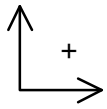
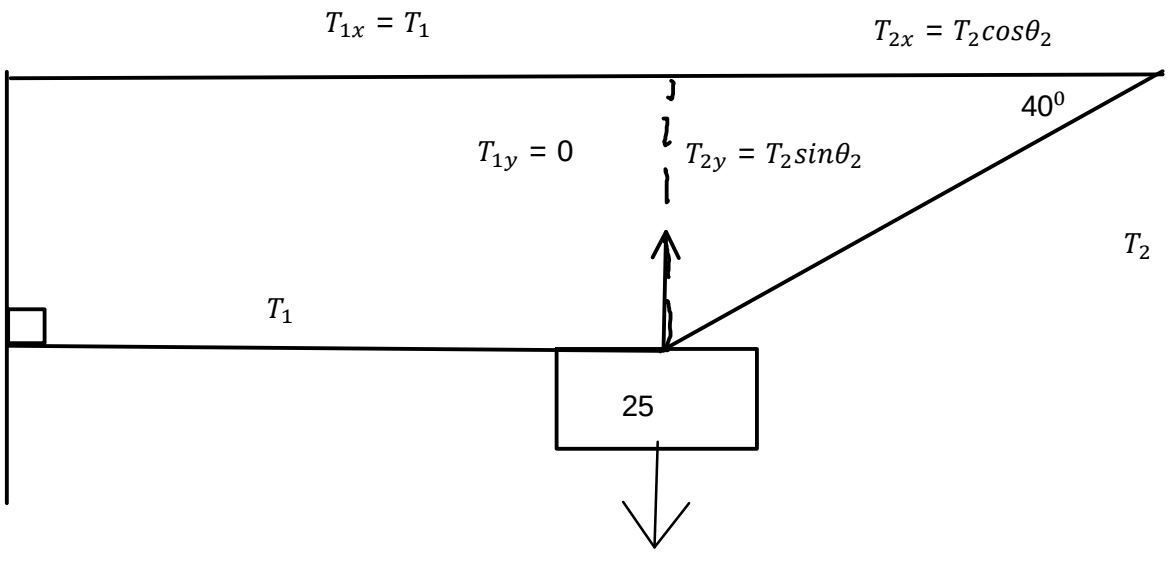
P12 - 4.1 - Equilibrium 90 Notes



Find the Tension in each string.



