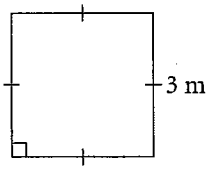
Activating Prior Knowledge

Perimeter and Area of a Rectangle

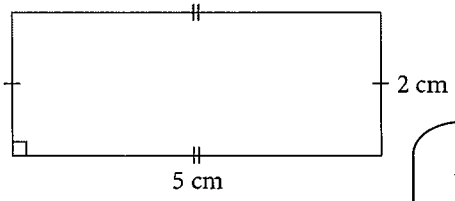
Perimeter is the distance around a shape.
Area is the amount of surface a shape covers.

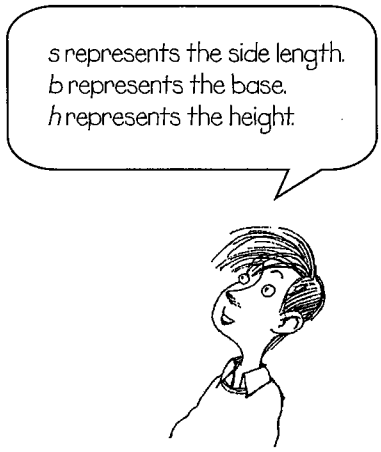
Example 1

a) Find the perimeter and area of the square.



b) Find the perimeter and area of the rectangle.





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 m^2.

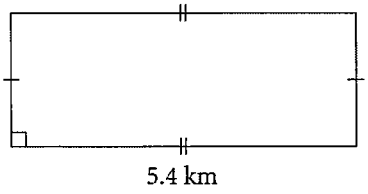
b) Perimeter, $P = 2(b + h)$
Substitute $b = 5$ and $h = 2$.
$P = 2(5 + 2) = 14$
The perimeter is 14 cm.

Area, $A = bh$
Substitute $b = 5$ and $h = 2$.
$A = 5 \times 2 = 10$
The area is 10 cm^2.

Check

1. Find the perimeter and area of each shape.

a)



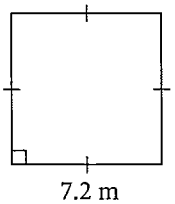
$P = 2(b + h)$
$= 2(\_\_\_\_\_ + \_\_\_\_\_)$
$= \_\_\_\_\_$

Perimeter = _____

$A = bh$
$= \_\_\_\_\_ \times \_\_\_\_\_$
$= \_\_\_\_\_$

Area = _____

b)



Perimeter = _____

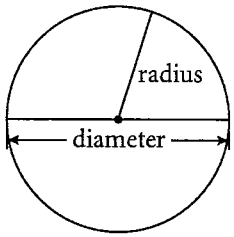
Area = _____

4.1 Investigating Circles

Quick Review

At Home / At School

- 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.

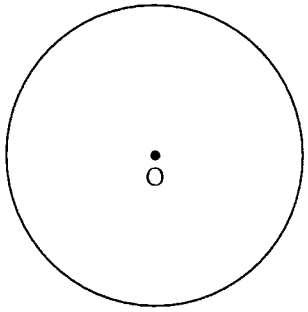
For example, in a circle, d is 10 cm.
Since $r = \frac{1}{2}d$, $r = \frac{1}{2} \times 10 = 5$
The radius is 5 cm.

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.

_____

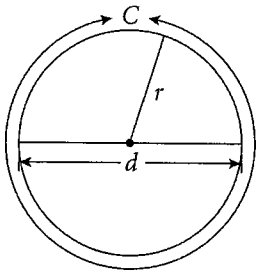
4.2 Circumference of a Circle

Quick Review

At Home At School

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

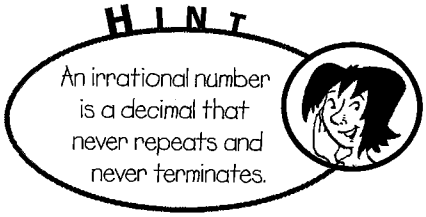
The ratio of the circumference, C, to the diameter, d, of a circle, $\frac{C}{d}$, is a number close to 3.



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: $r = 5$
$C = 2 \times \pi \times 5$ Use a calculator.
$\doteq 31.4$
The circumference is 31.4 cm to one decimal place.

Practice

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

Tip
Use $\pi = 3$ for estimates.

a) 2 cm _____

b) 24 cm _____

c) 4.2 m _____

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.

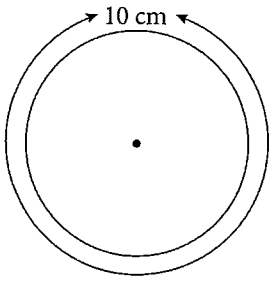
a) $r = 2$ cm _____

b) $r = 24$ cm _____

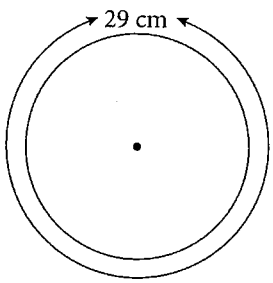
c) $r = 4.2$ m _____

4. The circumference of each circle is given.
Calculate the diameter and radius. Give the answers to one decimal place.

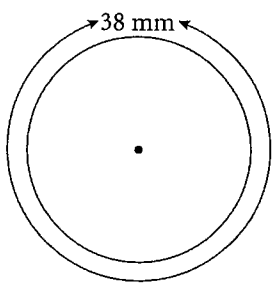
a) $d =$ _____ $r =$ _____



b) $d =$ _____ $r =$ _____



c) $d =$ _____ $r =$ _____



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

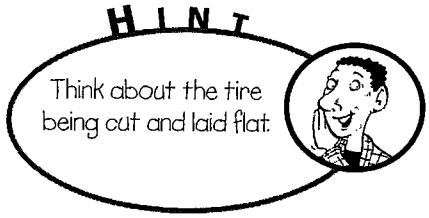
a) Calculate the diameter of the circular base. _____

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.