

Circles and Area

Just for Fun

Counting Rectangles

Challenge a classmate to see who can find the greatest number of rectangles in the room.

Set a time limit of 1 minute.

Write down all the rectangles you can see.

At the end of 1 minute, exchange papers with your classmate.

Check each other's list.

Geometric Designer

Use only circles, triangles, rectangles, and parallelograms.

Draw any 3 of the following items:

- car, bus, truck, motorcycle
- person
- building
- animal
- landscape

Trade drawings with a classmate.

Identify your classmate's drawings.

Products and Factors

A Game for 2

Work with a partner.

You will need two number cubes labelled 1 to 6 and 7 to 12, a pencil, and paper.



Take turns to roll the two cubes.

Record the two numbers and find their product.

In 10 seconds, write all the factors of that product that you can.

Score 1 point for each factor you find.

For which products did you score the fewest points? Why?

Activating Prior Knowledge

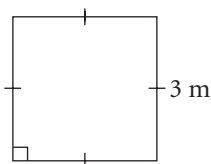
Perimeter and Area of a Rectangle

Perimeter is the distance around a shape.

Area is the amount of surface a shape covers.

Example 1

- a) Find the perimeter and area of the square.



Solution

- a) Perimeter, $P = 4s$

Substitute $s = 3$.

$$P = 4 \times 3 = 12$$

The perimeter is 12 m.

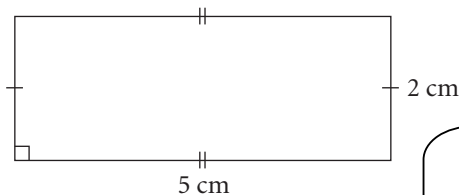
Area, $A = s^2$

Substitute $s = 3$.

$$A = 3^2 = 9$$

The area is 9 m².

- b) Find the perimeter and area of the rectangle.



- b) Perimeter, $P = 2(b + h)$

Substitute $b = 5$ and $h = 2$.

$$P = 2(5 + 2) = 14$$

The perimeter is 14 cm.

Area, $A = bh$

Substitute $b = 5$ and $h = 2$.

$$A = 5 \times 2 = 10$$

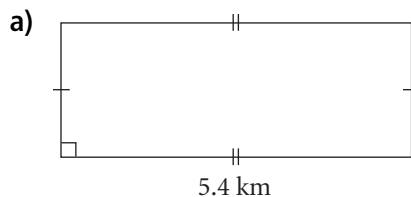
The area is 10 cm².

s represents the side length.
 b represents the base.
 h represents the height.



Check

1. Find the perimeter and area of each shape.



$$P = 2(b + h)$$

$$A = bh$$

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

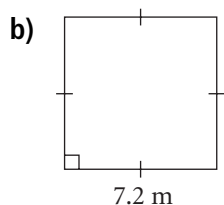
$$= \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$$

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

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

$$\text{Perimeter} = \underline{\hspace{2cm}}$$

$$\text{Area} = \underline{\hspace{2cm}}$$



$$\text{Perimeter} = \underline{\hspace{2cm}}$$

$$\text{Area} = \underline{\hspace{2cm}}$$

Using a Protractor to Measure Angles

To measure an angle, place the base line of a protractor along one arm of the angle, with the centre of the protractor on the vertex of the angle.

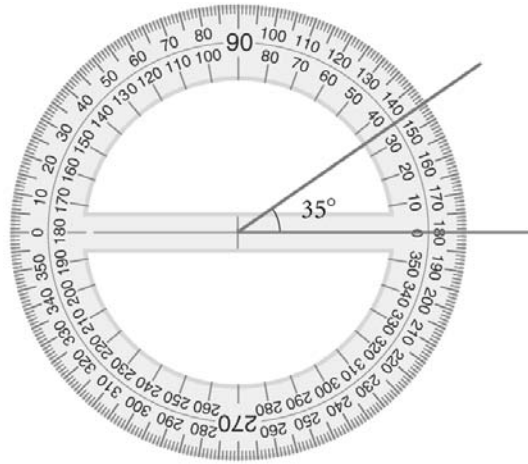
Read the angle measure from the scale that has its 0 on the arm of the angle.

Example 2

Find the measure of this angle.

Solution

The measure of the angle is 35° .



✓ Check

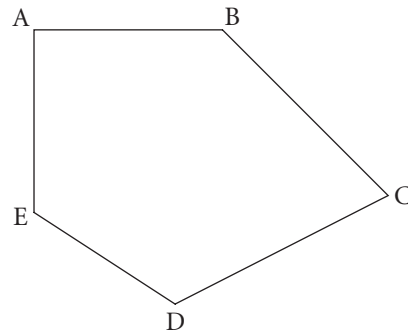
2. Measure each angle in polygon ABCDE.

$$\angle A = 90^\circ \quad \angle B = \underline{\hspace{2cm}}^\circ \quad \angle C = \underline{\hspace{2cm}}^\circ$$

$$\angle D = \underline{\hspace{2cm}}^\circ \quad \angle E = \underline{\hspace{2cm}}^\circ$$

Find the sum of the angles.

$$\angle A + \angle B + \angle C + \angle D + \angle E = \underline{\hspace{2cm}}^\circ$$



3. a) Use a ruler but not a protractor.
Draw an angle that you think measures 75° .

- b) Measure the angle with a protractor.
How close was your angle to 75° ?



Quick Review

- A circle is a closed curve. All points on the circle are the same distance from the centre of the circle.

The distance between a point on a circle and the centre of the circle is a **radius** of the circle.

The plural of radius is *radii*.

The distance between two points on a circle through its centre is a **diameter** of the circle.

- The length of the diameter, d , of a circle is two times the length of the radius, r .

That is, $d = 2r$

Also, the radius, r , of a circle is one-half the diameter, d .

That is, $r = \frac{1}{2}d$, or $\frac{d}{2}$

You can find the radius of a circle, given the diameter.

