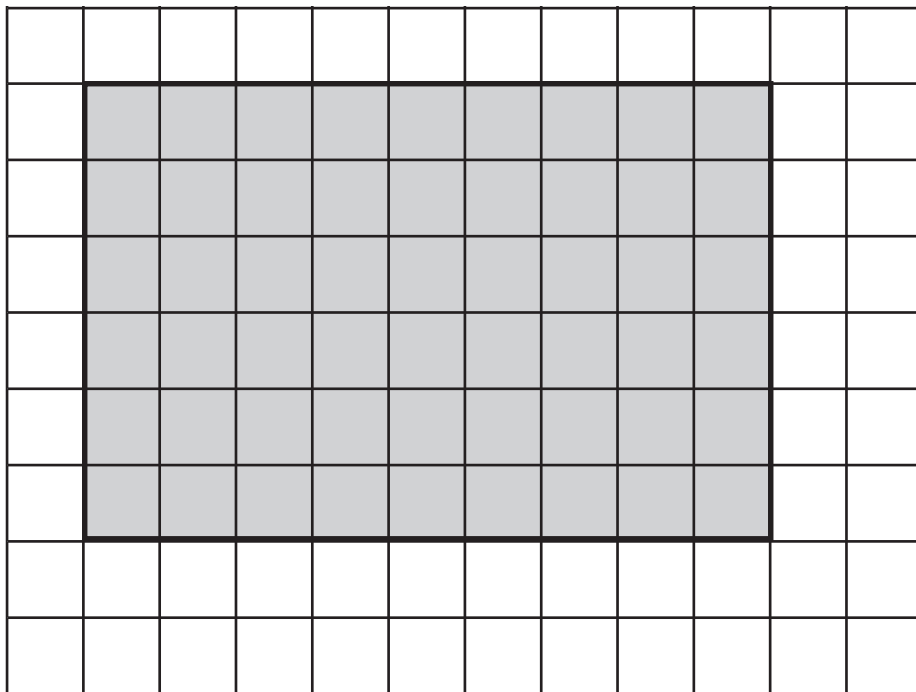
- a. Draw a rectangle with one side 8 cm long. The perimeter is 28 cm.

$$8 \text{ cm} + \underline{8} \text{ cm} + \underline{6} \text{ cm} + \underline{6} \text{ cm} = 28 \text{ cm}$$



- b. Draw a rectangle with one side 9 cm long. The perimeter is 30 cm.

$$9 \text{ cm} + \underline{9} \text{ cm} + \underline{6} \text{ cm} + \underline{6} \text{ cm} = 30 \text{ cm}$$

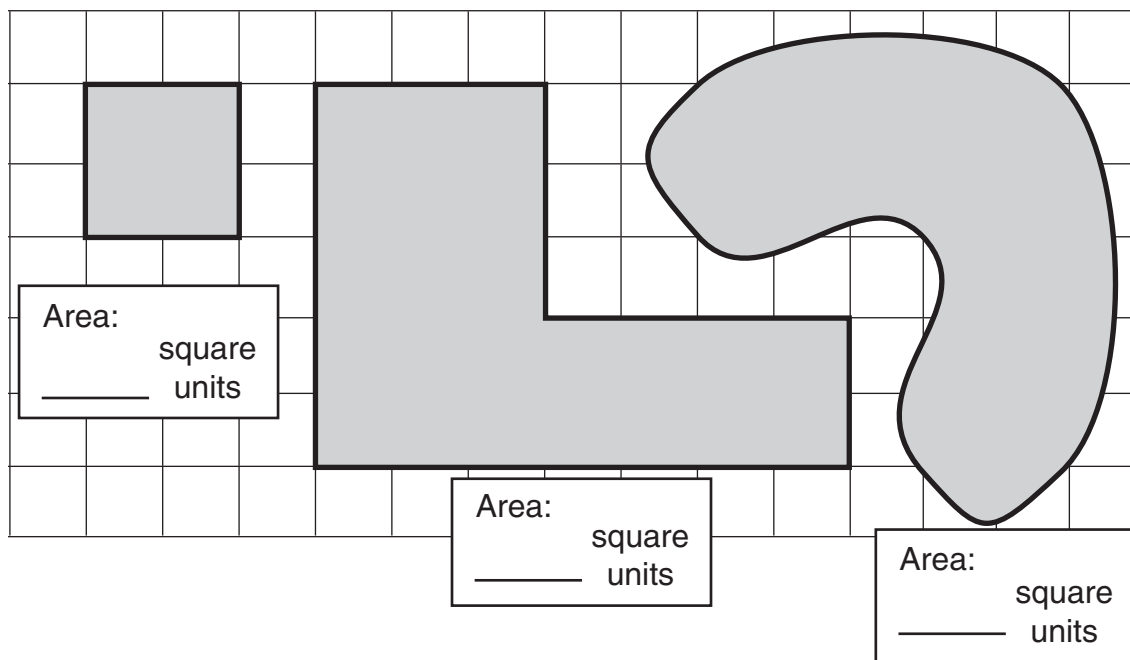


B. Area

Area is the measurement of how much space is covered by a shape. The amount of floor space in a room is called the area of the room.

Area is always measured by counting **square units** in the shape.

1. Estimate the area of each shape below.



A square that is 1 cm wide and 1 cm long is called a **square centimetre**. The short form for square centimetre is **cm²**.

A square that is 1 m wide and 1 m long is called a **square metre (m²)**.

