

$$1. \quad s = r\theta$$

$$\frac{s}{r} = \theta$$

$$\frac{8.29 \times 10^6}{6.18 \times 10^6} = \theta$$

$$1.34 \text{ rad} = \theta$$

$$2. \quad \Delta t = 9.09 \text{ hr} \left(\frac{60 \text{ min}}{1 \text{ hr}} \right) \left(\frac{60 \text{ s}}{1 \text{ min}} \right) = 32,724 \text{ s}$$

$$\omega = ?$$

$$\omega = \frac{\theta}{\Delta t} = \frac{1.34 \text{ rad}}{32,724 \text{ s}} = 4.09 \times 10^{-5} \text{ rad/s}$$

$$3. \quad [2]v_1 = \frac{2\pi r}{T}v_2 = \frac{2\pi(r+d)}{T}$$

$$T_2 \cos \theta_2 = T_1 \cos \theta_1$$

$$T_2 = \frac{T_1 \cos \theta_1}{\cos \theta_2}$$

$$T_1 \sin \theta_1 + \left(\frac{T_1 \cos \theta_1}{\cos \theta_2} \right) \sin \theta_2 = 350$$

$$T_1 \sin \theta_1 + \frac{T_1 \cos \theta_1 \sin \theta_2}{\cos \theta_2} = 350$$

$$T_1 \sin \theta_1 + T_1 \frac{\cos \theta_1 \sin \theta_2}{\cos \theta_2} = 350$$

$$T_1 \left(\sin \theta_1 + \frac{\cos \theta_1 \sin \theta_2}{\cos \theta_2} \right) = 350$$

$$T_1 \left(\frac{\sin \theta_1 \cos \theta_2 + \cos \theta_1 \sin \theta_2}{\cos \theta_2} \right) = 350$$

$$T_1 \left(\frac{\sin (\theta_1 + \theta_2)}{\cos \theta_2} \right) = 350$$

$$T_1 = 350 \left(\frac{\cos \theta_2}{\sin (\theta_1 + \theta_2)} \right)$$

$$T_1 = \frac{350 \cos \theta_2}{\sin (\theta_1 + \theta_2)}$$

$$T_1 = \frac{350 \cos 23.8}{\sin (55.3 + 23.8)}$$

$$T_1 = \frac{350 \cos 23.8}{\sin 79.1}$$

$$T_1 = 326.12 \text{ N}$$

$$T_1 \sin \theta_1 = 350 - T_2 \sin \theta_2$$

$$T_1 = \frac{350 - T_2 \sin \theta_2}{\sin \theta_1}$$

$$- \left(\frac{350 - T_2 \sin \theta_2}{\sin \theta_1} \right) \cos \theta_1 + T_2 \cos \theta_2 = 0$$

$$- \left(\frac{350 \cos \theta_1 - T_2 \sin \theta_2 \cos \theta_1}{\sin \theta_1} \right) + T_2 \cos \theta_2 = 0$$

$$\frac{-350 \cos \theta_1 + T_2 \sin \theta_2 \cos \theta_1}{\sin \theta_1} + T_2 \cos \theta_2 = 0$$

$$\frac{-350 \cos \theta_1}{\sin \theta_1} + \frac{T_2 \sin \theta_2 \cos \theta_1}{\sin \theta_1} + T_2 \cos \theta_2 = 0$$

$$\frac{-350 \cos \theta_1}{\sin \theta_1} + T_2 \left(\frac{\sin \theta_2 \cos \theta_1}{\sin \theta_1} + \cos \theta_2 \right) = 0$$

$$T_2 \left(\frac{\sin \theta_2 \cos \theta_1}{\sin \theta_1} + \cos \theta_2 \right) = \frac{350 \cos \theta_1}{\sin \theta_1}$$

$$T_2 \left(\frac{\sin \theta_2 \cos \theta_1 + \cos \theta_2 \sin \theta_1}{\sin \theta_1} \right) = \frac{350 \cos \theta_1}{\sin \theta_1}$$

$$T_2 \left(\frac{\sin (\theta_2 + \theta_1)}{\sin \theta_1} \right) = \frac{350 \cos \theta_1}{\sin \theta_1}$$

$$T_2 = \frac{350 \cos \theta_1}{\sin \theta_1} \left(\frac{\sin \theta_1}{\sin (\theta_2 + \theta_1)} \right)$$

$$T_2 = \frac{350 \cos \theta_1}{\sin (\theta_2 + \theta_1)}$$

$$T_2 = \frac{350 \cos 55.3}{\sin (23.8 + 55.3)}$$

$$T_2 = 203 \text{ N}$$