For example, in a circle, d is 10 cm.

Since $r = \frac{1}{2}d$, $r = \frac{1}{2} \times 10 = 5$

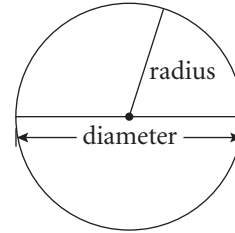
The radius is 5 cm.

You can find the diameter of a circle, given the radius.

For example, in a circle, r is 4 cm.

Since $d = 2r$, then $d = 2 \times 4 = 8$.

The diameter is 8 cm.



Practice

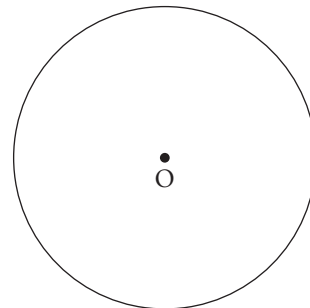
1. This circle has its centre at point O.

- a) Draw a radius of the circle.

What is the length of the radius? _____

- b) Draw a diameter of the circle.

What is the length of the diameter? _____



2. From your results in question 1, write a relationship between the radius and the diameter of a circle.

3. Find the diameter of the circle with each radius.

- a) 12 cm _____ b) 27 cm _____ c) 3.4 cm _____

4. Find the radius of the circle with each diameter.

- a) 12 cm _____ b) 28 cm _____ c) 3.4 cm _____

5. Write the steps you would take to draw a circle with radius 1 cm.
Draw the circle.

6. Draw 4 radii in the circle you drew in question 5.
What is the sum of the central angles of the circle? _____

7. Write the steps you would take to draw a circle with diameter 4 cm.

8. Circular plates with diameter 20 cm are placed side by side on a table.
The table measures 2.4 m by 1.2 m.

a) What is the length of the table in centimetres? _____

b) How many plates can fit side by side along the length of the table?

c) What is the width of the table in centimetres? _____

d) How many plates can fit side by side along the width of the table? _____

e) How many plates can fit on the table? _____

f) How many plates can fit around the perimeter of the table? _____

Tip

To convert metres
to centimetres,
multiply by
100.



Quick Review

- The distance around a circle is its **circumference**.

The ratio of the circumference, C , to the diameter, d , of a circle, $\frac{C}{d}$, is a number close to 3.

That is, the circumference is approximately 3 times the diameter, or 6 times the radius.

- The Greek letter π is used to represent the constant for $\frac{C}{d}$.

In symbols: $\frac{C}{d} = \pi$

π is an **irrational number** equal to about 3.14.

So, the circumference, C , is π multiplied by d .

$$C = \pi d$$

Since $d = 2r$, $C = \pi \times 2r$, or $C = 2\pi r$

- You can use one of the formulas above to find the circumference of a circle given the diameter or radius.

The radius of a circle is 5 cm.

To estimate the circumference,

use: $C = 6r$

Substitute: $r = 5$

$$C = 6(5)$$

$$= 30$$

The circumference is about 30 cm.

To calculate the circumference,

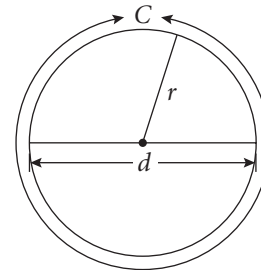
use: $C = 2\pi r$

Substitute: $r = 5$

$$C = 2 \times \pi \times 5 \quad \text{Use a calculator.}$$

$$\doteq 31.4$$

The circumference is 31.4 cm to one decimal place.



HINT

An irrational number is a decimal that never repeats and never terminates.



Practice

1. Estimate the circumference of each circle with the given diameter.

a) 2 cm

b) 24 cm

c) 4.2 m

Tip

Use $\pi = 3$ for estimates.

2. Estimate the circumference of each circle with the given radius.

a) 2 cm

b) 24 cm

c) 4.2 m

3. Calculate the circumference of each circle in question 2.

Give the answers to one decimal place.

a) $r = 2$ cm

b) $r = 24$ cm

c) $r = 4.2$ m

4. The circumference of each circle is given.

Calculate the diameter and radius. Give the answers to one decimal place.

a) $d =$ _____

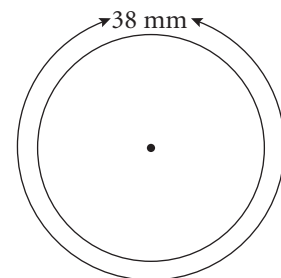
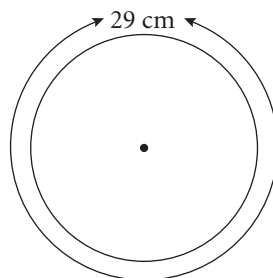
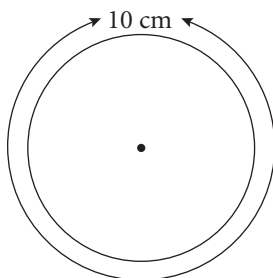
b) $d =$ _____

c) $d =$ _____

$r =$ _____

$r =$ _____

$r =$ _____



5. A drinking glass has a circular base with a circumference of 21.4 cm.

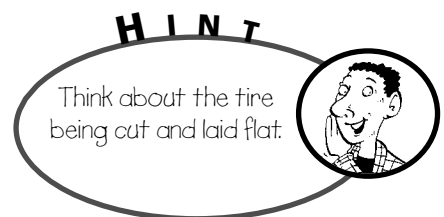
a) Calculate the diameter of the circular base. _____

b) Circular coasters are made to extend beyond the edge of the glass base by 1 cm.

What is the diameter of the coaster? _____

c) Calculate the circumference of the coaster. _____

6. A car tire has a radius of 36 cm. A stone gets stuck in the tire. How many times will the stone hit the ground when the car travels 1 km? Show your work.