2. a. What would you call a square that is 1 mm long and 1 mm wide?

A square millimetre

- b. What is the short form for this unit? ***mm²***

3. Write the long form for each of these measurements.

a. 12 m^2 **12 square metres**

b. 8 km^2 **8 square kilometres**

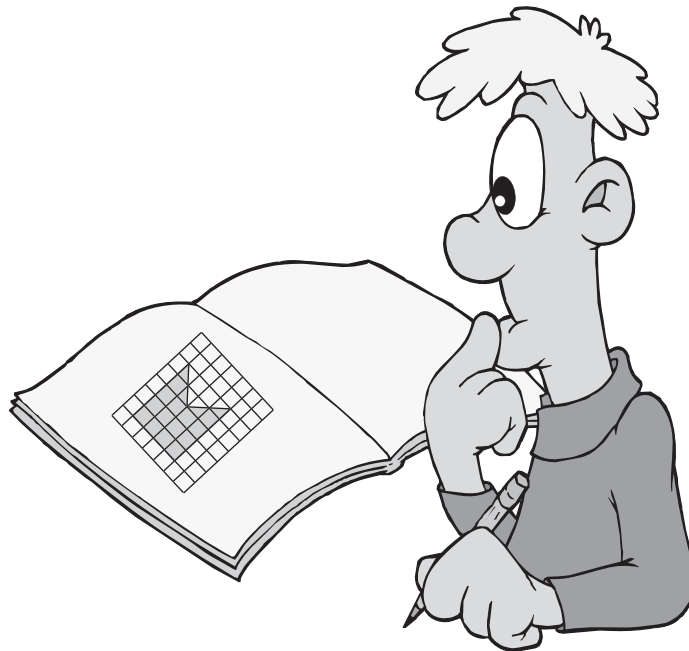
c. 250 cm^2 **250 square centimetres**

4. Write the short form for each of these measurements.

a. 6 square centimetres **6 cm^2**

b. 4 square metres **4 m^2**

c. 36 square millimetres **36 mm^2**

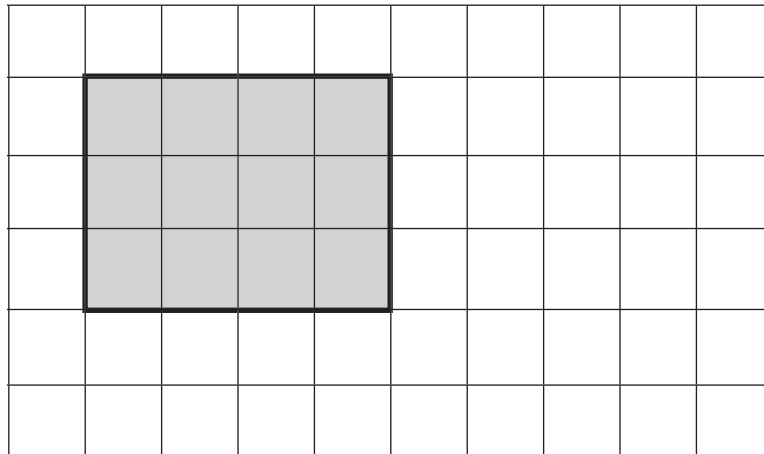


On the grid below, the shaded area covers 12 squares. Each of the squares is 1 cm wide so the size of the shaded area is

12 square centimetres

or

12 cm²



You can find the area by counting the squares, but there is a faster way to find the area.

The length of the rectangle is 4 squares or 4 cm.

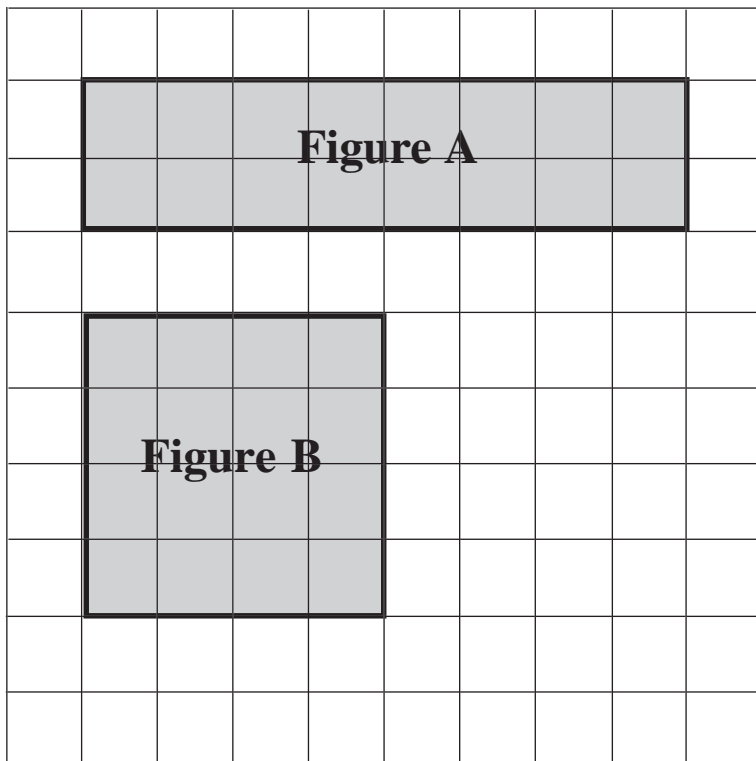
The width of the rectangle is 3 squares or 3 cm.

3 rows of 4 squares make 12 squares of area.

