fs4u

Area, Perimeter & Volume

‘How To’ Booklet 39

Area, Perimeter & Volume

Perimeter: The perimeter of a plane figure is the total length of its sides. (Distance all round)

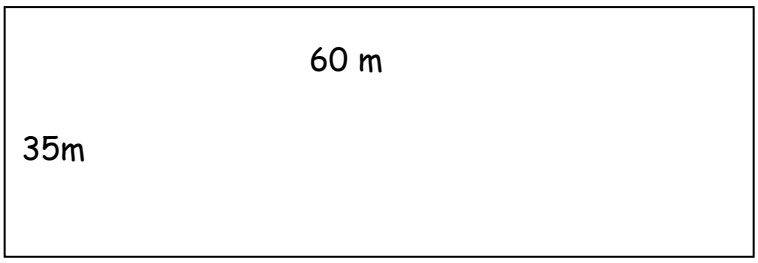
Area: Area is a measure of the surface covered by a given shape

Volume: A measure of the amount of space taken up by a solid shape

Perimeter

Example 1

A field is 60m long by 35 m wide. Find the distance between its edge, its perimeter.



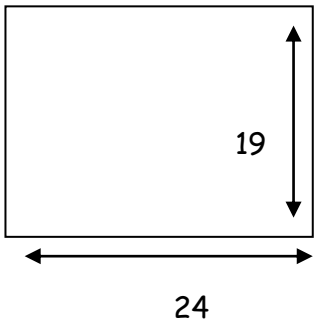
35 + 35 + 60 + 60 = 190 m

Activity

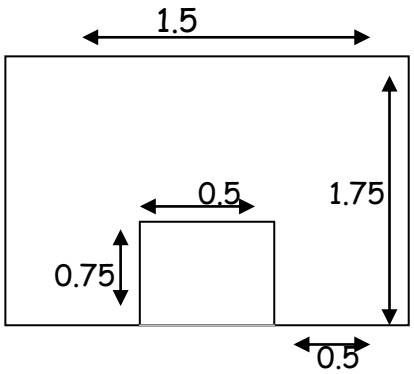
Find the perimeter of each of the following:

1)

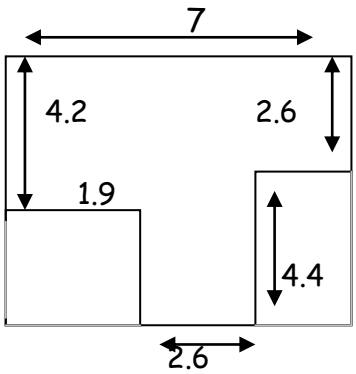
a



b



c



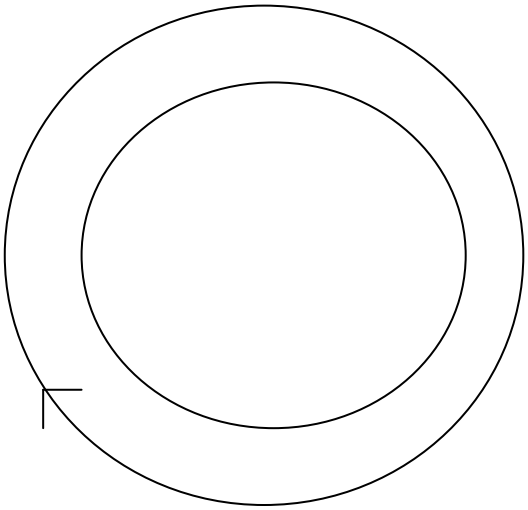
2 Find the perimeter of each of the following:-

a) A square of side 11.5cm
b) A rectangle of length 15.4m and width 9.2m
c) An office block is 4.5m wide and has a perimeter of 43m. How long is it?

Example 2

A perimeter of a circle is called the circumference.

Circumference = 2π or πd



Find circumference of a circle with a radius of 6cm.

