| Question | Scheme | Marks | AOs |
|---|---|---|---|
| 3 | States or uses $\frac{1}{2}r^2\theta = 11$ | B1 | 1.1b |
| | States or uses $2r + r\theta = 4r\theta$ | B1 | 1.1b |
| | Attempts to solve, full method $r = ...$ | M1 | 3.1a |
| | $r = \sqrt{33}$ | A1 | 1.1b |
| | | | **[4]** |

**(4 marks)**

**Notes:**

**B1:** States or uses $\frac{1}{2}r^2\theta = 11$ This may be implied with an embedded found value for $\theta$

**B1:** States or uses $2r + r\theta = 4r\theta$ or equivalent

**M1:** Full method to find $r = ...$ This involves combining the equations to eliminate $\theta$ or find $\theta$

The initial equations must be of the same "form" (see **) but condone slips when attempting to solve.

It cannot be scored from impossible values for $\theta$ Hence only score if $0 < \theta < 2\pi$ FYI $\theta = \frac{2}{3}$ radians

Allow this to be scored from equations such as $...r^2\theta = 11$ and ones that simplify to $...r = ...r\theta$ **

Allow their $2r + r\theta = 4r\theta \Rightarrow \theta = ..$ then substitute this into their $\frac{1}{2}r^2\theta = 11$

Allow their $2r + r\theta = 4r\theta \Rightarrow r\theta = ..$ then substitute this into their $\frac{1}{2}r^2\theta = 11$

Allow their $\frac{1}{2}r^2\theta = 11 \Rightarrow \theta = \frac{..}{r^2}$ then substitute into their $2r + r\theta = 4r\theta \Rightarrow r = ..$

**A1:** $r = \sqrt{33}$ only but isw after a correct answer.

.....

The whole question can be attempted using $\theta$ in degrees.

B1: States or uses $\frac{\theta}{360} \times \pi r^2 = 11$

B1: States or uses $2r + \frac{\theta}{360} \times 2\pi r = 4 \times \frac{\theta}{360} \times 2\pi r$