Area = Length \times Width

The area = 4 cm \times 3 cm = 12 cm².

5. Draw two **different four-sided** shapes on the grid. Each should have an area of 16 cm^2 . For both of your figures, the length \times the width will equal 16 cm^2 . When you are finished, label your shapes **Figure A** and **Figure B**.



There are three possible figures:

- *1 cm x 16 cm*
- *2 cm x 8 cm*
- *4 cm x 4 cm*

Only the last two will fit the grid.

Figure A: Area = Length \times Width

$$= \underline{8} \times \underline{2}$$

$$= \underline{16 \text{ cm}^2}$$

Figure B: Area = Length \times Width

$$= \underline{4} \times \underline{4}$$

$$= \underline{16 \text{ cm}^2}$$

Remember: Area = Length \times Width or $A = L \times W$

Choosing the Correct Units

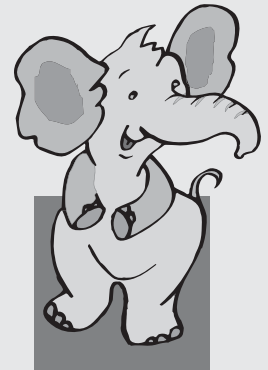
Choosing the correct unit before you do any kind of measuring is important. If you are measuring the **length** of your driveway, it is better to use **metres** than **millimetres**. Larger units are used for larger measurements. The same applies to measuring **area**. If you are measuring larger areas, you should use larger **square units**.

6. Suppose you were asked to measure the area of each of the following objects. Which unit — **cm²** or **m²** — would be best to use?

- a. a classroom **m²** b. a desk top **cm²**
c. a TV screen **cm²** d. a garden **m²**
e. a flag **cm²** f. a photo **cm²**

How "Big" is a Square Metre?

The **square metre** is a unit of measure that is used to measure large areas. Many students are surprised to discover how large a square metre really is. If you have a metre stick or measuring tape, measure out a square metre on the floor, and mark it off with tape.



7. About how many Grade 4 students do you think could stand inside the taped square (**one square metre**)?

Answers will vary. The physical size of different students affects the answer. Accept any reasonable answer. (e.g., 12 to 16 students.)

8. List four things whose area would measure about 1 m^2 . (**Hint:** Think of objects in your home or your school.)

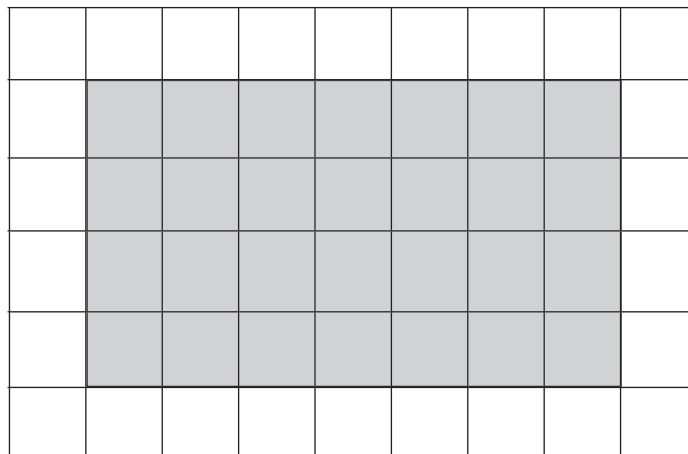
Answers will vary. Some examples are given.

- a. a large TV screen b. a tabletop
c. a window d. a small area rug

Remember: **Perimeter** is the **distance around** the outside of any shape. **Area** is the measurement of how much **space** is covered by a shape.

9. What is the area and perimeter of each of the following shapes?

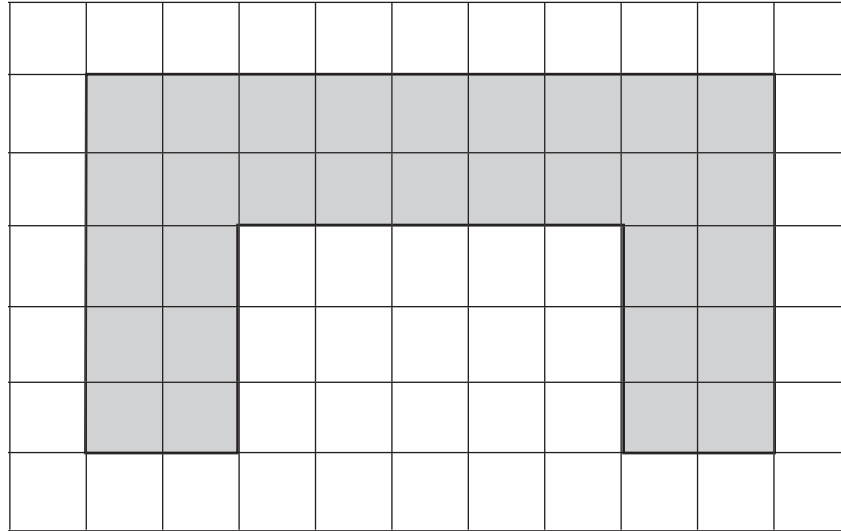
a.



Area 28 cm^2 Perimeter 22 cm



b.