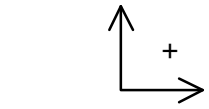
$F_g = mg$
$F_g = 25(9.8)$
$F_g = 245$

$T_{1x} = T_{2x}$
$T_1 = T_2 cos\theta_2$
$T_1 = T_2 cos40$

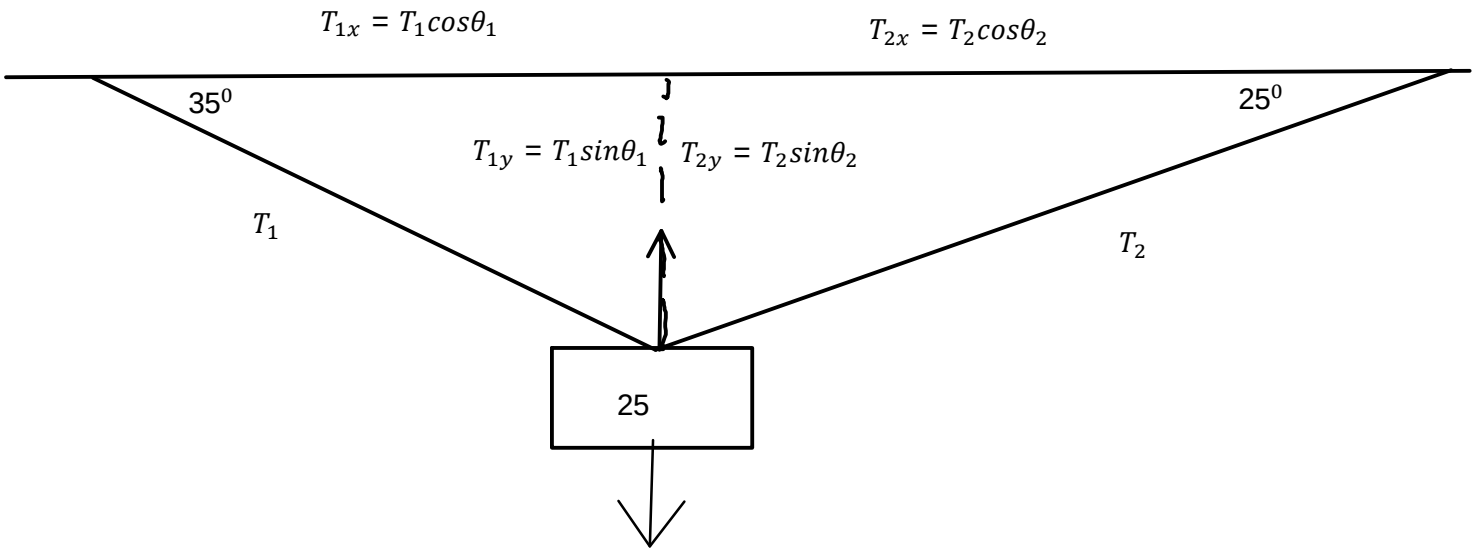
$T_2 = 381.5 cos40$
$T_1 = 291.98\ N$

$T_{1y} + T_{2y} = F_g$
$0 + T_2 sin\theta_2 = 245$
$T_2 sin40 = 245$
$0.6428\ T_2 = 245$
$T_2 = 381.15\ N$

P12 - 4.1 - Equilibrium Notes



Find the Tension in each string.



$F_g = mg$
$F_g = 25(9.8)$
$F_g = 245$

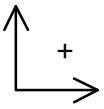
$$T_{1x} = T_{2x}$$
$$T_1 cos\theta_1 = T_2 cos\theta_2$$
$$T_1 cos35 = T_2 cos25$$
$$T_1 = \frac{T_2 cos25}{cos35}$$

$$T_{1y} + T_{2y} = F_g$$
$$T_1 sin\theta_1 + T_2 sin\theta_2 = 245$$
$$T_1 sin35 + T_2 sin25 = 245$$

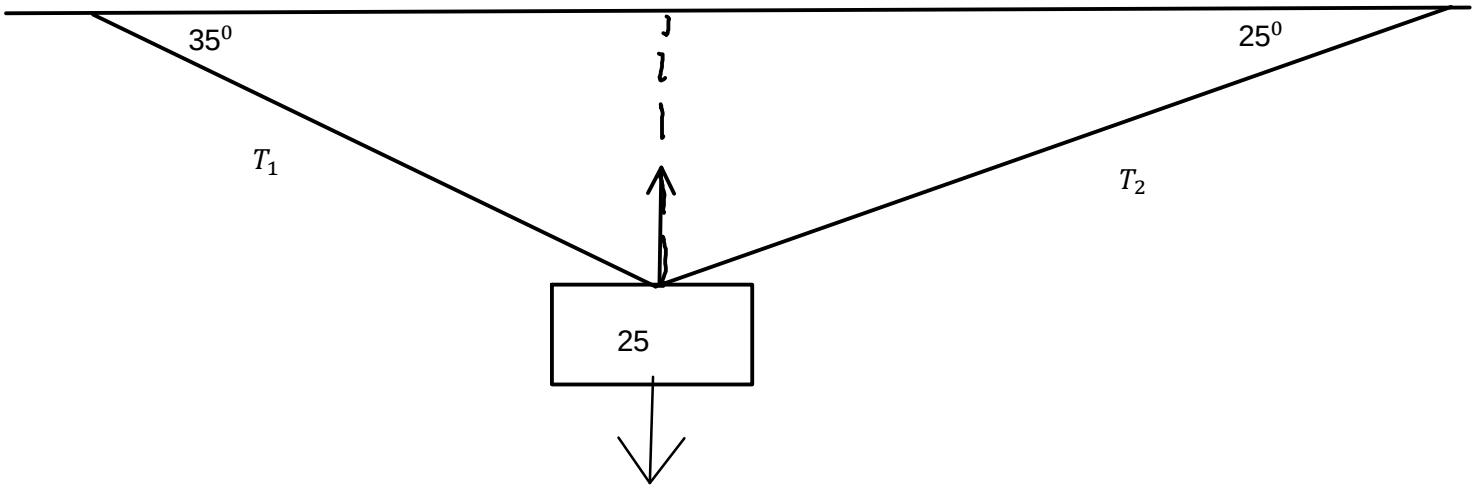
$$\left(\frac{T_2 cos25}{cos35}\right) sin35 + T_2 sin25 = 245$$
$$0.6346\, T_2 + 0.4226\, T_2 = 245$$
$$1.057\, T_2 = 245$$
$$T_2 = 231.74\ N$$

