Formative on Trig(Radians, Arc, Sectors) MS

1. $AB = r\theta$

$= \frac{1}{2}r^2\theta \times \frac{2}{r}$ (M1)(A1)

$= 21.6 \times \frac{2}{5.4}$ (A1)

$= 8$ cm (A1)

OR $\frac{1}{2} \times (5.4)^2\theta = 21.6$

$\Rightarrow \theta = \frac{4}{2.7}$ (= 1.481 radians) (M1)

$AB = r\theta$ (A1)

$= 5.4 \times \frac{4}{2.7}$ (M1)

$= 8$ cm (A1) (C4)

[4]

2. Perimeter = $5(2\pi - 1) + 10$ (M1)(A1)(A1)

Note: *Award (M1) for working in radians; (A1) for $2\pi - 1$; (A1) for +10.*

$= (10\pi + 5)$ cm (= 36.4, to 3 sf) (A1) (C4)

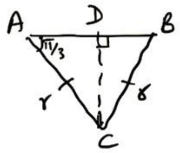
[4]

3. $AB = AC = BC = r$

$\therefore \triangle ABC$ is equilateral (M1)

so, $\angle CAB = \frac{\pi}{3}$ or 60° (M1)

$\sin\frac{\pi}{3} = \frac{CD}{AC} = \frac{\sqrt{3}}{2}$ $\therefore CD = \frac{\sqrt{3}}{2}r$



$\therefore$ Area of $\triangle = \frac{1}{2}(r)\left(\frac{\sqrt{3}}{2}r\right)$ (M1)

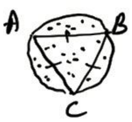
$= \frac{\sqrt{3}}{4}r^2$ (A1)

Shaded Area of Sector

$=$ Area of Sector $-$ Area of $\triangle$ (M1)

$= \frac{1}{2}r^2 \cdot \frac{\pi}{3} - \frac{\sqrt{3}}{4}r^2$ (M1)

$= \frac{\pi r^2}{6} - \frac{\sqrt{3}}{4}r^2$ (A1)



$\therefore$ Shaded Area of the figure =

$= 3\left[\frac{\pi}{6}r^2 - \frac{\sqrt{3}}{4}r^2\right] + \frac{\sqrt{3}}{4}r^2$ (M1)

$= \frac{\pi}{2}r^2 - \frac{3\sqrt{3}}{4}r^2 + \frac{\sqrt{3}}{4}r^2$

$= \frac{\pi}{2}r^2 - \frac{2}{4}\sqrt{3}r^2$ (A1)

$= \frac{r^2}{2}\left[\pi - \sqrt{3}\right]$ (A1)