Area 30 cm² Perimeter 34 cm

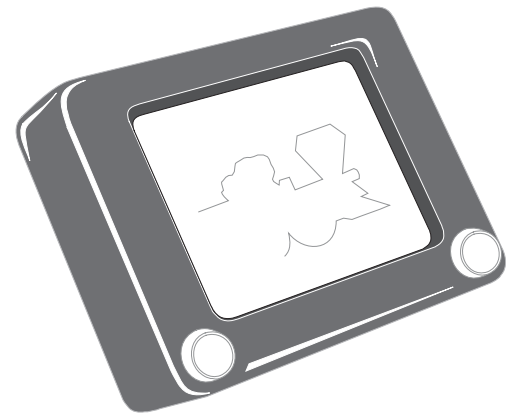
10. Use the formula **A = L × W** to find the area of the following rectangles:

a. Length = 6 cm Width = 3 cm

$$\begin{aligned} \text{Area} &= \underline{6} \times \underline{3} \\ &= \underline{18 \text{ cm}^2} \end{aligned}$$

b. Length = 5 cm Width = 4 cm

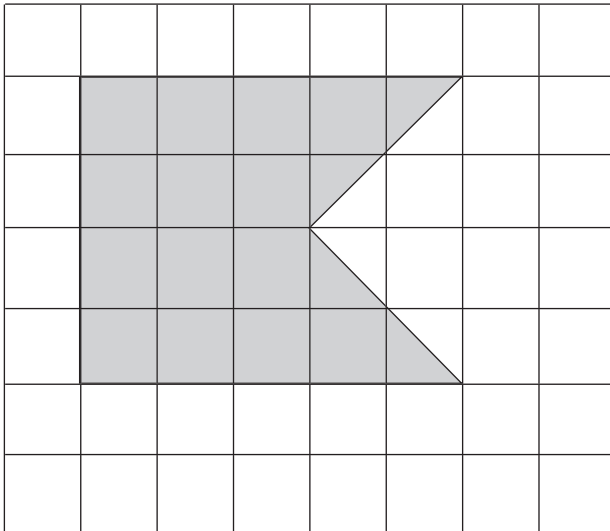
$$\begin{aligned} \text{Area} &= \underline{5} \times \underline{4} \\ &= \underline{20 \text{ cm}^2} \end{aligned}$$



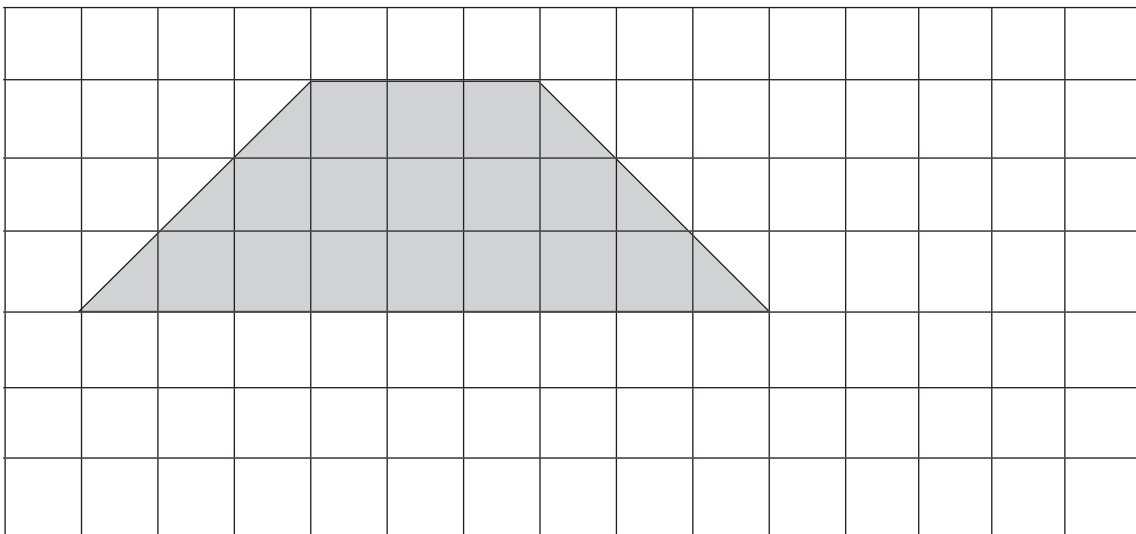
Area of Irregular Shapes

11. Calculate the area of the following shapes by counting the total number of shaded squares. Notice that for some of the squares only half of the square is shaded. Every two half-squares equal one whole square. Don't forget to put the correct units in your answer.

a.

Area 16 cm²

b.

Area 18 cm²

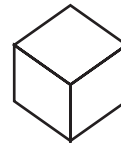
C. Capacity

Capacity is the amount that a container holds or the measure of the space inside a container.

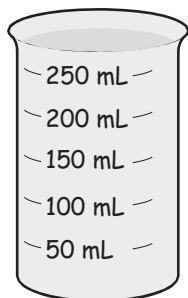
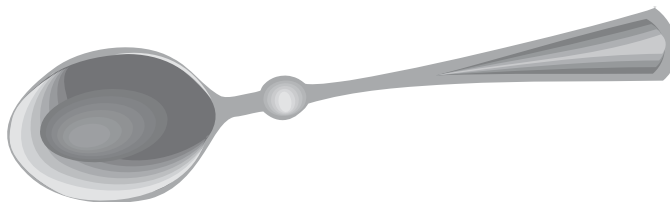
Capacity is measured in units called **millilitres** and **litres**.

The short form for millilitre is **mL**. The short form for litre is **L**.

Millilitres are very small units. One millilitre is equal to the amount of liquid that a 1 cm cube holds. That is about the size of a sugar cube.



