Starter

Find the circumference of these circles (to 3 sig. fig.):

a) 20cm

62.83185...

$C = \pi \times d$
$= \pi \times 20$
$= 62.83cm$

b) 5m

15.707963...

15.7m

c) 12.5km

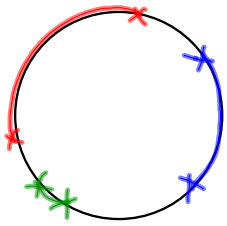
25km

78.539816...

$\pi \times 25$
$78.5km$

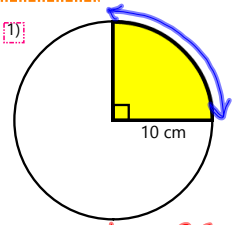
Today's Learning:

Calculating the length of an **arc** of a circle.



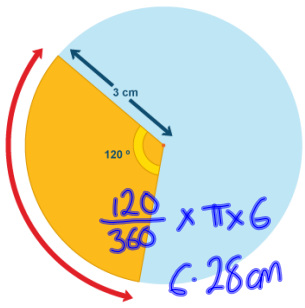
Challenge Find the length of these arcs:

1)



$\frac{1}{4} \times \pi \times 20$
$15.7cm$

2)

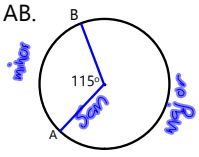


$\frac{120}{360} \times \pi \times 6$
$6.28cm$

Arc Length

An arc length is a section of the circumference of a circle. Use the angle as a fraction of 360°.

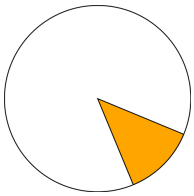
E.g. 1) Find the length of the minor arc AB.



$\text{Arc length} = \frac{x}{360} \times \pi \times d$
$= \frac{115}{360} \times \pi \times 10$
$= 10.0 \text{ (1dp) cm}$

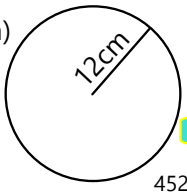
Today's Learning:

To calculate the area of sectors of circles.



Find the area of these circles:

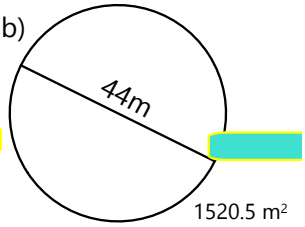
a)



452.4 cm²

$A = \pi r^2$
$= \pi \times 12^2$

b)

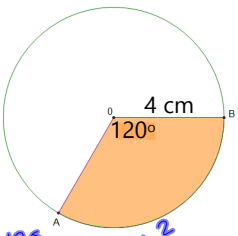


1520.5 m²

$A = \pi r^2$
$= \pi \times 22^2$

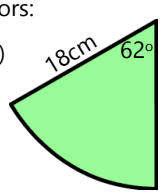
Challenge: Find the area of the sectors:

a)



$\frac{120}{360} \times \pi \times 4^2$
$16.8\ cm^2$

b)

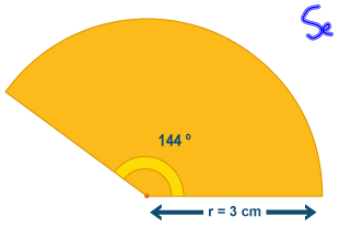


$\frac{62}{360} \times \pi \times 18^2$
$= 175.3\ cm^2$

Sector Area

A sector is a fraction of a circle's area.

e.g. 1) Find the area of the sector:



$\text{Sector Area} = \frac{x}{360} \times \pi r^2$

$\text{Area} = \frac{144}{360} \times \pi \times 3^2$
$= 11.3\ cm^2\ (1dp)$

Starter

1) Find the gradient of the straight line that goes through (2, -4) and (-6, 12).

$\text{grad} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{12 - -4}{-6 - 2} = \frac{16}{-8} = \frac{2}{1} = -2$

2) Round 30.462 to 3 sig. fig.

30.5

3) Factorise $24x^2 - 6x$

$6(4x^2 - x)$

$6x(4x - 1)$

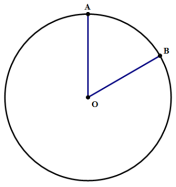
4) Multiply out and collect like terms: $(2x - 4)(x + 7)$

$2x^2 + 14x - 4x - 28$

$2x^2 + 10x - 28$

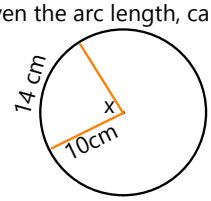
Today's Learning:

Starting with the arc length or the sector area, and working out the angle or the radius.



Challenge:

Given the arc length, can you calculate the angle?