Circumference	=	$2 \times \pi \times r$
	=	$2 \times 3.14 \times 6$
	=	**37.68cm**

Activity

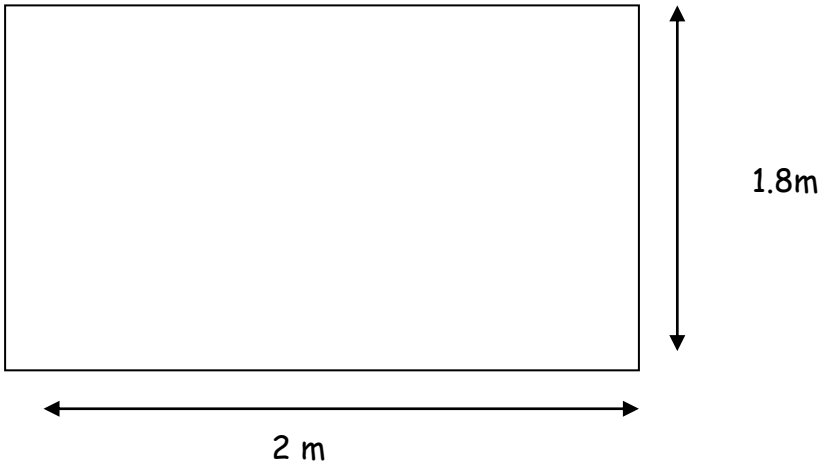
Calculate the circumference of the following:-

1	a circle of diameter of 26 cm
2	a compact disc of diameter 12 cm
3	a circle of radius 7 m
4	a circle of diameter 3.8 cm
5	The radius of a circular field is 65m. What would be the distance around its boundary.

Area

Example 1

A rectangular patio is 2 m long and 180 cm wide. Calculate its area in square metres.



Area = length x width
= 2 m x 1.8 m
= 3.6 m^2

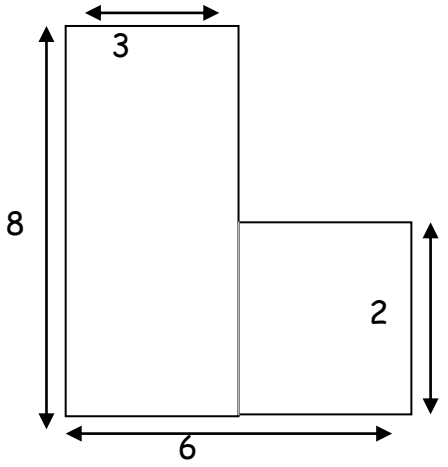
Activity

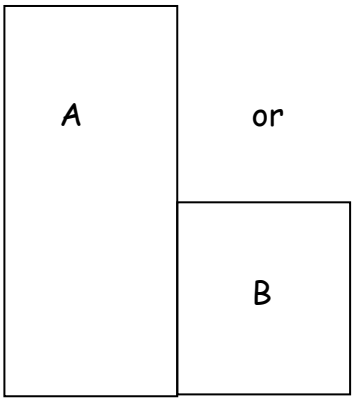
Calculate the areas of the following:-

1 The rectangle with dimensions of 6.5 cm x 7 cm
2 A square of side 8.45 cm
3 A rectangle with dimensions of 14.75 m x 8.42 m

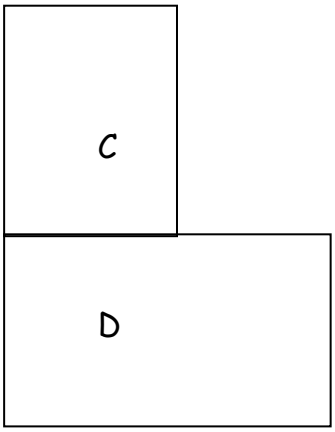
Example 2

NB Drawing not to scale; measurements in centimetres.