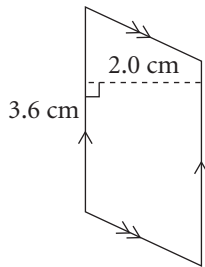
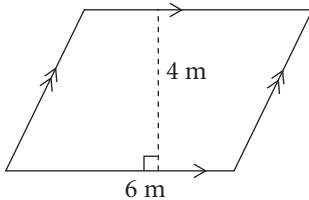
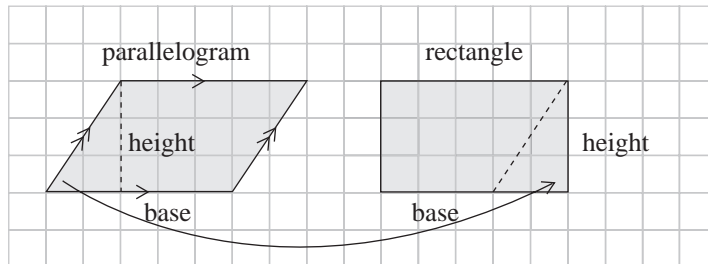


The stone will hit the ground _____ times.



Quick Review

- ▶ You can rearrange a parallelogram to form a rectangle. They have the same area.
- ▶ The formula for the area of a parallelogram is the same as for the area of a rectangle:
Area = base \times height or $A = bh$



For the parallelogram at the left:

$$A = bh$$

Substitute $b = 6$ and $h = 4$.

$$\begin{aligned} A &= 6 \times 4 \\ &= 24 \end{aligned}$$

The area is 24 m^2 .

For the parallelogram at the left:

$$A = bh$$

Substitute $b = 3.6$ and $h = 2.0$.

$$\begin{aligned} A &= 3.6 \times 2.0 \\ &= 7.2 \end{aligned}$$

The area is 7.2 cm^2 .

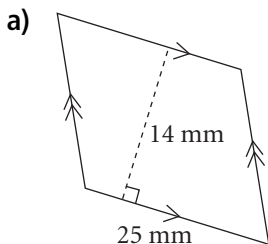
HINT

The height of a parallelogram must be perpendicular to the base.



Practice

1. Find the area of each parallelogram.



$$A = bh$$

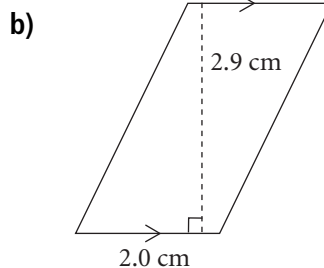
Substitute $b = \underline{\hspace{2cm}}$

and $h = \underline{\hspace{2cm}}$.

$$A =$$

=

The area is $\underline{\hspace{2cm}}$.

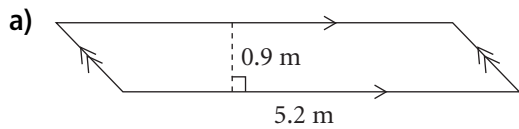


The area is $\underline{\hspace{2cm}}$.

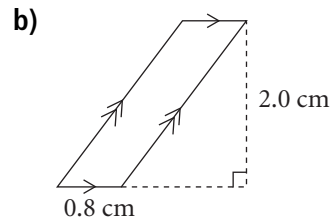
KEY TO SUCCESS

- Record formulas in your journal so that they can be found easily.
- Write an example of how to use each formula.

2. Find the area of each parallelogram.



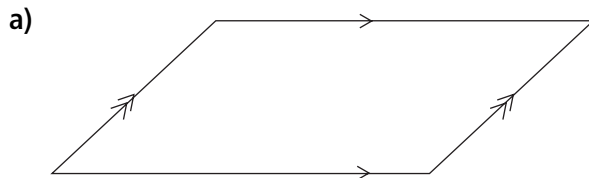
The area is _____.



The area is _____.

3. Draw the height of each parallelogram. Measure the height and the corresponding base. Then find the area.

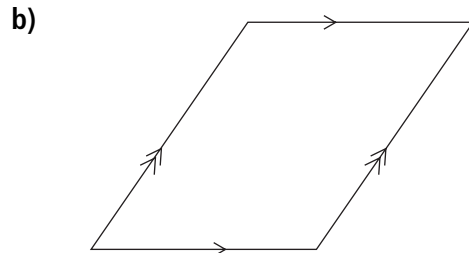
Tip
You can use a protractor to draw a line perpendicular to the base.



Height = _____ cm

Base = _____ cm

Area = _____ cm²

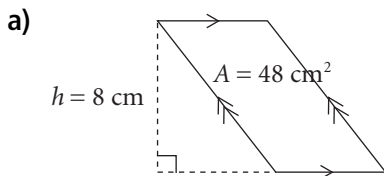


Height = _____

Base = _____

Area = _____

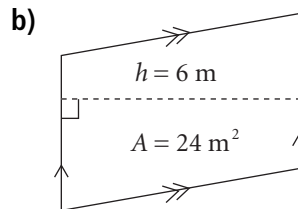
4. The area and height of each parallelogram are given. Find the measure of the base in each parallelogram.