$$T_1 = \frac{(231.74) cos25}{cos35}$$
$$T_1 = 256.4\ N$$

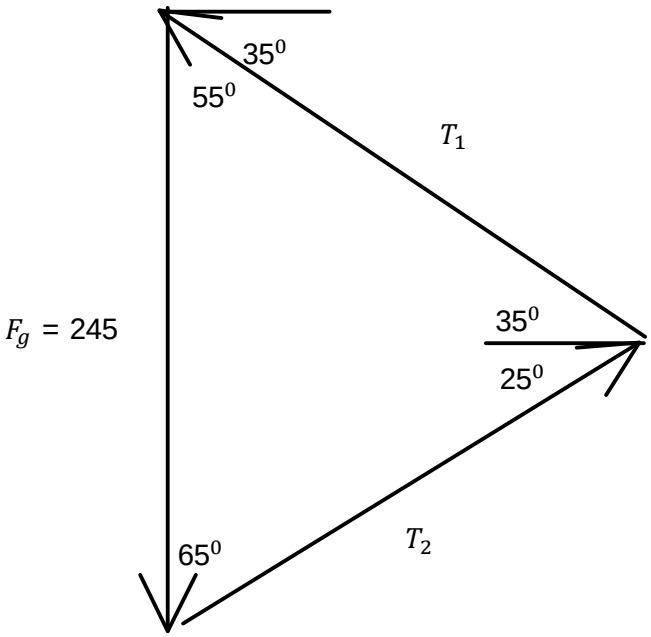
P12 - 4.1 - Equilibrium Vector Notes



Find the Tension in each string.



