

Topic: Arc Length & Sector Area

22.01

$$\begin{aligned} & \frac{\text{angle}}{360} \times \pi d \\ &= \frac{160}{360} \times \pi \times 60 \\ &= 83.775\dots \\ &= 83.8 \text{ cm to 1dp} \end{aligned}$$

22.02

$$\begin{aligned} \text{Area} &= \frac{\text{angle}}{360} \times \pi r^2 \\ 200 &= \frac{\text{angle}}{360} \times \pi \times 15^2 \\ \frac{200}{\pi \times 15^2} &= \frac{\text{angle}}{360} \\ \text{angle} &= \frac{360 \times 200}{\pi \times 15^2} \\ &= 101.86^\circ \\ \text{Arc length} &= \frac{101.86}{360} \times \pi \times d \\ &= \frac{101.86}{360} \times \pi \times 30 \\ &= 26.7 \text{ cm to 1dp} \end{aligned}$$

22.03

$$\begin{aligned} \text{Arc} &= \frac{\text{angle}}{360} \times \pi d & C = \pi d \\ & & = 40.8 \\ &= \frac{110}{360} \times 40.8 \\ &= 12.46\dots \\ &= 12.5 \text{ cm to 1dp} \end{aligned}$$

22.04

$$\begin{aligned} 360 \div 16 &= 22.5 \\ 22.5 \times 7 &= 157.5^\circ \\ \text{Arc length} &= \frac{157.5}{360} \times \pi \times d \\ &= \frac{157.5}{360} \times \pi \times 18 \\ &= 24.74\dots \\ &= 24.7 \text{ m to 1dp} \end{aligned}$$

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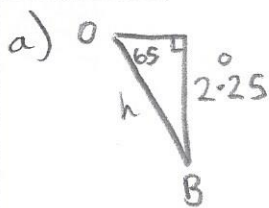
22.05

$$\begin{aligned} \text{Arc} &= \frac{\text{angle}}{360} \times \pi d \\ &= \frac{118}{360} \times \pi \times 21 \\ &= 21.624 \dots \\ &= 21.6 \text{ cm} \end{aligned}$$

22.06

$$\begin{aligned} 360 \div 5 &= 72^\circ \\ \text{Arc} &= \frac{72}{360} \times \pi \times 24 \\ &= 15.079 \dots \\ &= 15.1 \text{ cm to 1 dp} \\ \text{Perimeter} &= 15.1 + 12 + 12 \\ &= 39.1 \text{ cm} \end{aligned}$$

22.07



$$\begin{aligned} \sin 65 &= \frac{2.25}{h} \\ h &= \frac{2.25}{\sin 65} \\ &= 2.039 \dots \\ &= 2 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{130}{360} \times \pi \times d \\ &= \frac{130}{360} \times \pi \times 4 \\ &= 4.537 \dots \\ &= 4.5 \text{ m} \end{aligned}$$

$$\begin{array}{r} 8.3 \\ 8.3 \\ 4.5 \\ 4.5 \\ \hline 25.6 \text{ m} \end{array}$$

22.08 ~~Only try at end of course~~

Use trigonometry

$$\begin{aligned} A &= \frac{1}{2} ab \sin C \\ A &= \frac{1}{2} \times 7 \times 7 \times \sin 50 \\ A &= 18.76 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Sector} &= \frac{50}{360} \times \pi \times r^2 \\ &= \frac{50}{360} \times \pi \times 7^2 \\ &= 21.38 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Total Area} &= 21.38 + 18.76 \\ &= 40.1 \text{ cm}^2 \end{aligned}$$

Topic: Arc Length & Area of Sector

22.09

$$\begin{aligned} \text{Area} &= \frac{\text{angle}}{360} \times \pi r^2 \\ &= \frac{240}{360} \times \pi \times 3^2 \\ &= 18.849\dots \\ &= \underline{\underline{18.8\text{cm}^2}} \end{aligned}$$