Area = base \times height

$$48 = \text{_____} \times 8$$

Base = _____ cm

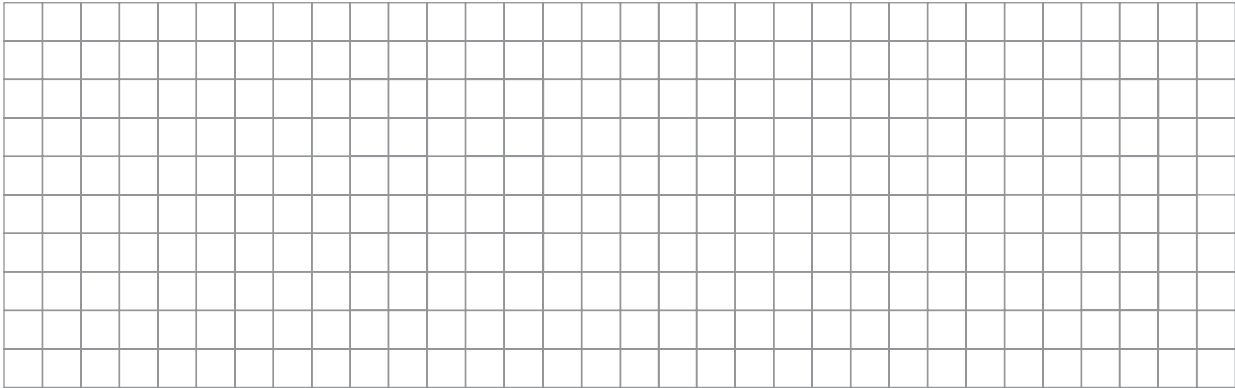


Base = _____

5. a) On the grid below, draw 3 different parallelograms with base 6 units and height 2 units.

Tip
The height can be drawn outside the parallelogram.

Find the area of each parallelogram.



- b) On the grid above, draw a parallelogram with base 3 units and height 2 units.

Find its area. _____

How does the area compare with the area of the parallelograms in part a?

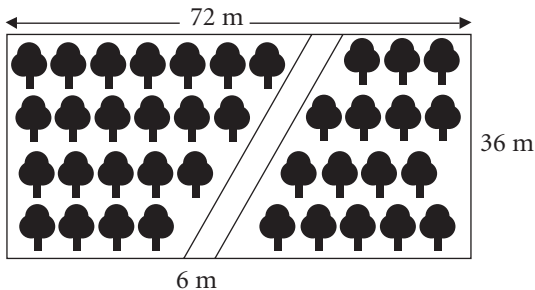
- c) On the grid above, draw a parallelogram with base 6 units and height 4 units.

Find its area. _____

How does the area compare with the area of the parallelograms in part a?

6. Jamie makes a road through his wooded lot.

What is the area of the part of the lot that has trees? Show your work.



H I N T

Subtract the area of the road from the total area of the lot to find the area of the part that has trees.

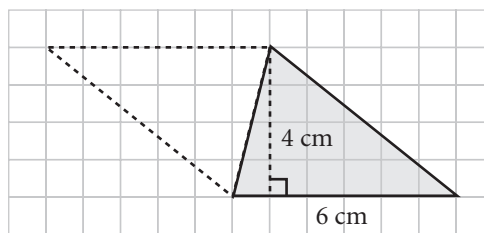
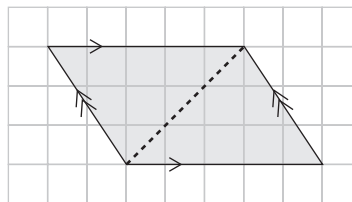
4.4

Area of a Triangle



Quick Review

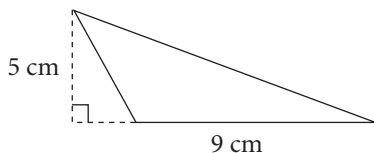
- This parallelogram has been divided into 2 congruent triangles. So, the area of one triangle is $\frac{1}{2}$ the area of the parallelogram.
- To find the area of a triangle with base 6 cm and height 4 cm, complete a parallelogram on one side of the triangle.
- The area of the parallelogram is:
 $A = \text{base} \times \text{height}$
 $A = 6 \times 4 = 24$
 The area of the parallelogram is 24 cm^2 .
 So, the area of the triangle is: $\frac{1}{2}$ of $24 \text{ cm}^2 = 12 \text{ cm}^2$
- You can use this formula for the area of a triangle.
 $\text{Area} = \frac{1}{2} \text{ base} \times \text{height}$
 $A = \frac{1}{2} bh$
 or $A = bh \div 2$
 or $A = \frac{bh}{2}$



Practice

1. Find the area of each triangle.

a)



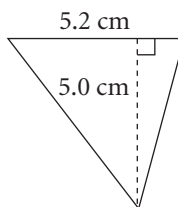
$$A = \frac{bh}{2}$$

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

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

The area is $\underline{\hspace{2cm}}$ cm^2 .

b)



$$A = \frac{1}{2} bh$$

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

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

The area is $\underline{\hspace{2cm}}$ cm^2 .

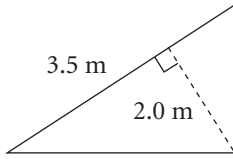
H I N T

Write the formula first.
Then substitute for each variable.

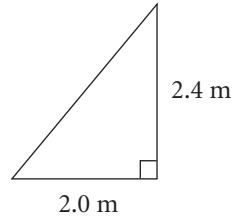


2. Find the area of each triangle.

a)

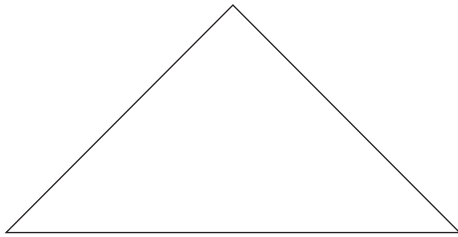


b)



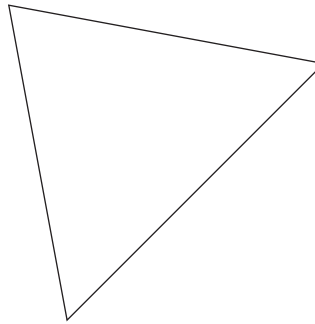
3. Measure and label the base and height of each triangle in centimetres. Then calculate the area.

a)



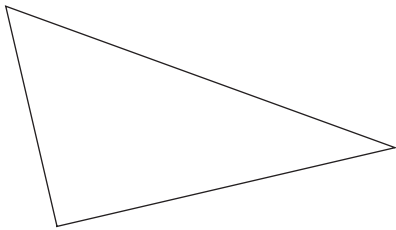
Area = _____

b)



Area = _____

c)



Area = _____

HINT

In a right triangle, the perpendicular sides can be the base and the height.



