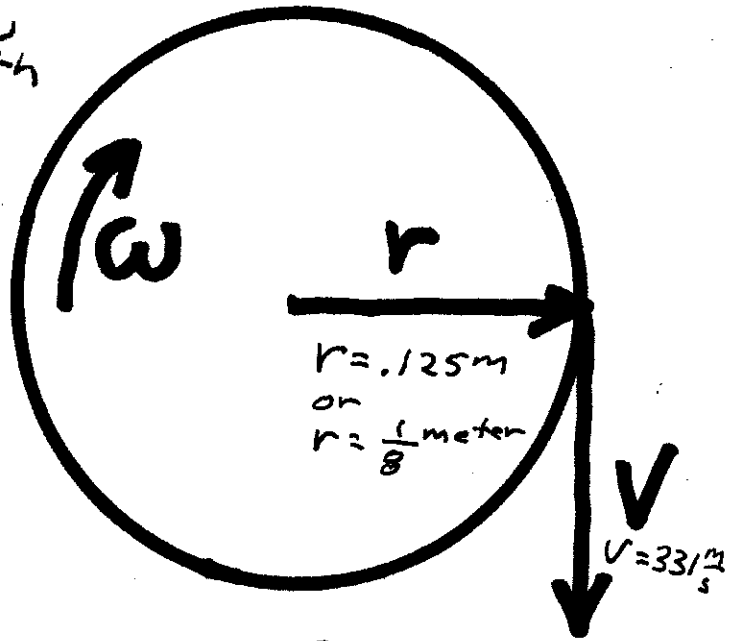


20080219-1616

How fast, in Rev/min, must a grindstone with a radius of 12.5 cm be turning, to have the linear velocity (v) be equal to 331.0 m/sec?

Solution: Use $v = r\omega$ after converting 12.5 cm into .125 meters.



$$v = r\omega \quad \text{or} \quad \omega = \frac{v}{r}$$

$$\omega = \frac{v}{r} = \frac{331.0 \frac{\text{m}}{\text{s}}}{\frac{1}{8} \text{m}} = \frac{(8)(331.0)}{1 \text{ sec}}$$

$$\frac{331}{8} = 2648$$

$$\omega = 2648 \frac{\text{radians}}{\text{sec}}$$

Next convert $\frac{\text{rad}}{\text{sec}}$ into $\frac{\text{rev}}{\text{min}}$

$$\omega = \frac{2648 \text{ rad}}{1 \text{ sec}} \cdot \frac{1 \text{ rev}}{2\pi \text{ rad}} \cdot \frac{60 \text{ sec}}{1 \text{ min}}$$

$$\omega = \frac{(1324)(60) \text{ rev}}{\pi \text{ min}} = \frac{79440 \text{ rev}}{\pi \text{ min}}$$

$$\omega = 25286 \frac{\text{Rev}}{\text{min}} \text{ or } 25286 \text{ RPM}$$

Properly rounded to 3SF gives

$$\omega = 2.53 \times 10^4 \text{ RPM}$$