

Daily Practice 8.3.2018

Q1. Simplify $\frac{3k^2 \times 8k}{2k^8} = \frac{24k^3}{2k^8} = 12k^3 \text{ or } \frac{12}{k^5}$

Q2. Write as a single fraction $\frac{k+3}{2} - \frac{4k+1}{5} = \frac{5k+15}{10} - \frac{8k+2}{10} = \frac{-3k+13}{10}$

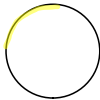
Q3. Simplify $\frac{x+3}{x^2+6x+9} = \frac{x+3}{(x+3)(x+3)} = \frac{1}{x+3}$

Q4. Write 16 000 000 in scientific notation
 1.6×10^7

Today we will be learning how to calculate arc length.
Homework due Friday!

Arc Length

An arc is a fraction of the circumference of a circle.



The minor arc is the smaller fraction of the circumference. The major arc is what's left (the larger part).

Arc Length

How do you work out the length of a fraction of the circumference?

Work out the following:

(a) The length of an arc that is a quarter of the circumference of a circle with a diameter of 20cm

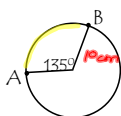
length = $\frac{20 \times \pi}{4} = 15.7 \text{ cm (1 d.p.)}$

(b) The length of an arc that is a half of the circumference of a circle with a radius of 11cm

length = $\frac{\pi \times 22}{2} = 34.56 \text{ cm (2 d.p.)}$

Arc Length

What if instead of a fraction, you were given the angle at the centre?



How could you work out what fraction the arc is out of the circumference?

Arc Length

$$\text{Arc Length} = \frac{x^\circ}{360} \times \pi D$$

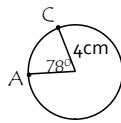
Arc Length

Examples:

1. Calculate the length of the minor arc AC

$$\frac{78^\circ}{360^\circ} \times \pi \times 8$$

$$= \underline{\underline{5.45 \text{ cm (2 d.p.)}}}$$



Arc Length

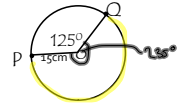
Examples:

2. Calculate the perimeter of the major sector POQ

$$360^\circ - 125^\circ = 235^\circ$$

$$\frac{235^\circ}{360^\circ} \times \pi \times 30 = 61.52 \text{ cm (2 d.p.)}$$

$$\text{Perimeter} = 61.52 \text{ cm} + 30 \text{ cm} = \underline{\underline{91.52 \text{ cm}}}$$



Daily Practice

9.3.2018

Q1. Write as a single fraction $\frac{3a}{2b} + \frac{5a}{20b} = \underline{\underline{\frac{34}{20}}}$

Q2. A mirror is shaped like part of a circle.

$24^2 - 11^2 = x^2$
 $x^2 = 455$
 $x = \sqrt{455}$
 $x = 21.3$
 $AB = 2 \times 21.3 = \underline{\underline{42.6 \text{ cm}}}$

$\frac{34}{24} \times \frac{20}{30}$
 $= \frac{30}{5} = \underline{\underline{6}}$

The radius of the circle, centre C, is 24 centimetres.
The height of the mirror is 35 centimetres.
Calculate the length of the base of the mirror, represented in the diagram by AB.

Today we will continue to practise questions on arc length.

Homework due today!

Q1. Simplify the following:

(i) $\frac{(3x+1)^2}{(3x+1)(2x+5)}$

$$\underline{\underline{\frac{3x+1}{2x+5} \checkmark}}$$

(ii) $\frac{4x-8}{x^2-3x+2}$

$$\frac{4(x-2)}{(x-2)(x-1)} \checkmark$$

$$\underline{\underline{\frac{4}{x-1} \checkmark}}$$

(iii) $\frac{2x+2}{(x+1)^2}$

$$\frac{2(x+1) \checkmark}{(x+1)^2}$$

$$\underline{\underline{\frac{2}{x+1} \checkmark}}$$

(iv) $\frac{m^2+10m+25}{m^2-25}$

$$\frac{(m+5)(m+5) \checkmark}{(m+5)(m-5) \checkmark}$$

$$\underline{\underline{\frac{m+5}{m-5} \checkmark}}$$

Q2. Write the following as single fractions in their simplest form:

