

P12 - 4.2 - Trig Torque Notes

Find the Tension the string and force on the pole/wall.

$$A = H \cos \theta$$

$$T_{2x} = T_2 \cos \theta$$

$$T_{2y} = 381.15 \cos 40$$

$$T_{2x} = 291.86 \text{ N}$$

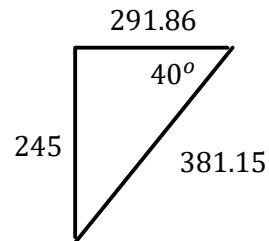
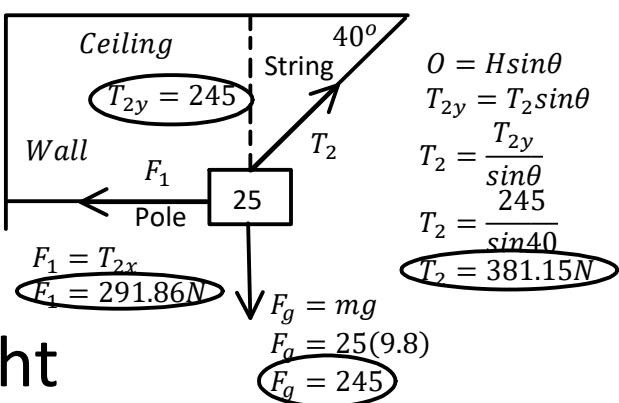
Up=Down

$$A = \frac{O}{\tan \theta}$$

$$F_1 = \frac{\tan \theta}{mg}$$

$$F_1 = \frac{25(9.8)}{\tan 40}$$

$$F_1 = 291.86 \text{ N}$$



Left=Right

$$T_{1x} = T_1 \cos \theta_1$$

$$T_1 = \frac{T_2 \cos 25}{\cos 35}$$

$$T_1 = \frac{(231.74) \cos 25}{\cos 35}$$

$$T_1 = 256.4 \text{ N}$$

Diagram showing a 25 kg mass hanging from two strings, 1 and 2, which make 35° and 25° with the vertical respectively. The forces acting on the mass are $F_g = mg$ (downward), $F_a = 25(9.8)$ (upward), T_1 (up-left), T_2 (up-right), and T_{1y} , T_{2y} (horizontal components). Equations derived:

$$T_{1x} = T_{2x}$$

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

$$T_1 \cos 35 = T_2 \cos 25$$

$$\frac{T_2 \cos 25}{\cos 35} \sin 35 + T_2 \sin 25 = 245$$

$$0.6346 T_2 + 0.4226 T_2 = 245$$

$$1.057 T_2 = 245$$

$$T_2 = 231.74 \text{ N}$$

Sin Law

Diagram showing a 245 kg mass hanging from two strings, 1 and 2, forming a triangle with angles 35° , 55° , 60° , 65° , and 25° . The forces acting on the mass are F_g (downward), $F_a = 245(9.8)$ (upward), T_1 (up-left), T_2 (up-right), and T_{1y} , T_{2y} (horizontal components). Equations derived using the Sine Rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{T_1}{\sin 65} = \frac{F_g}{\sin 60}$$

$$T_1 = \frac{F_g}{\sin 60} \times \sin 65$$

$$T_1 = 256.4 \text{ N}$$

$$\frac{T_2}{\sin 55} = \frac{F_g}{\sin 60}$$

$$T_2 = \frac{F_g}{\sin 60} \times \sin 55$$

$$T_1 = 231.74 \text{ N}$$