22.10

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

$$7 = \frac{x}{360} \times \pi \times 12$$

$$\frac{7}{\pi \times 12} = \frac{x}{360}$$

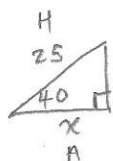
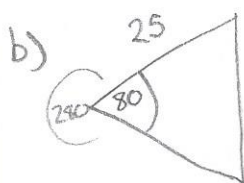
$$\frac{7}{37.699} = \frac{x}{360}$$

$$x = \frac{360 \times 7}{37.699}$$

$$= \underline{\underline{66.8^\circ}}$$

22.11

$$\begin{aligned} \text{a) Area} &= \frac{280}{360} \times \pi \times 25^2 \\ &= 1527.16\text{cm}^2 \end{aligned}$$



$$\cos 40 = \frac{x}{25}$$

$$\begin{aligned} x &= \cos 40 \times 25 \\ &= 19.15 \end{aligned}$$

$$\begin{aligned} 25 + 19.15 &= 44.15 \\ &= 45\text{cm to nearest cm} \end{aligned}$$

(round up because rounding down would make material short)

22.12

$$\text{Arc length} = \frac{284}{360} \times \pi \times d$$

$$= \frac{284}{360} \times \pi \times 18$$

$$= 44.6\text{cm}$$

$$44.6 \div 2 = 22.3$$

$$22.3 \times 100 = 2230\text{grams}$$

Topic: Arc Length and Sector Area

22.13

a) $360 \div 12 = 30$

$30 \times 5 = 150^\circ$

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

$120 = \frac{150}{360} \times \pi d$

$\frac{120}{\pi d} = \frac{150}{360}$

$150\pi d = 360 \times 120$

$d = \frac{360 \times 120}{150\pi}$

$d = 91.67... \quad r = 45.8\text{cm}$
to 1dp

22.14

a) $360 - 100 = 260$

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

$= \frac{260}{360} \times \pi \times 30^2$

$= \underline{\underline{2042\text{cm}^2}}$

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

$= \frac{260}{360} \times \pi \times 60$

$= \underline{\underline{136.1\text{cm to 1dp}}}$

22.15

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

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

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

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

$= 81.932...$

$= \underline{\underline{81.9^\circ}}$

22.16

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

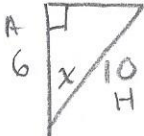
$= \frac{110}{360} \times \pi \times 12.5^2$

$= 149.98...$

$= \underline{\underline{150\text{cm}^2}}$

Topic: Arc Length and Area of Sector

22.17

a)  $\cos x = \frac{6}{10}$
 $x = \cos^{-1}\left(\frac{6}{10}\right)$
 $= 53.1^\circ$

angle QPR = 53.1×2
 $= \underline{106.2^\circ}$

b) Arc = $\frac{\text{angle}}{360} \times \pi d$
 $= \frac{106.2}{360} \times \pi \times 20$
 $= \underline{62.8 \text{ yards to 1dp}}$


22.18


large sector = $\frac{160}{360} \times \pi \times 18^2$
 $= 452.39 \text{ inches}^2$

small sector = $\frac{160}{360} \times \pi \times 10^2$
 $= 139.63 \text{ inches}^2$

Shaded Area = large - small
 $= 452.39 - 139.63$
 $= 312.8 \text{ inches}^2 \text{ to}$
 $\underline{\underline{1dp}}$

22.19

 = $\frac{45}{360} \times \pi \times 14^2$
 $\times 2$
 $= 76.97 \text{ cm}^2 = 153.9$

 = 40×14
 $\times 2$
 $= 560 = 1120$

total area = 1273.9 cm^2

20.20

$\frac{\text{angle}}{360} \times \pi \times r^2$
 $= \frac{54}{360} \times \pi \times 7.3^2$
 $= \underline{\underline{25.1 \text{ cm}^2 \text{ to 1dp}}}$

Topic: Arc length and Area of Sector

22.21

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

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

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

$$65\pi d = 360 \times 28.4$$

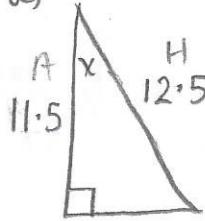
$$d = \frac{360 \times 28.4}{65\pi}$$

$$= 50.07 \text{ cm}$$

length of pendulum = 25 cm

22.22

a)



$$\cos x = \frac{17.5}{12.5}$$

$$x = \cos^{-1}\left(\frac{11.5}{12.5}\right)$$

$$= 23.07^\circ$$

$$= 23^\circ$$

b) $23 \times 2 = 46^\circ$

$$\frac{46}{360} \times \pi \times d$$

$$= \frac{46}{360} \times \pi \times 25 = 10.035$$

$$= \underline{\underline{10.0 \text{ m to 3sf}}}$$