Arc Length $= \frac{x}{360} \times \pi \times d$

$14 = \frac{x}{360} \times \pi \times 20$

$\div 20 \quad \div 20$

$14 \div 20 = \frac{x}{360} \times \pi$

$\div \pi \quad \div \pi$

$14 \div 20 \div \pi = \frac{x}{360}$

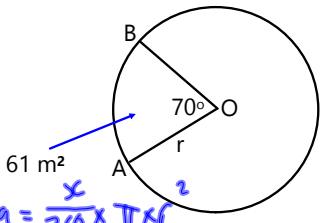
$\times 360 \quad \times 360$

$(14 \div 20 \div \pi) \times 360 = x$

$x = 86.2^\circ$ (1dp)

Challenge:

The area of this sector is 61 m². Given the angle AOB is 70°, find the radius of the circle.



Sector Area $= \frac{x}{360} \times \pi r^2$

$61 = \frac{70}{360} \times \pi \times r^2$

$\div \frac{70}{360} \quad \div \frac{70}{360}$

$61 \div \frac{70}{360} = \pi \times r^2$

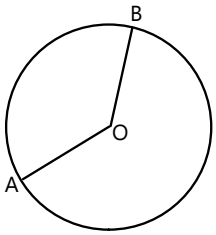
$\div \pi \quad \div \pi$

$61 \div \frac{70}{360} \div \pi = r^2$

$\sqrt{61 \div \frac{70}{360} \div \pi} = r$

$r = 9.9$ m (1dp)

Challenge: If the length of the minor arc AB is 7m and the radius of the circle is 3m, what is the size of the angle AOB?



Arc length $= \frac{x}{360} \times \pi \times d$

$7 = \frac{x}{360} \times \pi \times 6$

$7 \div 6 = \frac{x}{360} \times \pi$

$7 \div 6 \div \pi = \frac{x}{360}$

$\times 360 \quad \times 360$

$7 \div 6 \div \pi \times 360 = x$

$x = 133.7^\circ$ (1 d.p.)

Starter - NO Calculators

1) Calculate 4 x 3 - 6 ÷ 3

$= 4 \times 3 - 2$

$= 12 - 2$

$= 10$

2) Find the highest common factor of 15 and 45

15

3) List all the prime numbers up to 20

2, 3, 5, 7, 11, 13, 17, 19

4) $\frac{3}{5} + \frac{2}{6}$

$= \frac{18}{30} + \frac{10}{30}$

$= \frac{28}{30} = \frac{14}{15}$

5) Solve for x:

$4x + 7 = 2 - 6x$

$10x + 7 = 2$

$10x = -5$

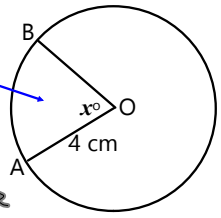
$x = \frac{-5}{10} = -\frac{1}{2}$

Today's Learning:

To practise working backwards with arc length and sector area.

Working Backwards

e.g. 1) Calculate the angle AOB:



Sector Area $= \frac{x}{360} \times \pi \times r^2$

$10 = \frac{x}{360} \times \pi \times 4^2$

$\div 4^2 \quad \div 4^2$

$10 \div 4^2 = \frac{x}{360} \times \pi$

$\div \pi \quad \div \pi$

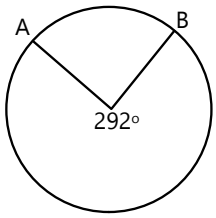
$10 \div 4^2 \div \pi = \frac{x}{360}$

$\times 360 \quad \times 360$

$(10 \div 4^2 \div \pi) \times 360 = x$

$x = 71.6^\circ$ (1 d.p.)

1) **Major** arc AB has length 20 cm. Find the diameter.



$20 = \frac{292}{360} \times \pi \times d$

$20 \div \frac{292}{360} \div \pi = d$

$d = 7.85\text{cm}$

373 cm

Starter

1) Write in completed square form:

$x^2 + 8x + 6$

$(x+4)^2 - 10$

$(x+4)(x+4) = x^2+4x+4x+16$

2) What is the gradient of the line joining (-3, -2) to (-2, -9)?

$\text{grad} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9--2}{-2--3} = \frac{-9+2}{-2+3} = \frac{-7}{1} = -7$

3) Factorise

$x^2 - 5x - 14$

$(x-7)(x+2)$

14, 7, 2

14, 1

4) What is the highest common factor of 16 and 40?

8

The pendulum of a clock swings along an arc of a circle, centre O.

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Arc length $= \frac{x}{360} \times \pi \times d$

$28.4 = \frac{65}{360} \times \pi \times d$

$\div \pi \quad \div \pi$

$28.4 \div \pi = \frac{65}{360} \times d$

$28.4 \div \pi \div \left(\frac{65}{360}\right) = d$

$d = 50.0677$

The pendulum swings through an angle of 65°, travelling from A to B.

The length of the arc AB is 28·4 centimetres.

Calculate the length of the pendulum.

$r = 25.0$ cm (1 d.p.)