A large teaspoon holds about 5 mL.



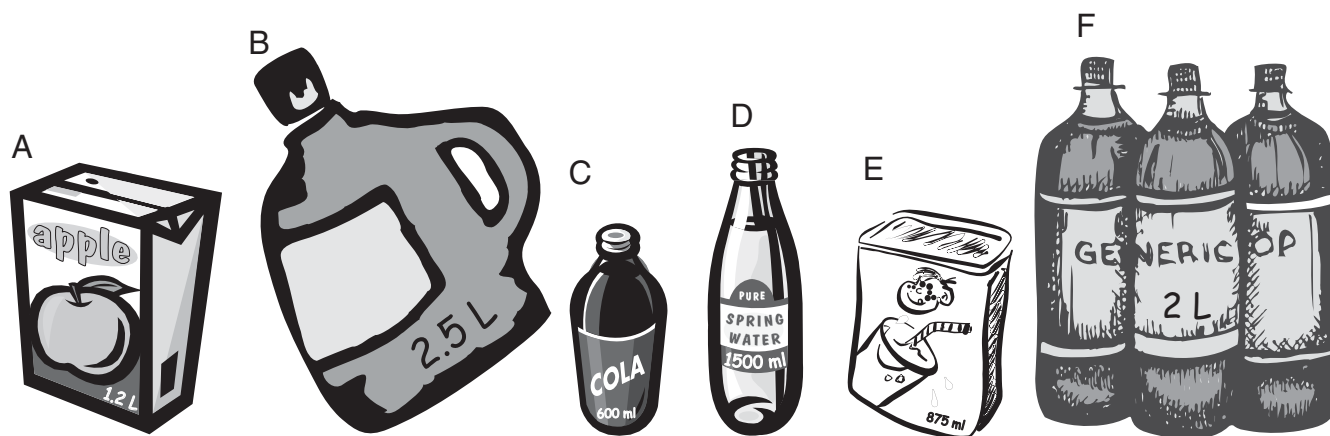
A cup holds 250 mL.



A can of pop holds 333 mL.

What is a Litre?

A **litre** is a unit of capacity that is used mostly for measuring liquids. Gasoline is sold by the litre. Milk and pop are sold in containers with a capacity of 1 L, 2 L, 3 L, or even 4 L. It takes 1 000 mL to make 1 L.



1. List the above containers in order of their capacities, starting with the smallest. Write the letter in each blank.

Container C , E , A , D , F , B .

Smallest → *Greatest*

2. Which of the above containers are smaller than a 1 L?

 C, E

3. A measuring cup holds 250 mL of liquid. How many measuring cups of liquid does it take to fill a 1 L container? (Hint: 1 000 mL = 1 L)

It will take 4 measuring cups (250 mL - size) to fill a 1 L container.

4. How many millilitres does it take to fill a 4-L milk container?

It takes 4 000 mL to fill a 4 L container.

$$1 \text{ L} = 1\,000$$

$$4 \text{ L} = 4\,000 \text{ mL}$$

5. List four containers in your home that show capacity measured in **litres**.
Answers will vary. Some examples are given.

 hot-water tank

 paint can

 pop bottle

 water jug

6. List four things in your home that are measured in **millilitres**.

Answers will vary.

measuring spoons

cans/containers of food

measuring cups

cleaning supplies

Solve this story problem. Show your calculation. Then, write a sentence answer.

7. It takes about 25 mL of peanut butter to make one peanut butter sandwich. How many sandwiches could you make using the whole jar of peanut butter?

25 mL peanut butter

25 mL

..... **1 sandwich**

10 x 25 mL

25 mL	25 mL	25 mL	25 mL	25 mL
25 mL	25 mL	25 mL	25 mL	25 mL

250 mL 10 sandwiches

4 x 250 mL



25 mL	25 mL	25 mL	25 mL	25 mL
25 mL	25 mL	25 mL	25 mL	25 mL

250 mL 10 sandwiches

25 mL	25 mL	25 mL	25 mL	25 mL
25 mL	25 mL	25 mL	25 mL	25 mL

250 mL 10 sandwiches

25 mL	25 mL	25 mL	25 mL	25 mL
25 mL	25 mL	25 mL	25 mL	25 mL

250 mL 10 sandwiches

25 mL	25 mL	25 mL	25 mL	25 mL
25 mL	25 mL	25 mL	25 mL	25 mL

250 mL 10 sandwiches

Total

1 000 mL... 40 sandwiches

You could make about 40 sandwiches from 1 L of peanut butter.

D. Mass

Mass is the amount of matter in an object measured in grams or kilograms. Everything around us has some sort of mass. A feather has very little mass. A car has a lot of mass.

Mass is measured using a tool called a **scale**. Small amounts, such as pills and other medications, are measured on very precise electronic scales. In your science class, you may have used spring scales for experiments. Fruit is measured on hanging scales in grocery stores. People measure their body mass on bathroom scales. The mass of cars and trucks is measured on large underground highway scales.



1. What kind of scale would you use to measure each of the following masses?
 - a. a bag of apples *hanging scale*
 - b. your weight *bathroom scale*
 - c. a pick-up truck *underground highway scale*

Kilograms and **grams** are the units we use to measure mass. Grams are very small units. If you could fill a centimetre cube with water, it would weigh only 1 gram. A sugar cube also weighs about 1 gram.

It takes 1 000 **grams** to make 1 **kilogram** of mass.

