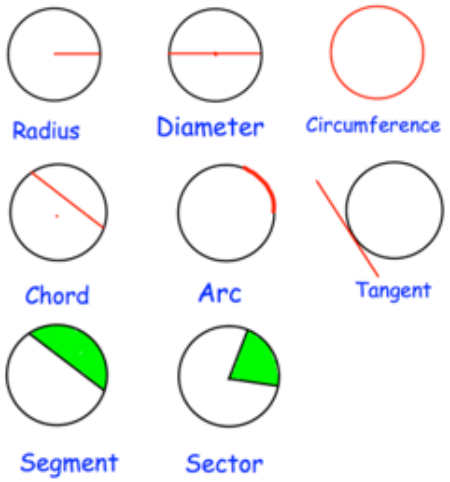
Foundation GCSE Maths Knowledge Organiser. Area and volume of shapes involving circles.

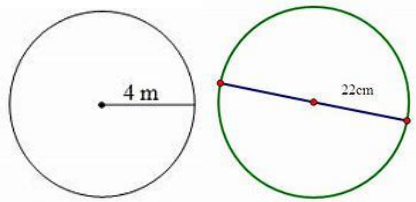
Parts of a Circle



NB: **r = radius, d = diameter**
h = height

Circumference of a Circle

Circumference = π x diameter
C = πd

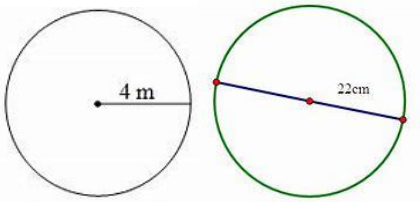


C = π x d
C = π x 2 x 4
C = 8π
C = 25.13…
C = 25.1cm (1dp)

C = π x d
C = π x 22
C = 22π
C = 69.11…
C = 69.1cm (1dp)

Area of a Circle

Area = π x radius^2
A = πr^2

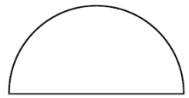


A = π x r^2
A = π x 4^2
A = 16π
A = 50.26…
A = 50.3cm^2 (1dp)

A = π x r^2
(r = 22 ÷ 2 =11)
A = π x 11^2
A = 121π
A = 380.13…
A = 380.1cm^2 (1dp)

Perimeter of a Semicircle

Calculate the perimeter of this semi-circle, to 1dp.



24 cm

The curve is half of the circumference, then add on the straight length (the diameter).

P = $\frac{\pi \times d}{2}$ + d
P = $\frac{\pi \times 24}{2}$ + d
P = 61.6991…
P = 61.7 cm (1dp)

Area of a Semicircle

Calculate the area of this semi-circle, giving your answer to 1 d.p.

24 cm

Find the area of the whole circle, then halve it.

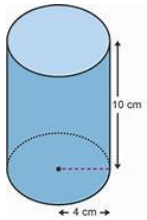
A = $\frac{\pi \times r^2}{2}$
A = $\frac{\pi \times 12^2}{2}$
A = 226.1946
A = 226.2 cm^2 (1dp)

Volume & Surface Area of Cylinders

Volume
V = π x r^2 x h
V = πr^{2}h

Surface Area
SA = (2 x π x r^2) + (π x d x h)
SA = 2πr^2 + 2πrh

SA: 3 Faces: Circle top & bottom and rectangle around the middle.



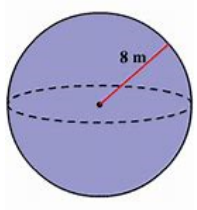
V = πr^{2}h
V = π x r^2 x h
V = π x 4^2 x 10
V = 160π
V = 502.65…
V = 502.6cm^3 (1dp)

SA = 2πr^2 + 2πrh
SA = (2 x π x r^2) + (π x d x h)
SA = 2 x π x 4^2 + π x 2 x 4 x 10
SA = 32π + 80π
SA = 112π
SA = 351.85…
SA = 351.9cm^2 (1dp)

Volume & Surface Area of Spheres

Volume
V = $\frac{4}{3}$ x π x r^3
V = $\frac{4}{3}$πr^3

Surface Area
SA = 4 x π x r^2
SA = 4πr^2



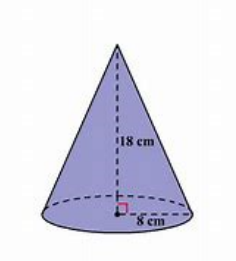
V = $\frac{4}{3}$πr^3
V = $\frac{4}{3}$ x π x r^3
V = $\frac{4}{3}$ x π x 8^3
V = 2144.66…
V = 2144.7cm^3 (1dp)

SA = 4πr^2
SA = 4 x π x r^2
SA = 4 x π x 8^2
SA = 804.24…
SA = 804.2cm^2 (1dp)

Volume of Cones

Volume
V = $\frac{1}{3}$ x π x r^2 x h
V = = $\frac{1}{3}$πr^{2}h

NB: h is vertical height – from the top straight down. It is not the slope.



V = = $\frac{1}{3}$πr^{2}h
V = $\frac{1}{3}$ x π x r^2 x h
V = $\frac{1}{3}$ x π x 8^2 x 18
V = 384π
V = 1206.37…
V = 1206.4cm^3 (1dp)