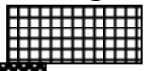


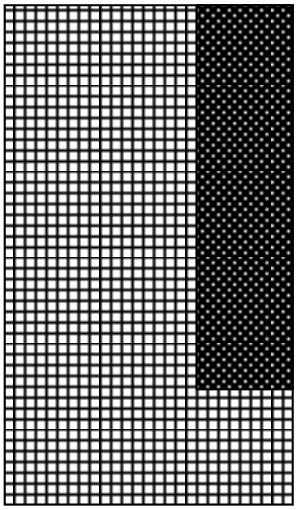


or



This shape could be divided into 2 rectangles

Another approach is to use two rectangles, E and F. Rectangle E the larger or the two is shown by the shaded area  and F is shown by the darker shaded area overlaying part of E



Area of E = 8 x 6 = 48 cm^2

Area of F = 6 x 3 = 18 cm^2

Area of shape = Area of A – Area of B

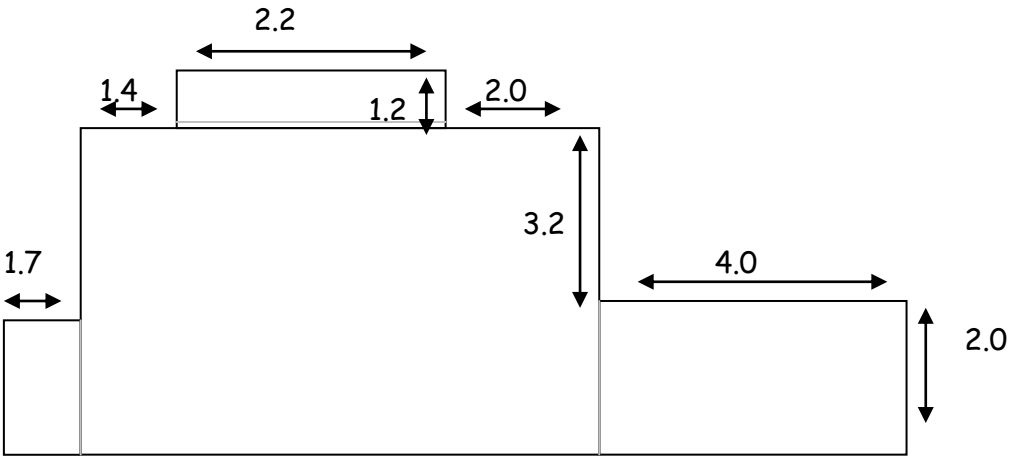
= 48 – 18

= 30 cm^2

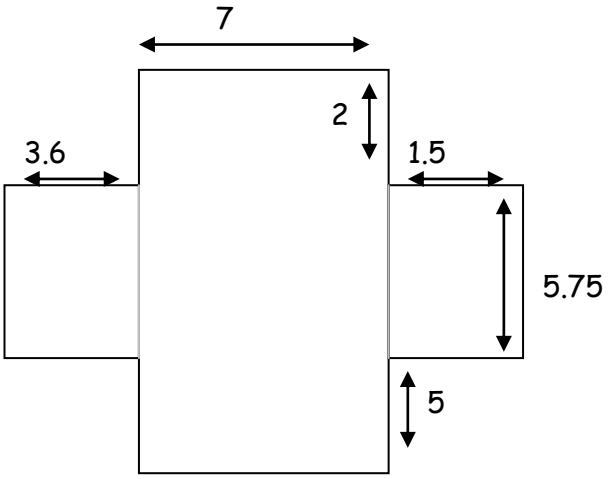
Activity

Calculate the areas of the following shapes (which are not drawn to scale)