The short form for gram is **g**. The short form for kilogram is **kg**.



2. Think of objects in the classroom around you. Some have a mass less than 1 kg. Others have a mass greater than 1 kg.

List four items in your classroom that have a mass of **less than 1 kg**.

Answers will vary.

pencil

paper clip

eraser

thumb tack

Now list four items that have a mass **greater than 1 kg**.

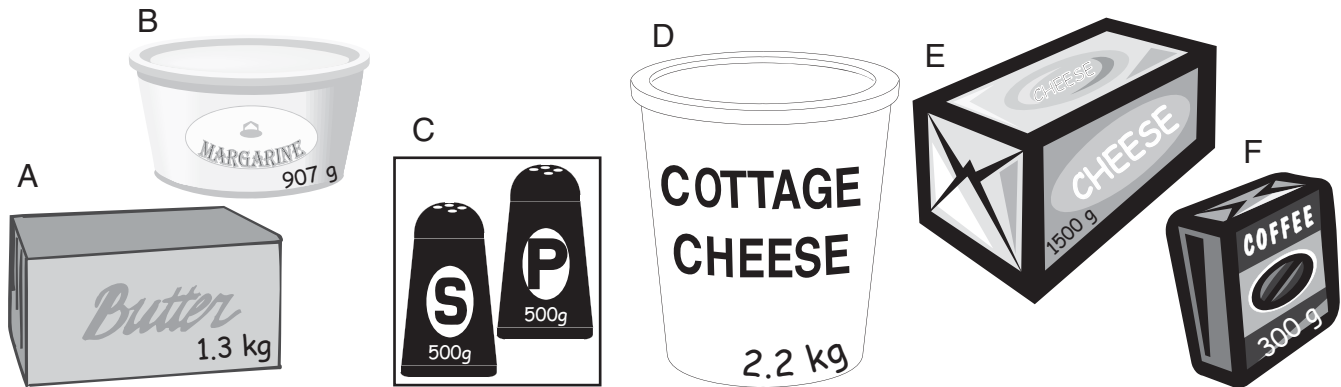
Answers will vary.

desk

large dictionary

table

your teacher!



3. List the above masses in order starting with the smallest. Write the letter in each blank.

Container **F** , **C** , **B** , **A** , **E** , **D** .

Smallest \longrightarrow *Greatest*

4. Remember that it takes 1 000 g to make 1 kg. Use this information to complete the chart below. The first one is done for you.

GRAMS = KILOGRAMS	
1 000 g	1 kg
5 000 g	5 kg
2 000 g	2 kg
3 500 g	3.5 kg
2 500 g	2.5 kg
500 g	0.5 kg
10 000 g	10 kg

E. Money

Knowing how to count money and make change are important skills. This section will give you practice in both skills. If you need to, find or make some play money to use in the following exercises.

Change is the money returned to a customer if he or she pays more money than is due at the time of purchase. The clerk determines the total amount of change due. Usually the clerk will try to use as few coins and bills as possible when “making change”.

1. Draw each amount of change below using coins and bills. Use as few coins and bills as possible.

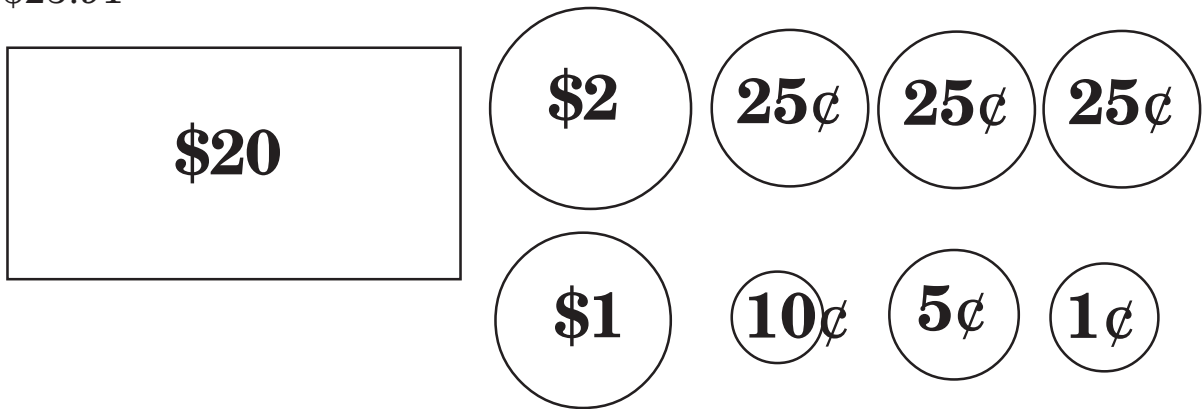
a. \$0.82



b. \$7.46



c. \$23.91



Instead of drawing the change, you could make a list of the bills and coins that make up the correct amount of change owed.

For Example:

Suppose you purchase two bottles of pop. The total is \$3.38. You do not have the exact amount with you, so you give the clerk a \$10 bill. How much change will you get? What is the least amount of coins and bills you could get in change?

- Amount of Change: \$10.00

$$\begin{array}{r} 10.00 \\ - 3.38 \\ \hline 6.62 \end{array}$$

- The best way to make \$6.62 in change:

one \$5–bill	\$5.00
one \$1–dollar coin (loonie)	1.00
two 25¢–coins (quarters)	.50
one 10¢–coin (dime)	.10
two 1¢–coins (pennies)	<u>0.02</u>
	<u>\$6.62</u>

Your Turn!

