Learning Development

University of Northampton

PROPERTIES OF A CIRCLE

Useful data:
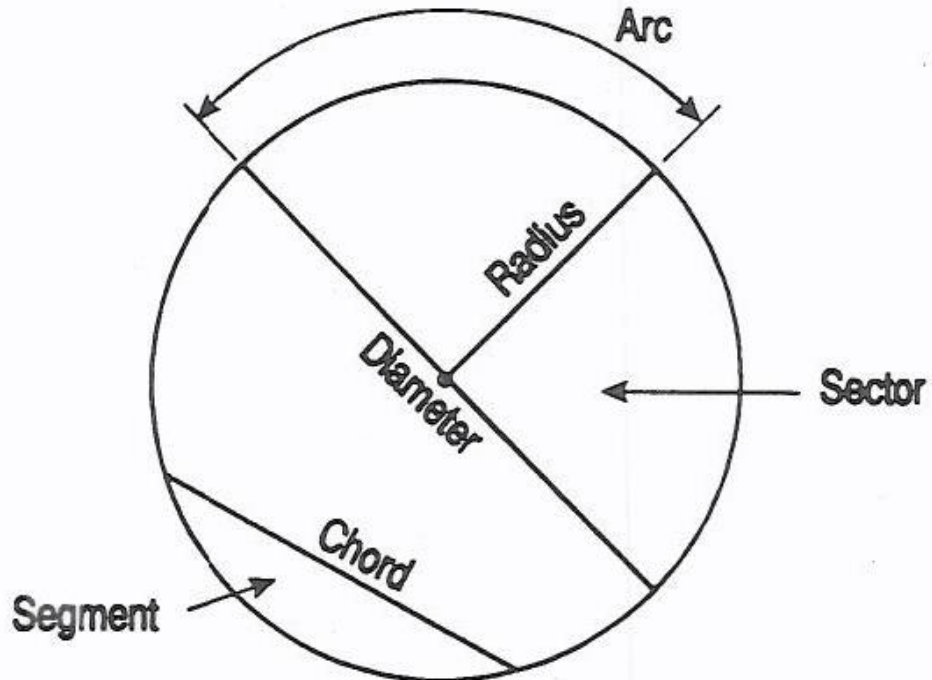
π = 3.142 (3 decimal places)

Area of a circle = πr^2 r = radius

Circumference of a circle = πd or $2\pi r$ d= diameter

$360^0 = 2\pi$ radians

Exercise 1

Find the area and circumference of a circle with radius 5cm

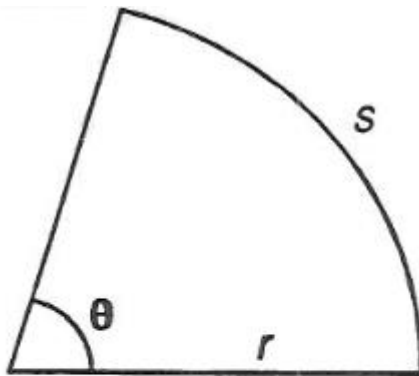Give your answers to 3 significant figures.
Take π to be 3.142.

Now check your answer.

Exercise 2

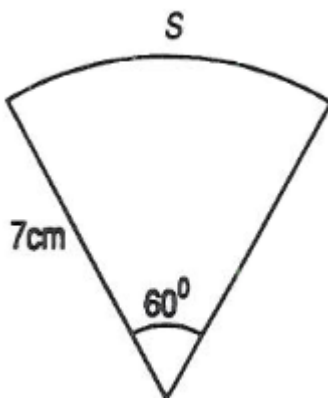Find the diameter of a circle whose circumference is 50cm.

Now check your answers.

The length of the arc *S*.

$$S = \frac{\theta}{360} \times 2\pi r$$

Example 1

Find the length of the arc given below.
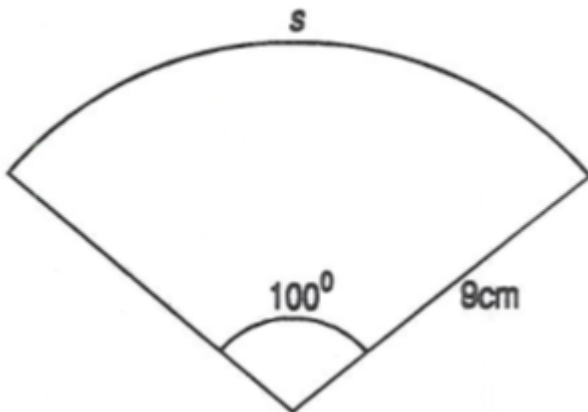

$S = \underline{60} \times 2 \times \pi \times 7$
  360

$= \underline{60} \times 2 \times 3.142 \times 7$
   360

$= \underline{2639.28}$
    360

= 7.33 cm   to 3 significant numbers

Exercise 3

Find the length of the arc given below.

Now check your answer.

The relationship between radians and degrees is as follows:

2π radians $=360^0$

or π radians $=360^0$

Where possible radians are written in terms of π.

So, for example, $90^0 = \dfrac{\pi}{2}$ radians

$60^0 = \dfrac{\pi}{3}$ radians

Of course this isn't possible with 31^0!

To find 0^0 in radians, use:

$$\dfrac{\pi}{180} \text{ x } 0$$

To find 0 radians in degrees, use:

$$\dfrac{180}{\pi} \text{ x } 0$$

Exercise 4

Convert:

a) 50^0 to radians.
b) 2 radians to degrees.

Now check your answer.

ANSWERS

Exercise 1

Area = πr^2 = 3.142 x 5^2 (remember square the 5 before multiplying by π)

           = 3.142 x 25

           = 78.55

           = 78.6 cm^2 to 3 significant figures.

Circumference = 2 π r = 2 x π x 5

           = 2 x 3.142 x 5

           = 31.42

           = 31.4cm

Now return to the text.

Exercise 2

Circumference = π d = 50

Transposing   d = $\dfrac{50}{\pi}$ = $\dfrac{50}{3.142}$ = 15.91

        $\therefore$ d = 15.9cm to 3 significant figures.

Now return to the text.

Exercise 3

     S = $\dfrac{100}{360}$ x 2 x 3.142 x 9 = $\dfrac{5655.6}{360}$ = 15.71cm

     S = 1.57 cm to 3 significant figures.

Now return to the text

Exercise 4

a) $\dfrac{\pi}{180}$ x 50 = 0.873 radians   to 3 significant figures

b) $\dfrac{180}{\pi}$ x 2 = 114..6 degrees to 1 decimal place