$F_g = mg$
$F_g = 25(9.8)$
$F_g = 245$



$$\frac{a}{sinA} = \frac{b}{sinB}$$

$$\frac{T_1}{sinT_1} = \frac{F_g}{sinF_g}$$

$$T_1 = \frac{F_g}{sinF_g} \times sinT_1$$

$$T_1 = \frac{245}{sin60} \times sin56$$

$$T_1 = 256.36\ N$$

$$\frac{T_2}{sinT_2} = \frac{F_g}{sinF_g}$$

$$T_2 = \frac{F_g}{sinF_g} \times sinT_2$$

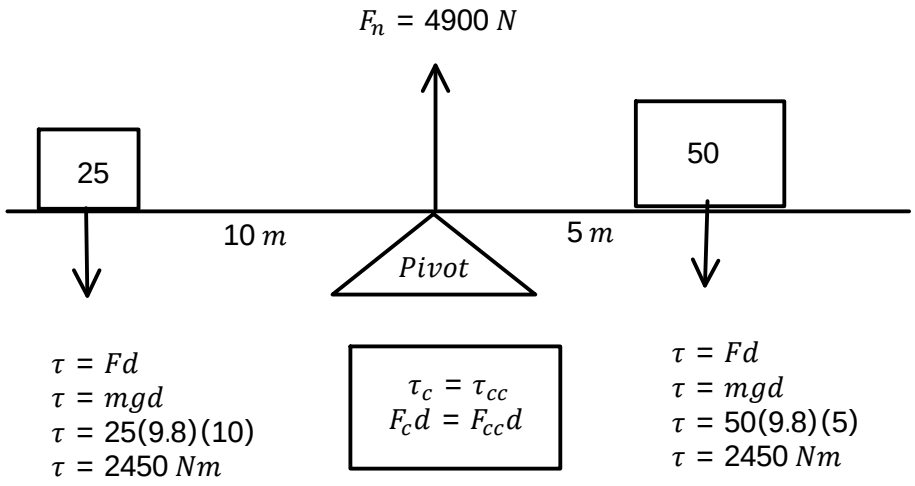
$$T_2 = \frac{245}{sin60} \times sin55$$

$$T_1 = 231.74\ N$$

P12 - 4.2 - Torque Teeter Wrench Notes

$\tau = Fd$ $\quad$ $Torque = Force\ perpendicular\ to\ distance\ from\ pivot$

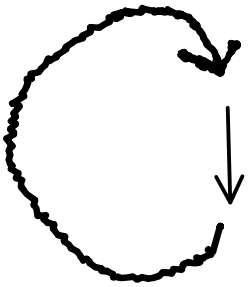
; $Fd = Newtons \times Meters = Nm$



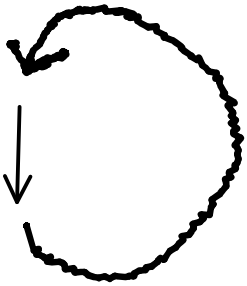
$\tau = Fd$
$\tau = mgd$
τ = 25(9.8)(10)
τ = 2450 Nm

$\tau_c = \tau_{cc}$
$F_c d = F_{cc} d$

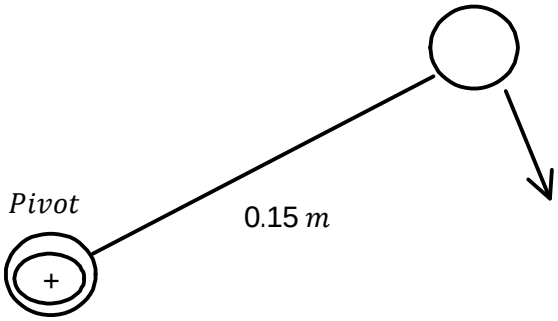
$\tau = Fd$
$\tau = mgd$
τ = 50(9.8)(5)
τ = 2450 Nm



$Clockwise\ Torque$ = $Counter-Clockwise\ Torque$



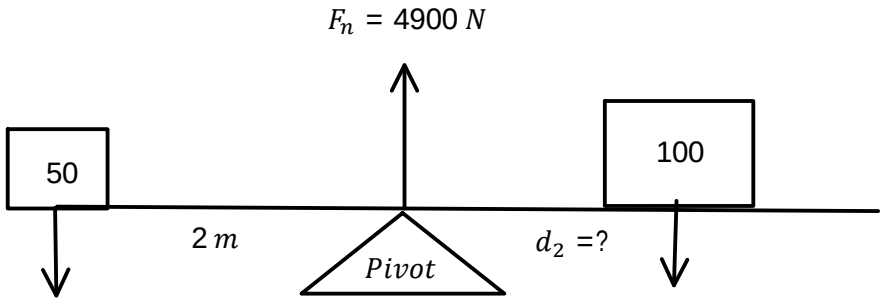
How much Torque can a 100 N *force do on a* 0.15 m *wrench*?



