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Finds equation for dr in terms of r and A

Let A = area of the circle

$$A = \pi r^2$$

$$\frac{dA}{dr} = 2\pi r$$

$$dr = \frac{dA}{2\pi r}$$

Eliminates dr

$$\frac{\frac{dA}{2\pi r}}{dt} = \frac{1}{3r^2}$$

M1

M1

5 cont.

Rearranges for $\frac{dA}{dt}$ and simplifies

$$\frac{dA}{dt} = \frac{2\pi r}{3r^2} = \frac{2\pi}{3r}$$

Start of process to rearrange to given form

$$\text{e.g. } \frac{dA}{dt} = \frac{2\pi^2}{3\pi r}$$

$$\left(\frac{dA}{dt}\right)^2 = \frac{4\pi^4}{9\pi^2 r^2}$$

$$\left(\frac{dA}{dt}\right)^2 = \frac{4\pi^3}{9\pi r^2}$$

Substitution of $A = \pi r^2$

$$\text{e.g. } \left(\frac{dA}{dt}\right)^2 = \frac{4\pi^3}{9A}$$

Continuation of process of rearranging resulting in,

$$\frac{dA}{dt} = +\sqrt{\frac{4\pi^3}{9A}}, \text{ Do not accept } \pm\sqrt{\frac{4\pi^3}{9A}} \text{ since } r > 0$$

$$a = 4, b = 9$$

Accept sensible alternative methods

M1

M1

M1

M1 a and b
may be stated
or implied

[6]

[6 marks]