**Circles and Pi**

**Circle Words**

- Diameter
- Circumference
- Radius
- Segment
- Chord
- Sector
- Tangent

**Circumference and Area**

\[ \pi \] is the ratio of the circumference (C) to the diameter (d) of a circle.

\[ \pi \] is an irrational number – it cannot be written exactly.

\[
C = \pi d \\
A = \pi r^2 \\
( A = \text{Area}, r = \text{radius})
\]

**Examples**

1. The diameter of a bicycle wheel is 80cm.
   
   (a) Find the circumference.
   (b) Find how many times the wheel turns in travelling 1 km.

   (a) \[ C = \pi \times 80 = 251.3 \text{ cm} \]
   
   (b) \[ 1 \text{ km} = 1000 \text{ m} = 100 000 \text{ cm} \]

   No of turns = \[ \frac{100 000}{251.3} = 397.9 \]
(2) Find the area of a circular flower bed with a diameter of 3m.

radius = \( \frac{3m}{2} = 1.5m \)

Area = \( \pi \times 1.5^2 = 7.1 \, m^2 \)

(3) 

Find the area and perimeter of this shape.

60° is \( \frac{1}{6} \) of 360°

so this is \( \frac{1}{6} \) of a circle

Area = \( \frac{1}{6} \times \pi \times 8^2 = 33.5 \, cm^2 \)

Perimeter = \( \frac{1}{6} \times \pi \times 16 + 8 + 8 \)

= 24.4 \, cm

Whole circumference = \( \pi \times d = \pi \times 16 \)

Curved part = \( \frac{1}{6} \times \pi \times 16 \)

(4) A circular running track 400m long is to be built. What should be the radius of the track.

\[ \pi \, d = 400m \]

\[ d = \frac{400}{\pi} \]

= 127.3 \, cm

Radius = \( \frac{127.3}{2} = 63.7 \, m \) (3sf)
Find the area of this shape.

$45^\circ$ is $\frac{1}{8}$ of $360^\circ$

So whole circumference $= 10 \times 8 = 80\text{ cm}$

So $d = \frac{80}{\pi} = 25.4\ldots \text{ cm}$

$r = \frac{d}{2} = 12.7\ldots \text{ cm}$

Whole Area $= \pi \times 12.7\ldots^2$

$= 509.2958\ldots$

Area of sector $= \frac{509.2958\ldots}{8} = 63.7\text{ cm}^2$