$\tau = Fd$
τ = 100(0.15)
τ = 15 Nm

P12 - 4.2 - Torque Tetter Notes

How far from the Pivot is the 100 *kg block so the system is in equilibrium? What is the upward force on the pivot?*



$F_{g1} = mg$
$F_{g1} = 50(9.8)$
$F_{g1} = 4900\ N$

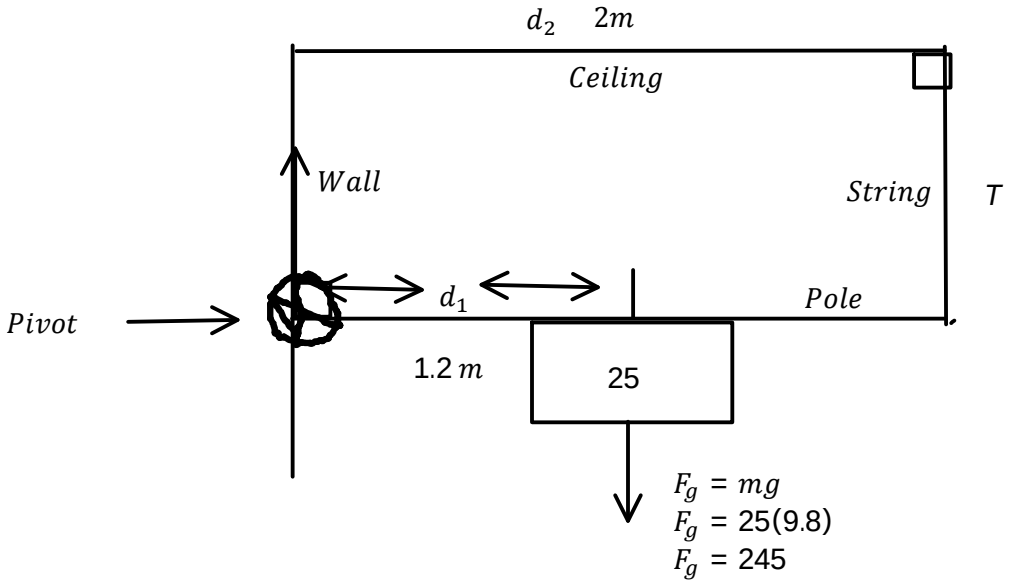
$F_{g2} = mg$
$F_{g2} = 100(9.8)$
$F_{g2} = 9800\ N$

$$\tau_c = \tau_{cc}$$
$$F_{g1}d_1 = F_{g2}d_2$$
$$d_2 = \frac{F_{g2}}{F_{g1}d_1}$$
$$d_2 = \frac{(9800)}{(4900)(2)}$$
$$d_2 = 1\ m$$

P12 - 4.2 - Torque Tension Notes

You choose the location of the Pivot

Find the Tension in the string. Ignore the mass of the pole.



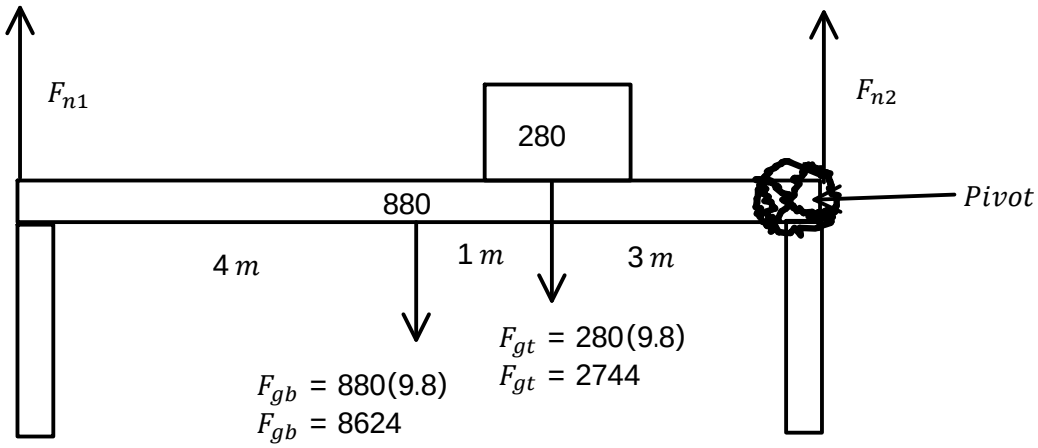
$$\tau_c = \tau_{cc}$$
$$F_g d = Td$$
$$mgd = Td$$
$$T = \frac{mgd}{d}$$
$$T = \frac{25(9.8)(1.2)}{2}$$
$$T = 147\ N$$