2. Sharon bought some flowers for her mother. The flowers cost \$6.42. She paid for the flowers with a \$20 bill.

- a. How much change did she get?

$$\begin{array}{r} \$20.00 \\ - 6.42 \\ \hline \$13.58 \end{array}$$

- b. Make a list of the bills and coins she should receive if the least number of bills and coins were used.

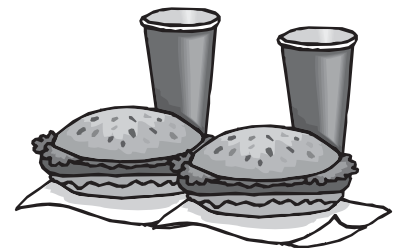
<i>one \$10 bill</i>	\$10.00
<i>one \$2 coin</i>	2.00
<i>one \$1 coin</i>	1.00
<i>two 25¢ coin</i>	.50
<i>one 5¢ coin</i>	.05
<i>three 1 coins</i>	<u>+.03</u>
	\$13.58

Solve the following problem. Remember that when you add or subtract money amounts, you are using decimal numbers. Be careful to keep the decimal points lined up.

3. Together you and your friend order two hamburgers for \$5.50 each and two drinks for 75 cents (\$0.75) each. How much did the two of you spend together?

$$\begin{array}{r} \$5.50 \\ 5.50 \\ .75 \\ + .75 \\ \hline \$12.50 \end{array}$$

We spent \$12.50 together.



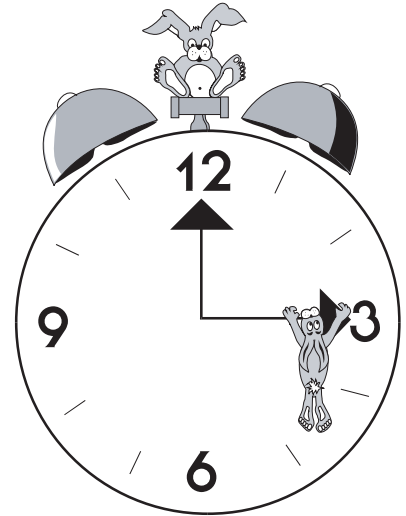
Be sure you have put a decimal and a dollar sign in each answer.

F. Time

You already know “time words” such as the days of the week and the months of the year. This section introduces you to larger units dealing with time.

Decade

A **decade** is a period of 10 years. Someone who is 10 years old has lived for one decade.



1. For how many decades has a 50-year old person lived?

5 decades

2. How many decades are there in 100 years? ***10 decades***

Century

A **century** is a period of 100 years. The period of years from 1800 to 1900 is called a century.

3. How many decades make one century?

10 decades

4. In what year will the next century begin? ***2101***

Millennium

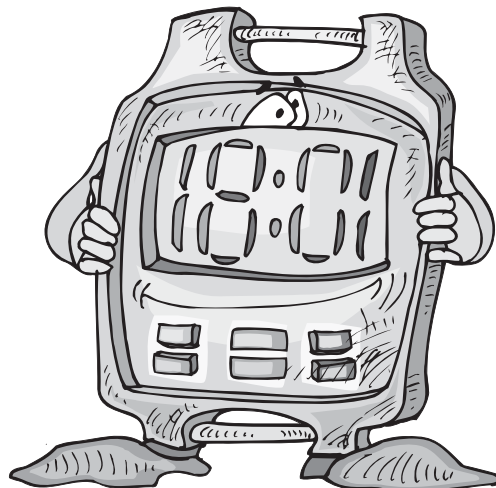
A **millennium** is a very large unit of time. It is made up of 1 000 years.