4. Draw 3 different triangles each with base 5 units and height 4 units.

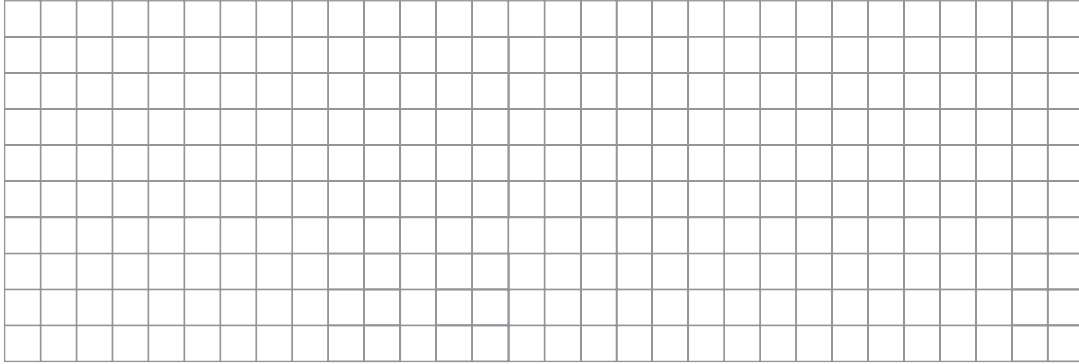


HINT

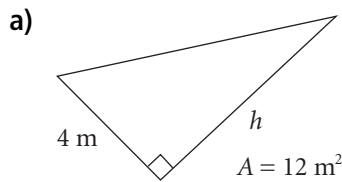
You can draw many different triangles with the same base and height.



5. Draw 3 different triangles each with area 12 square units.



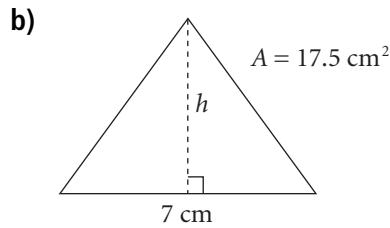
6. The area, A , of each triangle is given.
Find the height, h , of each triangle.



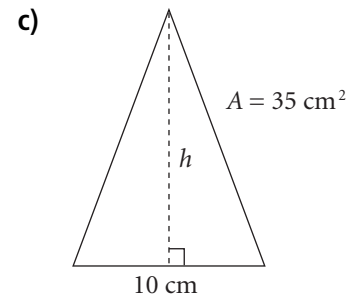
$$\text{Area} = \frac{bh}{2}$$

$$12 = \frac{4 \times h}{2}$$

Height = _____

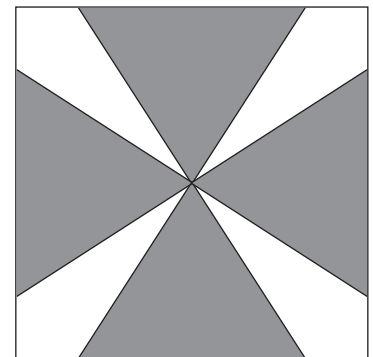


Height = _____



Height = _____

7. Bernice makes this design on a square sheet of paper.
The paper has a side length of 20 cm.
Each triangle has a base of 12 cm and a height of 10 cm.
Find the area of the white part of the design.
Show your work.



HINT

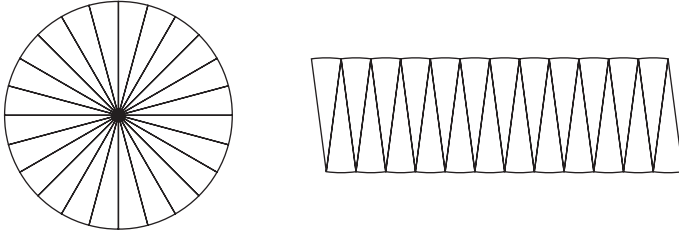
Subtract the areas of the shaded parts from the area of the square sheet of paper:





Quick Review

- When a circle is divided into many congruent sectors, the sectors can be arranged to approximate a parallelogram.



The more congruent sectors we use to divide the circle, the closer the area of the parallelogram is to the area of the circle.

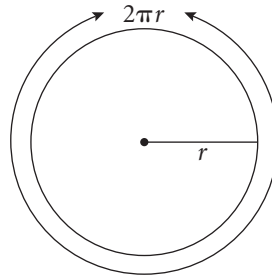
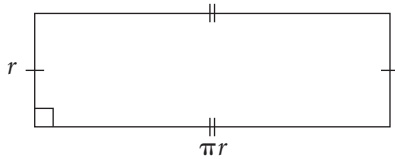
For even greater numbers of sectors, the parallelogram approaches a rectangle.
So, area of circle = area of rectangle

The sum of the 2 longer sides of the rectangle is equal to the circumference, C .

Length of rectangle: $l = \frac{C}{2} = \frac{2\pi r}{2} = \pi r$

Each of the shorter sides is equal to the radius r .

Width of rectangle: $w = r$



So, the area of a circle with radius r is:

$$\begin{aligned} A &= l \times w \\ &= \pi r \times r \\ &= \pi r^2 \end{aligned}$$

- You can use the formula $A = \pi r^2$ to find the area of any circle given the radius r .

The radius of a circle is 12 cm.

To estimate the area, use: $A = 3r^2$

Substitute: $r = 12$

$$\begin{aligned} A &= 3(12)^2 \\ &= 432 \end{aligned}$$

The area is about 432 cm².

To calculate the area, use: $A = \pi r^2$

Substitute: $r = 12$

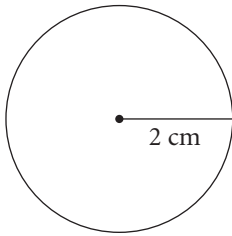
$$\begin{aligned} A &= \pi \times 12^2 \quad \text{Use a calculator.} \\ &\approx 452.389 \end{aligned}$$

The area is 452.39 cm² to 2 decimal places.