(a) $\frac{a}{2} + \frac{b}{3}$ (b) $\frac{3a+4}{2} - \frac{a}{5}$ (c) $\frac{3}{x+1} + \frac{2}{x}$ (d) $\frac{5x}{y} - \frac{4}{3x^2}$

$\frac{3a+2b}{6}$ ✓ $\frac{5(3a+4)}{10} - \frac{2a}{10}$ ✓ $\frac{3x}{x(x+1)} + \frac{2(x+1)}{x(x+1)}$ ✓ $\frac{15x^3 - 4y}{3xy}$ ✓

$\frac{13a+20}{10}$ ✓ $\frac{5x+2}{x(x+1)}$ ✓ $\frac{15x^3 - 4y}{3x^2y}$ ✓

(e) $\frac{3}{x+2} + \frac{4}{x+5}$ (f) $\frac{3}{2x+5} - \frac{5}{x+4}$ (g) $\frac{a}{b} \times \frac{c}{d}$ (h) $\frac{2a}{3} \div \frac{5}{8b}$

$\frac{3(x+5)+4(x+2)}{(x+2)(x+5)}$ ✓ $\frac{3(x+4)-5(2x+5)}{(2x+5)(x+4)}$ ✓ $\frac{ac}{bd}$ ✓

$\frac{3x+15+4x+8}{(x+2)(x+5)}$ ✓ $\frac{3x+12-10x-25}{(2x+5)(x+4)}$ ✓ $\frac{2a}{3} \times \frac{8b}{5}$ ✓

$\frac{7x+23}{(x+2)(x+5)}$ ✓ $\frac{-7x-13}{(2x+5)(x+4)}$ ✓ $\frac{16ab}{15}$ ✓

(i) $\frac{3t^2}{2} \times \frac{4}{5t}$

$\frac{12t^2}{10t} = \frac{6t}{5}$ ✓

34

(j) $\frac{4fg}{5} \div \frac{3g^2}{2}$

$\frac{4fg}{5} \times \frac{2}{3g^2}$ ✓

$\frac{8fg}{15g^2} = \frac{8f}{15g}$ ✓

Daily Practice

12.3.2018

Q1. Calculate the value of a car that was worth £6300 and depreciated by 15%

$6300 \times 0.85 = 5355$

Q2. Multiply out and simplify $(3x-1)(2x^2-7x+8)$

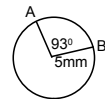
$6x^3 - 21x^2 + 24x - 2x^2 + 7x - 8 = 6x^3 - 23x^2 + 31x - 8$

Q3. Factorise fully $4x^2 - 100$

$4(x^2 - 25) = 4(x+5)(x-5)$

Q4. Calculate the length of the minor arc AB shown

$\frac{93}{360} \times \pi \times 10 = 8.1 \text{ mm (1 d.p.)}$



Area of a sector _____

How do you find the area of a circle?

Today we will be learning how to calculate the area of a sector of a circle.

Area of a sector

$$\text{Area of a sector} = \frac{x^\circ}{360} \times \pi r^2$$

Area of a sector

The diagram below shows a sector of a circle, centre C.

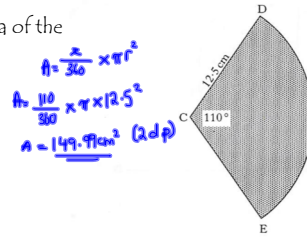
Examples:

1. Calculate the area of the

sector CDE where

$r = 12.5\text{cm}$

and $\angle DCE = 110^\circ$



The radius of the circle is 12.5 centimetres and angle DCE is 110° . Calculate the area of the sector CDE.

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

$$A = \frac{110}{360} \times \pi \times 12.5^2$$

$$A = 149.91 \text{ cm}^2 \text{ (2dp)}$$

Area of a sector

Examples:

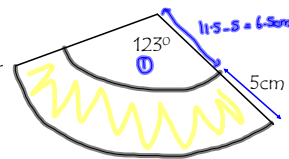
2. The brooch shown

is in the shape of a sector

of a circle.