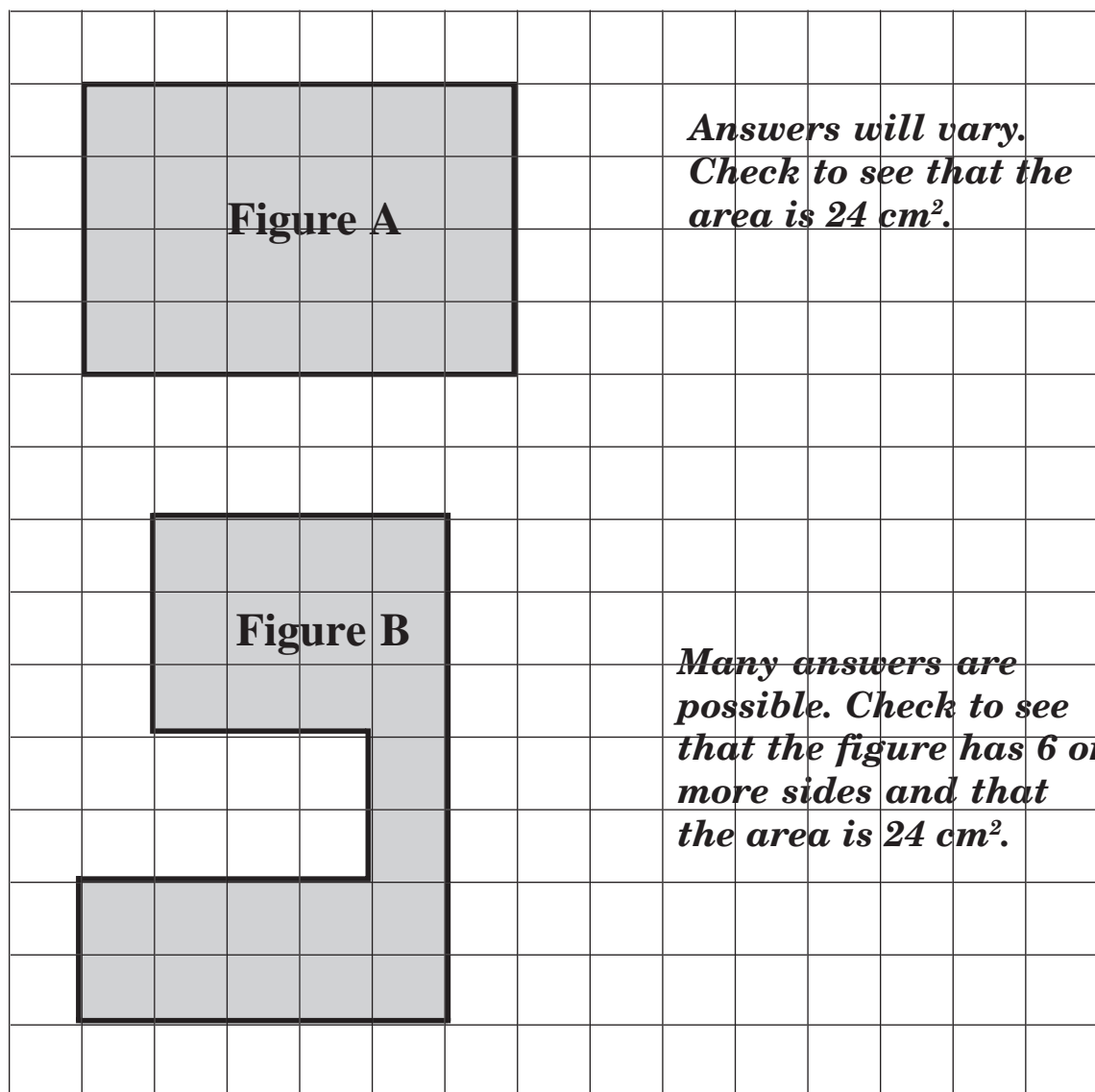
5. How many centuries are in a millennium? ***10 centuries***

6. Use the following words to complete the sentences below. All of the words are units of time.

months hours minutes decade millennium century

- a. There are sixty of these units in one hour. *minutes*
- b. A day has 24 of these. *hours*
- c. 10 years make up one of these. *decade*
- d. 100 years make up 1 of these units. *century*
- e. There are 12 of these in a year. *months*
- f. The date January 1st, 2001, was the beginning of one of these.
millennium (Also accept decade or century.)



Homework

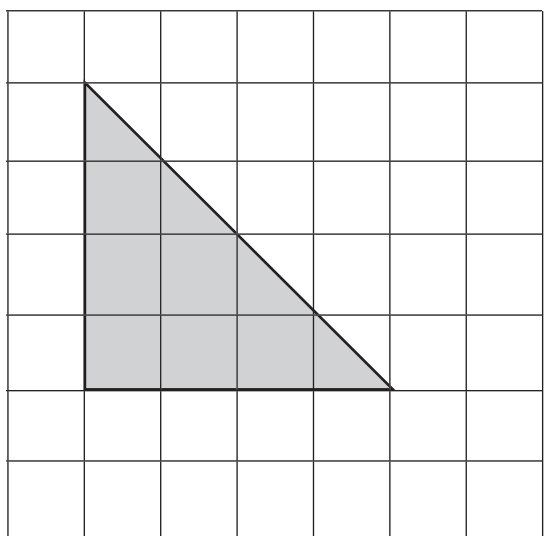
1. a. On the grid above, use a ruler to draw a rectangle with an area of 24 cm^2 . Label it Figure A.

- b. On the grid on page 27, draw a shape with 6 sides or more. Make its area 24 cm^2 . The figure should not be a rectangle. Label it Figure B.

Example:

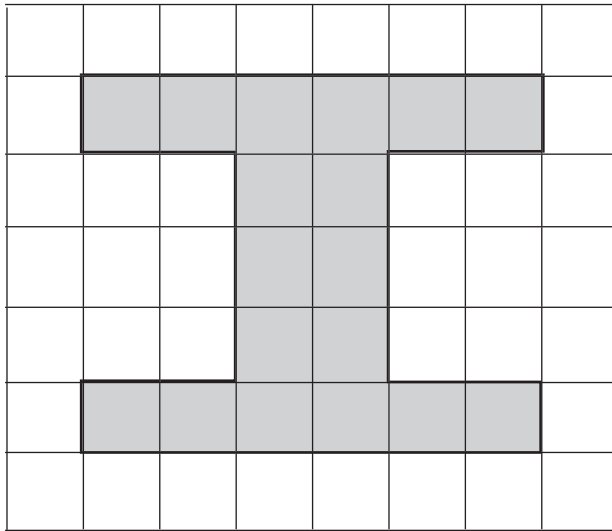


2. a. What is the area of this figure?



Area: 8 cm^2

b. What is the area **and** perimeter of this figure?



Area: **18 cm^2** Perimeter: **30 cm**

3. Look for these containers in your home. What is the capacity of each container? Be sure to include units in your answer.

a. small pop can _____ b. tube of toothpaste _____

c. shampoo bottle _____ d. milk container _____

e. juice container _____ f. can of vegetables _____

g. bag of sugar _____ h. jar of peanut butter _____

Answers will vary. Check to see that each answer has the proper units.

