

20080310-0851

Name _____

Find linear velocity (v) in m/s if force (F) is 50.00N and is applied for 20.00 seconds. The object is a uniform disk, with a mass of 100.0 kg.

$$I = \frac{1}{2}mr^2$$

$$\tau = Fd \quad \tau = I\alpha$$

$$\tau = I\alpha = Fd$$

$$\alpha = \frac{Fd}{I}$$

$$\alpha = \frac{(50N)(2m)}{\frac{1}{2}(100kg)(2m)^2}$$

$$\alpha = \frac{100 Nm}{200 kg m^2}$$

$$\alpha = \frac{1}{2} s^{-2}$$

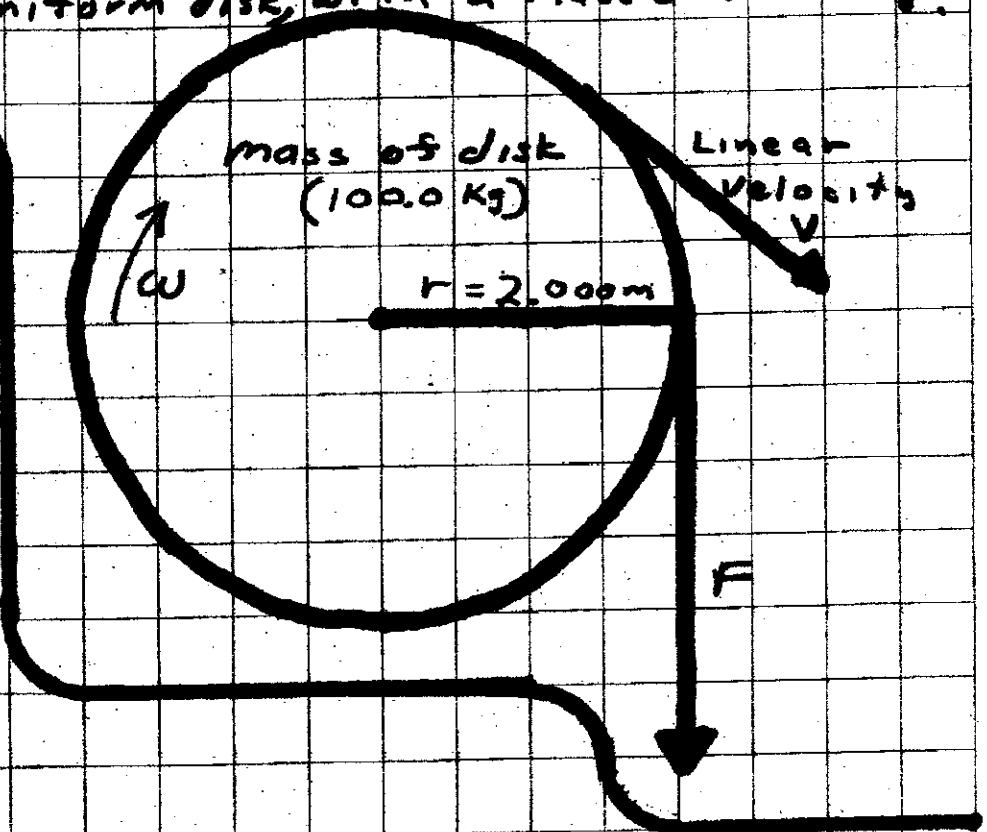
Note: This is radian measure.

To get ω_f use

$$\omega_f = \omega_i + \alpha t$$

$$= (0) + \left(\frac{1}{2} s^{-2}\right)(20s)$$

$$= 10 \frac{\text{radians}}{\text{sec}}$$



Then to get v use

$$v = r\omega$$

$$v = (2m)\left(10 \frac{\text{Rad}}{\text{sec}}\right)$$

$$v = 20 \text{ m/s}$$

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