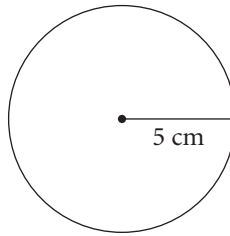
Practice

1. Estimate the area of each circle.

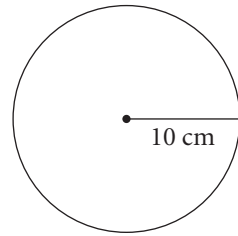
a)



b)



c)



Area: _____

Area: _____

Area: _____

2. Calculate the area of each circle in question 1.

Give the answers to two decimal places.

a) $r =$ _____

b) $r =$ _____

c) $r =$ _____

$$A = \pi \times (\text{_____})^2$$

$$\doteq \text{_____}$$

Area: _____

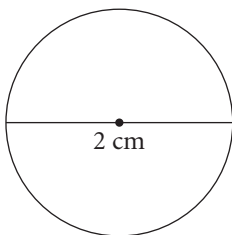
Area: _____

Area: _____

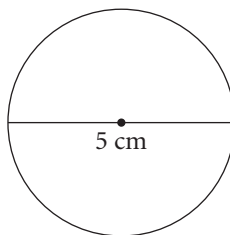
3. Calculate the area of each circle.

Give the answers to two decimal places.

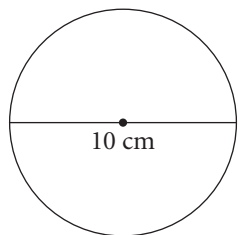
a)



b)



c)



$r =$ _____

$r =$ _____

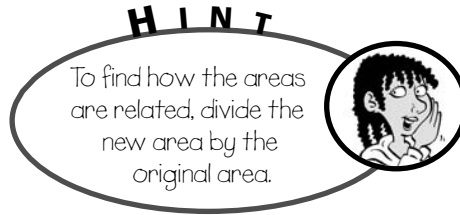
$r =$ _____

Area: _____

Area: _____

Area: _____

4. Use the results of questions 2 and 3.
What happens to the area of a circle when its radius is doubled?



What happens to the area of a circle when its radius is halved?

5. A machine is cutting circular coasters out of foam.
- a) Each coaster has a diameter of 12 cm. What is its radius? _____
- b) What is the area of each coaster? _____
- c) Each piece of foam is a rectangle measuring 144 cm by 984 cm.
What is the area of the foam? _____
- d) The coasters are cut with minimum waste.
How many coasters can be cut from each piece of foam?

- e) What area of foam is wasted?

6. The circumference of a circle is 92 cm. Calculate the area of the circle.
Give the answer to one decimal place. Show your work.

Tip

Recall that the formula for circumference is:
 $C = \pi d$

The area of the circle is _____.

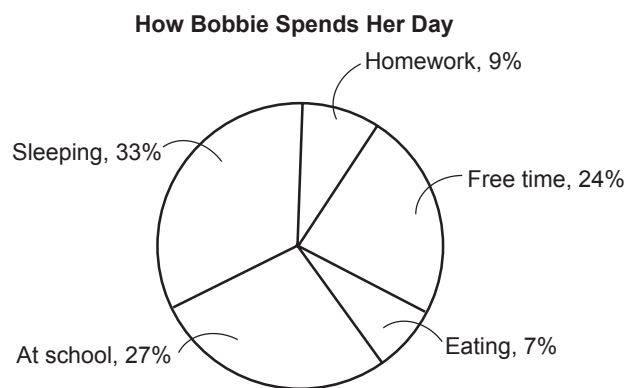


Quick Review

A **circle graph** shows parts of one whole.

This table and circle graph show how Bobbie spends a typical day.

Activity	Part of the day spent on each activity
Eating	7%
Free time	24%
Homework	9%
Sleeping	33%
At school	27%



The circle represents 100% of Bobbie's activities.

The sum of the measures of the central angles is 360° .

Each sector of the circle represents a percent of the whole circle and a percent of Bobbie's day.

The circle graph has a title that describes what it represents.

When a computer is used to draw a circle graph, a legend shows what each sector represents.

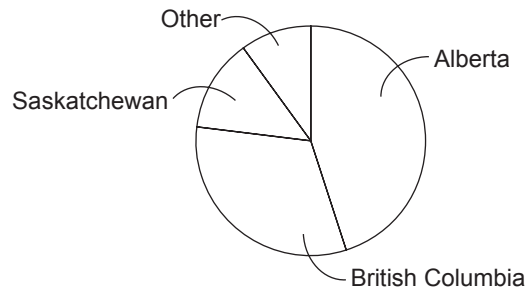
You can interpret the graph to find out about Bobbie's day:

- From the sizes of the sectors, you can see that Bobbie spent about 3 times as long at school as she did doing her homework.
- Also, the most time Bobbie spent doing any activity was sleeping. This was about one-third of the day.
- You can find how long Bobbie spent on any activity.
There are 24 h in a day.
Bobbie spent 9% of 24 h doing homework.
This is: $0.09 \times 24 \text{ h} = 2.16 \text{ h}$
So, Bobbie spent a little more than 2 h doing homework.

Practice

1. On the 2006-07 Kootenay Junior Ice Hockey Team, there were 22 players. The circle graph shows where they came from.

Kootenay Ice Roster, 2006/2007

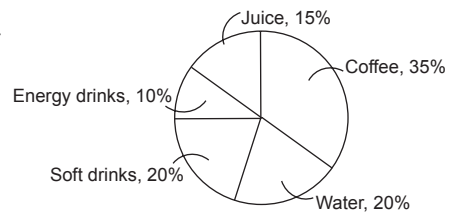


- a) From which region do more players come than any other region? _____
- b) From which region do fewer players come than any other region? _____
- c) From which two regions together do about one-half of the players come?

d) Why is there a sector labelled "Other"?