What is the force on the wall by the pole?

$$F_w + T = F_g$$
$$F_w = F_g - T$$
$$F_w = 245 - 147$$
$$F_w = 98\ N$$

P12 - 4.2 - Torque Notes

A 280 *kg tower is suspended on* 880 *kg bridge. Find the Force on each Pillar.*



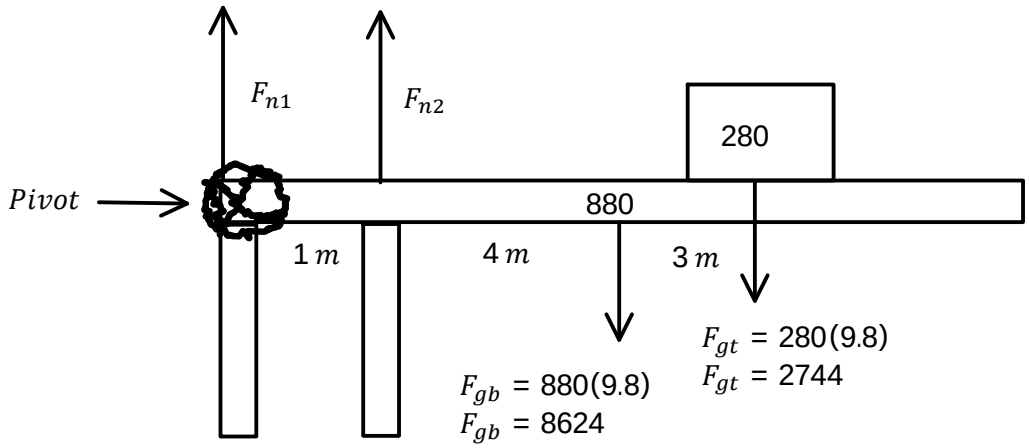
$$\tau_c = \tau_{cc} + \tau_{cc}$$
$$F_{n1}d_1 = F_{gb}d_b + F_{gt}d_t$$
$$F_{n1} = \frac{F_{gb}d_b + F_{gt}d_t}{d_1}$$
$$F_{n1} = \frac{(8624)(4) + (2744)(3)}{8}$$
$$F_{n1} = 5341\ N$$

The pivot force is not considered in this calculation

$$F_{n1} + F_{n2} = F_{gb} + F_{gt}$$
$$5341 + F_{n2} = 8624 + 2744$$
$$F_{n2} = 6027\ N$$

P12 - 4.2 - Torque Notes

A 2800 *kg tower is suspended on* 8800 *kg bridge. Find the Force on each Pillar.*



$$\tau_c = \tau_{cc} + \tau_{cc}$$
$$F_{n2}d_1 = F_{gb}d_b + F_{gt}d_t$$
$$F_{n2} = \frac{F_{gb}d_b + F_{gt}d_t}{d_2}$$
$$F_{n2} = \frac{(8624)(4) + (2744)(7)}{1}$$
$$F_{n2} = 53704\ N$$

The pivot force is not considered in this calculation

$$F_{n1} + F_{n2} = F_{gb} + F_{gt}$$
$$F_{n1} + 53704 = 8624 + 2744$$
$$F_{n2} = 6027\ N$$