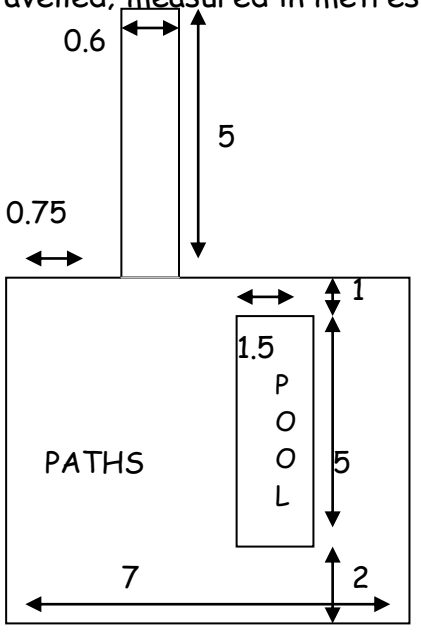
a) A reception area which is to be carpeted; the dimensions are in metres.



b) A steel plate; measured in centimetres



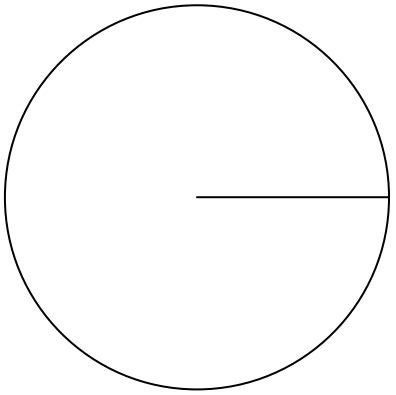
c) Paths to be gravelled; measured in metres.



Area of Circle $= \pi r^2$

Example 3

A circle is drawn with a radius of 3 cm



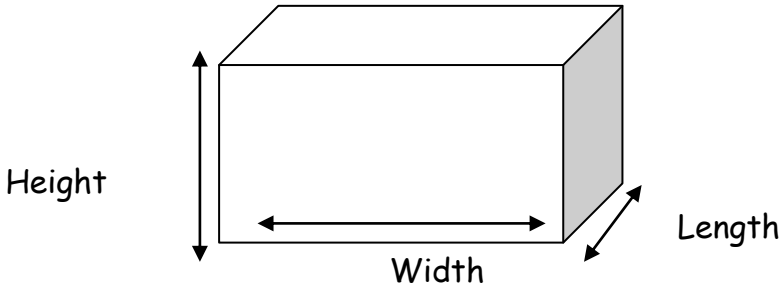
$$\begin{aligned} \text{Area} &= \pi r^2 \\ &= \pi \times 3 \times 3 \\ &= 28.3\text{cm}^2 \text{ (3 s.f.)} \end{aligned}$$

Exercise

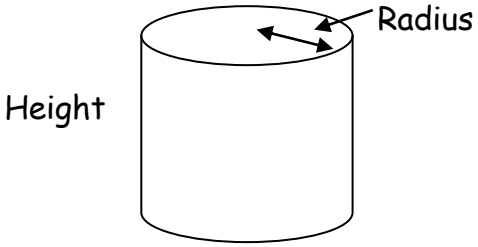
Work out the areas of the following circles: (give your answers to 3 s.f.)

1	Use the π button on your calculator to take $\pi = 3.14$
a	A circle of radius 5 cm
b	A circle of radius 13.6 mm
c	A circular pond has a diameter of 2.2 m. Calculate its area (diameter = twice the radius)
d	A biscuit tin has a diameter of 112 mm. What is the area of the top of the tin?

Volume



Volume of cuboid
= length x width x height



Volume of cylinder
= πr^2 x height

Exercise

1	**Find the volume of the following:**
a	A packing case measuring 2m x 2.3m x 1.5m
b	The measurements of a matchbox are 19mm x 53mm x 37mm. Calculate its volume
c	A cube has sides of 85mm. Calculate its volume in cm^3
d	A water tank is 6ft x 4 ft x 5ft high. How many cubic feet of oil does the tank hold when it's full?
2	**Use $\pi r^2 h$ to find the volumes of the following cylinders. (Give your answers to 3 s.f.)**
a	A cylinder of height 9cm and a diameter of 8.5cm
b	A cylinder of height 10.9cm and a diameter of 7.6cm
c	A cylinder of height 52mm and a diameter of 130mm.
3	**A tunnel 30m long has a cross section shown below. What is its volume?**