2. Ms. Reid runs the local convenience store. She keeps track of the types of drinks she sells so she always has stock in the store. The circle graph shows the drinks Ms. Reid sold in one week.

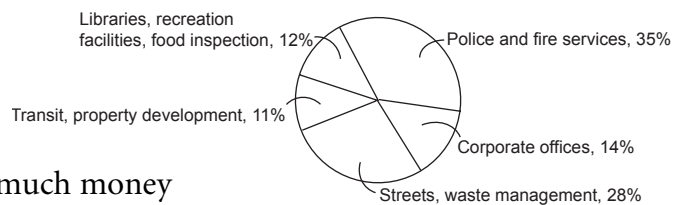
Drinks Sold in the Store



- a) Which drink was the most popular? _____
- b) Which drink was the least popular? _____
- c) Which two drinks together made up about one-half the sales? _____
- d) Can you find out how much water Ms. Reid sold that week? Explain.

3. This graph shows how the budget for the City of Winnipeg was spent in 2004. The budget for 2004 was \$692.9 million.

City of Winnipeg 2004 Budget



- a) i) Which sector is the smallest?

- ii) What does that tell you about how much money was spent for that sector?

b) How much money was spent on Police and fire services?

c) i) Which 3 sectors together are a little larger than the Police and fire services sector?

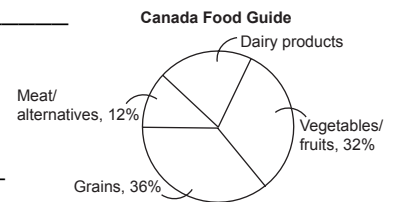
ii) What does that tell you about how much money was spent on these 3 sectors?

iii) How could you check your answer to part ii?

4. Kirabel's father is preparing meals according to the guidelines of the Canada Food Guide. He is planning a total of 25 servings per day, as shown in the graph. The labelling is incomplete.

a) What percent of the servings should be dairy products? _____

How do you know? _____



b) About how many of the servings should be grains? _____

c) About how many servings should be meat or meat alternatives? _____

d) About how many servings should be grains, or vegetables and fruits? _____

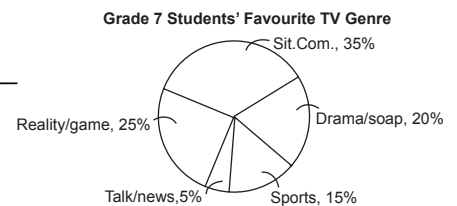
5. A survey was taken at school to determine the favourite genre of television shows of the grade 7 students. One hundred twenty students were surveyed. The results are shown in the graph.

a) Which genre had about one-third of the votes? _____

b) Which two genres together did one-quarter of the students vote for? _____

c) Which category received the fewest votes? _____

Why do you think that happened? _____



d) How many students picked sports as their favourite? _____



Quick Review

- A circle graph shows how parts of a set of data compare with the whole set.

To draw a circle graph, follow these steps:

- Write each number in the data set as a fraction of the sum of the numbers in the data set.

For example, suppose one number in the set is 8 and the total is 80.

Then the fraction is $\frac{8}{80}$.

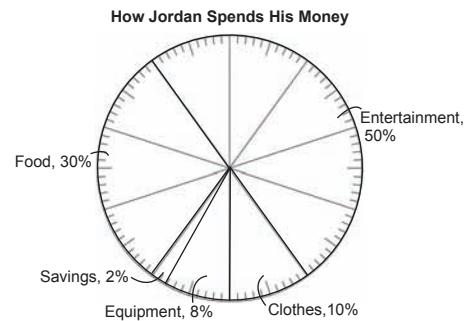
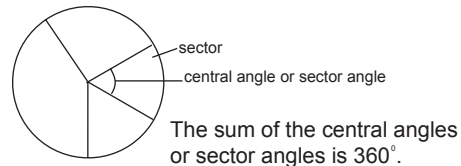
- Write each fraction as a percent.

For example, the fraction $\frac{8}{80} = \frac{1}{10} = 0.10 = 10\%$

- If you use a percent circle to draw a circle graph, mark a sector for each percent. Then label each sector and give the graph a title.

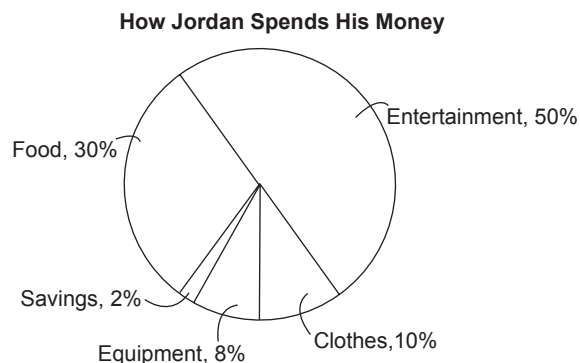
- If you do not have a percent circle, write each percent as a decimal, then multiply by 360° to determine the size of each sector angle. For example, the sector angle for 10% is: $0.10 \times 360^\circ = 36^\circ$

- Use a compass to draw a circle. Use a protractor and the angles you calculated to divide the circle into sectors. Label each sector, and give the graph a title.



HINT

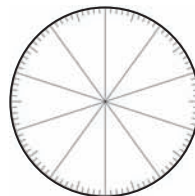
Remember the percents should add to 100%.



Practice

1. Emily and Tasha checked the cars in the teachers' parking lot. The students grouped the cars according to where the headquarters of the manufacturer are located. Here are their data.

Origin of car	Number of cars
Asia (except Japan)	12
Europe	8
Japan	20
North America	10



- a) How many cars are in the lot? _____
- b) Write each type of car as a fraction of the total number of cars in the lot.

- c) Write each fraction in part b as a percent.

