

National 5 Mathematics

Arcs & Sectors - Solutions - 2014-2019

Marks are indicated in brackets after each question number

2015 Paper 2 Question 10, (4)

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

$$28.4 = \frac{64}{360} \times \pi \times 2r \quad \text{Since diameter} = 2 \times \text{radius}$$

$$\frac{28.4 \times 360}{64\pi} = 2r$$

$$r = \frac{28.4 \times 360}{128\pi}$$

$$r = 25 \text{ cm}$$

2016 Paper 1 Question 3, (3)

$$\text{Area} = \frac{45}{360} \times \pi \times 20^2$$

$$= \frac{1}{8} \times 400 \times 3.14$$

$$= 50 \times 3.14$$

$$= \frac{100 \times 3.14}{2}$$

$$= \frac{314}{2}$$

$$= 157 \text{ cm}^2$$

2017 Paper 2 Question 14, (3)

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

$$31.5 = \frac{AOB}{360} \times \pi \times 12.8$$

Rearranging gives

$$AOB = \frac{31.5 \times 360}{12.8\pi}$$

$$AOB = 282^\circ$$

2018 Paper 2 Question 2, (3)

$$\begin{aligned} \text{Arc Length} &= \frac{320}{360} \times \pi \times 14.8 = 41.3 \\ &= 41.3 \text{ cm} \end{aligned}$$

2018 Paper 2 Question 17, (5)

$$\begin{aligned} \text{Area of Triangle} &= \frac{1}{2}(38)(55)\sin 75 \\ &= 1009.39 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of Sector} &= \frac{75}{360} \times \pi \times 60 \\ &= 39.27 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Shaded Area} &= 1009.39 - 39.27 \\ &= 970.12 \text{ cm}^2 \end{aligned}$$

2019 Paper 1 Question 4, (3)

$$\begin{aligned}\text{Arc Length} &= \frac{\text{angle}}{360} \times \pi \times d \\ &= \frac{240}{360} \times 3.14 \times 60 \\ &= \frac{2}{3} \times 3.14 \times 60 \\ &= 40 \times 3.14 \\ &= (40 \times 3) + (40 \times 0.1) + (40 \times 0.04) \\ &= 120 + 4 + 1.6 \\ &= 125.6 \text{ cm}\end{aligned}$$

2019 Paper 2 Question 12, (3) (3)

a) Linear Scale Factor = $\frac{30}{50}$

Area Scale Factor = $\left(\frac{30}{50}\right)^2 = 0.36$

Area = $2,750 \times 0.36 = 990 \text{ cm}^2$

b) Area = $\frac{\text{angle}}{360} \times \pi r^2$

Let the angle $ACB = x$

$$2,750 = \frac{x}{360} \times \pi \times 50^2$$

$$2,750 = \frac{2,500\pi x}{360}$$

$$x = \frac{2,750 \times 360}{2,500\pi}, \quad x = 126.1^\circ$$