

### Simple Static Equilibrium:

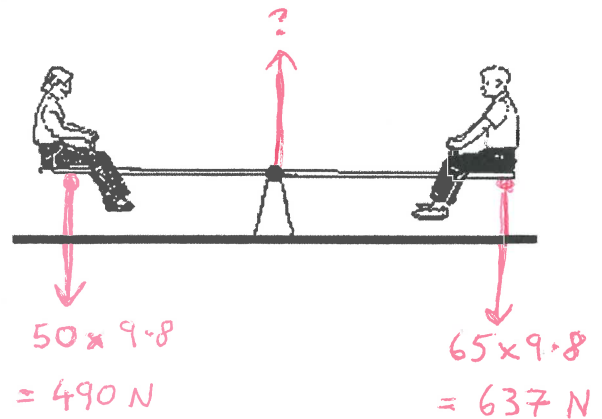
1. Two people are sitting on a see-saw. The person on the left weighs 50 kg while the person on the right weighs 65 kg. Calculate the magnitude of the reaction force at the pivot point.

$$\sum F_{up} = \sum F_{down}$$

$$\therefore F_{up} = 490 + 637$$

$$= 1127 \text{ N}$$

$$= \boxed{1.13 \times 10^3 \text{ N}}$$



2. A 2 kg sign is suspended by two wires from a wall and a beam. Find the magnitude of the tension in each wire.

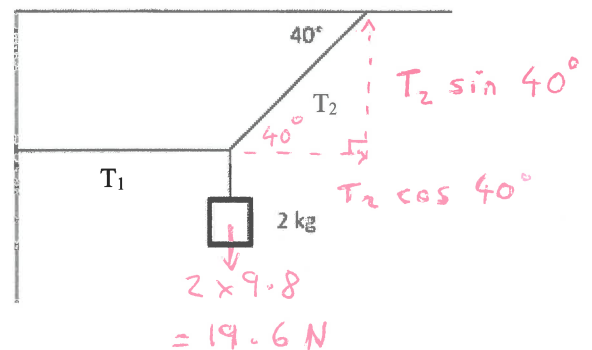
$$\sum F_{up} = \sum F_{down}$$

$$\therefore T_2 \sin 40^\circ = 19.6$$

$$\therefore T_2 = \frac{19.6}{\sin 40^\circ} = 30.49 \text{ N}$$

$$\sum F_{left} = \sum F_{right}$$

$$\begin{aligned} \therefore T_1 &= T_2 \cos 40^\circ \\ &= 30.49 \cos 40^\circ \\ &= 23.36 \text{ N} \end{aligned}$$

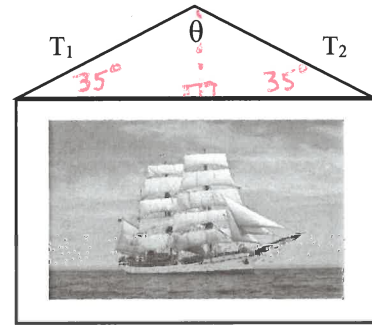


$$\therefore T_1 = 23.4 \text{ N}$$

&

$$T_2 = 30.5 \text{ N}$$

3. A picture is hung on the wall as shown. The string forms an isosceles triangle with  $\theta = 110^\circ$ . The picture weighs 1.50 kg. Find  $T_1$  &  $T_2$ :



⊛ By use of similar triangles,

$T_1$  &  $T_2$  are the same.

$\therefore T_1 = T_2$  (or by  $\sum F_L = \sum F_R$ ).

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$$\sum F_{up} = \sum F_{down}$$

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↓  
 $1.50 \times 9.8$   
 $= 14.7 \text{ N}$

$$\therefore T_1 \sin 35^\circ + T_2 \sin 35^\circ = 14.7 \quad (\text{Since } T_1 = T_2)$$

$$\therefore T_1 \sin 35^\circ + T_1 \sin 35^\circ = 14.7$$

$$\therefore 2 T_1 \sin 35^\circ = 14.7$$

$$\therefore T_1 = \frac{14.7}{2 \sin 35^\circ} = 12.8 \text{ N} = T_2$$

$$\therefore \boxed{T_1 = T_2 = 12.8 \text{ N}}$$