- d) Draw a circle graph in the percent circle.
2. A group of grade 7 students was asked how many of Canada's other provinces and territories they have visited for at least one day. The data are shown below.

Number of provinces and territories visited	Number of students	Each number of students as a fraction of the total	Each fraction as a percent	Each percent as an angle
0	2			
1	4			
2 or 3	10			
4 to 6	5			
7 to 10	3			
11 or 12	1			

- a) Find the total number of students surveyed. _____
- b) Complete the table. For the last column, write each percent as a decimal, then multiply by 360° . Write each angle to the nearest degree where necessary.
- c) Draw and label a circle graph.

3. Here are data for the students who wrote Diploma Exams in Alberta, in 2004/2005:

Alberta Diploma Exams Written, 2004/2005

Number of exams written	Percent of students	Each percent as an angle
0	18%	
1	4%	
2	13%	
3	12%	
4	19%	
5	21%	
6 or more	13%	

- a) Draw and label a circle graph to display the data in the table.
- b) Approximately what fraction of the students wrote 4 or 5 exams? _____
How do you know? _____

4. The table below shows some First Nations' Treaties in Saskatchewan and the approximate percent of land area controlled within each treaty. The table is not complete.

Saskatchewan's First Nations' Land by Treaty

Treaty number	Land area as a percent	Sector angle in degrees
2	5%	
4		
5	3%	
6	25%	
8	14%	
10	32%	

- a) Find the percent of land controlled within treaty number 4. Complete the table.
- b) Display the data in a circle graph.
- c) Which treaty number controls one-quarter of the land? _____
How do you know? _____
- d) Which treaty number controls about 4 times as much land as treaty number 2? _____
How do you know? _____

Tip
Check that the total number of degrees is 360.

5. A group of adults was asked this question: “How do you regularly listen to music?” Here is what the adults said.

Adults’ Listening Preferences

Category	Number of adults	Fraction of adults	Percent of adults	Each percent as an angle
CD	4			
MP3 player	12			
Radio	18			
Tape/walkman	4			
Vinyl	2			

- Complete the table.
- Draw a circle graph.
- Write, then answer a question about your graph.

6. Matt loves to race his BMX bicycle. Last summer, he attended a race in Kelowna, B.C. The registration in each class is given in the table below.

Class	Number of riders
20" elite women	19
20" elite men	65
20" elite junior women	31
20" elite junior men	96
Elite cruiser	29

- Display the data on a circle graph.
Write the percents and angles to the nearest whole number where necessary.
- Colour the graph and include a legend.
- Which class did about one-quarter of the riders enter? _____
How do you know?

- Write a question you could answer using your circle graph. _____

Answer your question. _____

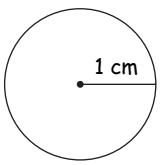
In Your Words

Here are some of the important words of this unit.

Build your own glossary by recording definitions and examples here. The first one is done for you.

radius *distance between*
a point on a circle and the centre of
the circle

For example,
the radius of this
circle is 1 cm.



diameter _____

circumference _____

area of a circle _____

area of a triangle _____

circle graph _____

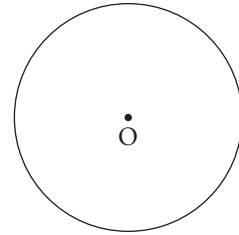
List other mathematical words you need to know.

Unit Review

LESSON

4.1 1. This circle has its centre at point O.

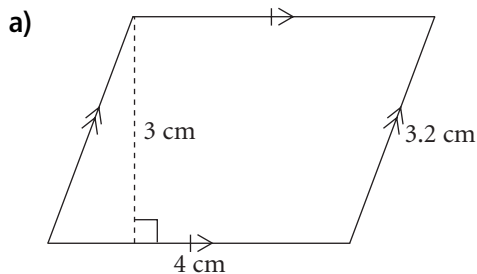
- a) Draw a radius of the circle.
What is the length of the radius? _____
- b) Draw a diameter of the circle.
What is the length of the diameter? _____
- c) Write a relationship between the radius, r , and the diameter, d , of a circle.



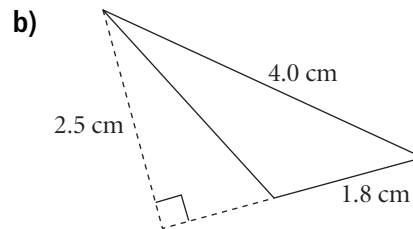
4.2 2. Billy plans to put some plastic edging around his circular fish pond.
The diameter of the pond is 5 m.
Find the amount of plastic edging that Billy will need.

4.3 3. Find the area of each shape.

4.4



Base = _____
Height = _____
Area = base \times height
Area = _____ \times _____ = _____
The area is _____.



The area is _____.

4.5 4. Estimate the area of each circle, then calculate the area to the nearest square unit.

a) radius of 4 mm
Estimate: _____
Area: _____

b) diameter of 10.1 m
Estimate: _____
Area: _____

Tip

Use $\pi = 3$
in your
estimates.

- 4.6 **5.** Kelly and her friends plan to start a rock band.
 4.7 They will play in their town and in the surrounding area.
 The band has made this table to show its expenses
 as percents of what it will earn.

Expenses of Kelly and the Rockers

Type of Expense	Percent of budget	Each percent as an angle
Advertising	10%	
Clothes	20%	
Equipment	25%	
Food	15%	
Travel	30%	

- a) Complete the table.
- b) Draw and label a circle graph.
- c) The band estimates it will earn \$10 000 from its gigs.
 How much money will the band spend on food? _____
- d) Which type of expense is one-half the amount spent on clothes? _____
 How can you tell this:
- i) from the table? _____
- ii) from the graph? _____
- _____
- e) The band wants to spend \$5000 on equipment upgrades.
 How much will the band have to earn to be able to do this? _____
- f) Write a question you can answer from the graph.

- g) Answer your question.
