

P. 13

Circumf. = Distance
Chain moved
↓
rotator

#1 e) Chain ring circumf = $2\pi r = 2\pi(0.1m) = 0.628m$

f) Sprocket circumf = $2\pi(0.04m) = 0.25m$

$\left(\frac{0.628 \text{ m of chain}}{0.25 \text{ m of chain}}\right) \frac{1 \text{ sprocket rev}}{1} = 2.51 \text{ revolutions}$

g) Wheel circumf = $2\pi(0.35m) = 2.20m$ distance traveled during wheel rotation

$\left(\frac{2.20 \text{ m traveled}}{\text{revolution}}\right) (2.51 \text{ revolutions}) = 5.52 \text{ m traveled}$

h) $\left(\frac{5.52 \text{ m}}{\text{revolution}}\right) \left(\frac{1 \text{ revolution}}{s}\right) = 5.52 \text{ m/s}$

$v = \frac{d}{t} = \frac{5.52 \text{ m}}{1s} = 5.52 \text{ m/s}$

$$8. \quad T_{\text{Big crank}} = 80 \text{ N} (0.3 \text{ m}) = 24 \text{ N}\cdot\text{m}$$

$$T_{\text{sprocket A}} = 24 \text{ N}\cdot\text{m} = F (0.02 \text{ m})$$

$$F_{\text{sprocket}} = 1200 \text{ N}$$

$$T_{\text{sprocket B}} = 1200 \text{ N} (0.8 \text{ m}) = 960 \text{ N}\cdot\text{m}$$

$$T_{\text{Smear wheel}} = 960 \text{ N}\cdot\text{m} = F_{\text{Smear wheel}} (0.83 \text{ m})$$

$$F_{\text{Smear wheel}} = 1160 \text{ N}$$

$$9. \quad \text{Circumf}_{\text{sprocket A}} = 2\pi (0.02 \text{ m}) = 0.126 \text{ m}$$

$$\text{Circumf}_{\text{sprocket B}} = 2\pi (0.8 \text{ m}) = 5.03 \text{ m}$$

↑
chain moved
with
each
rotation

↑
chain moved
with each rotation

$$\left(\frac{0.126 \text{ m of chain}}{5.03 \text{ m of chain}} \right) \left(\frac{1 \text{ rotation sprocket B}}{5.03 \text{ m of chain}} \right) = 0.025 \text{ rotations}$$

$$\text{Circumf}_{\text{smear wheel}} = 2\pi (0.83 \text{ m}) = 5.21 \text{ m}$$

$$\left(\frac{5.21 \text{ m}}{\text{rotation}} \right) (0.025 \text{ rotations}) = 0.13 \text{ m}$$

10.

$$\left(\frac{0.13 \text{ m}}{\text{rotation}} \right) \left(\frac{1 \text{ rotation}}{1.8 \text{ s}} \right) = 0.072 \text{ m/s}$$

$$v = \frac{d}{t} = \frac{0.13 \text{ m}}{1.8 \text{ s}} = 0.072 \text{ m/s}$$