Given the radius

is 11.5cm, calculate the shaded area



$$\text{Total area} = \text{Area } \odot$$

$$\left(\frac{123}{360} \times \pi \times 11.5^2\right) - \left(\frac{123}{360} \times \pi \times 6.5^2\right)$$

$$= 141.954 - 45.350$$

$$= 96.604 \text{ cm}^2 \text{ (1dp)}$$

4B Book Pg. 42, 43

Daily Practice

14.3.2018

Q1. Factorise $x^2 + 3x - 10$
 $(x+5)(x-2)$

Q2. Multiply out and simplify $(p+3)(p-1)$

$$p^2 - p + 3p - 3$$

$$p^2 + 2p - 3$$

Q3. Simplify $\frac{t^3 \times t^{-5}}{t^3} = \frac{t^{-2}}{t^3} = t^{-5} = \frac{1}{t^5}$

Q4. Write as a single fraction $\frac{3}{x+1} - \frac{2}{x}, x \neq -1, 0$

$$\frac{3x - 2(x+1)}{x(x+1)} = \frac{3x - 2x - 2}{x(x+1)} = \frac{x-2}{x(x+1)}$$

Today we will be working out how to find the angle at the centre of a circle given the circumference or area.

Finding the angle at the Centre - Working backwards

A pendulum travels along an arc of a circle, centre C.

Examples:

1. Arc length = $\frac{x}{360} \times \pi D$

$$28.6 = \frac{x}{360} \times \pi \times 40$$

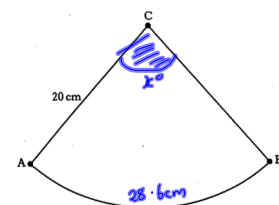
$$\div 40\pi \quad \div 40\pi$$

$$\frac{28.6}{40\pi} = \frac{x}{360}$$

$$\times 360 \quad \times 360$$

$$\frac{28.6}{40\pi} \times 360 = x$$

$$x = 21.9^\circ \text{ (1dp)}$$



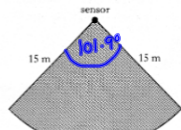
The length of the pendulum is 20 centimetres.
 The pendulum swings from A to B.

The length of the arc AB is 28.6 centimetres.

Find the angle through which the pendulum swings from A to B.

Angle at the Centre

2. A sensor in a security system covers a horizontal area in the shape of a sector of a circle of radius 15 m.



- * The area of the sector is 200 square metres.
- Find the length of the arc of the sector.

$$200 = \frac{x}{360} \times \pi \times 15^2$$

$$\frac{200}{\pi \times 15} \times 360 = x$$

$$x = 101.9^\circ$$

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

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

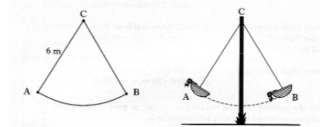
$$\text{length of arc} = \frac{101.9}{360} \times \pi \times 30$$

$$= 26.7 \text{ m (1d.p.)}$$

20 Questions Mental Maths

Today we will be continuing to find the angle at the centre given arc length or sector area.

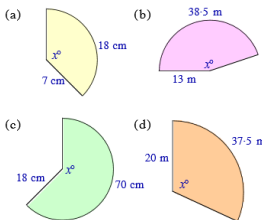
The boat on a carnival ride travels along an arc of a circle, centre C.



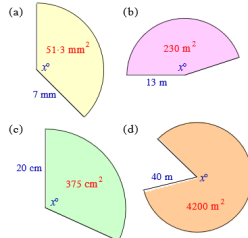
The boat is attached to C by a rod 6 metres long.
 The rod swings from position CA to position CB.
 The length of the arc AB is 7 metres.
 Find the angle through which the rod swings from position A to position B.

4 RE

1. Find the angle at the centre of each sector :-



2. Find the angle at the centre of each sector :-



3. The sector shown has an area of 572.22 cm².

- (a) Find the size of the angle at the centre.
 (b) Find the length of the major arc.

