

Static Equilibrium

Dynamic equilibrium - the forces are balanced in a moving object; constant velocity

Static equilibrium - the forces are all balanced in a stationary object.

$\sum \vec{F} = 0$ (the sum of all the forces is zero)

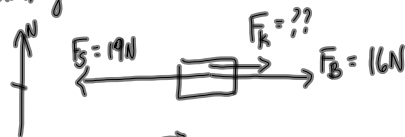
$\vec{F}_{net} = 0$

$\vec{F}_{x,net} = 0$
(all forces balance horizontally)

$\vec{F}_{y,net} = 0$
(all forces balance vertically)

SP (205 - FOP)

Bird's Eye View



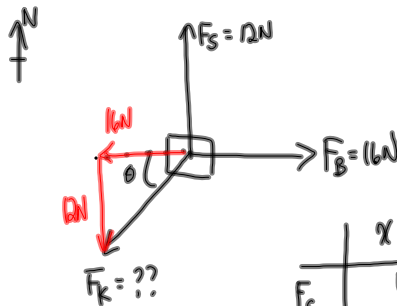
$\vec{F}_{net} = 0$

$F_K + F_B - F_S = 0$

$F_K + 16N - 19N = 0$

$F_K = 3N$

$\vec{F}_K = 3N [E]$

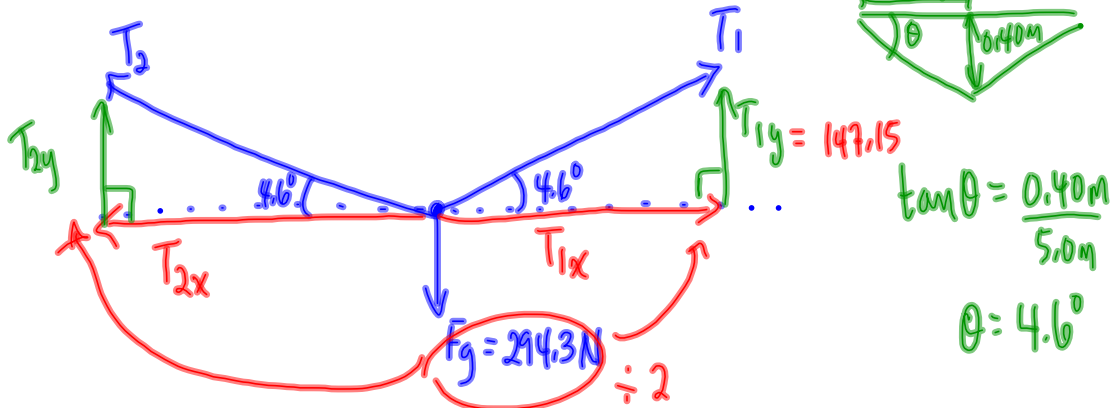


	x	y
F_S	0	12N
F_B	16N	0
F_K	-16N	-12N
F_{net}	0	0

$c^2 = a^2 + b^2$
 $c = (12N)^2 + (16N)^2$
 $c = 20N$

$\tan \theta = \frac{opp}{adj}$
 $\tan \theta = \frac{12N}{16N}$
 $\theta = 37^\circ$
 $\vec{F}_K = 20N [W37^\circ S]$

SP3 (p207 - FOP)



Vertically:

$$T_{1y} + T_{2y} = F_g$$

$$T_1 \sin 4.6^\circ + T_2 \sin 4.6^\circ = 294.3\text{N}$$

Horizontally:

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

$$T_1 \cancel{\cos 4.6^\circ} = T_2 \cancel{\cos 4.6^\circ}$$

(cancel $\cos 4.6^\circ$
due symmetry)

$$T_1 = T_2$$

$$T_2 \sin 4.6^\circ + T_2 \sin 4.6^\circ = 294.3\text{N}$$

$$2T_2 \sin 4.6^\circ = 294.3\text{N}$$

$$T_2 = \frac{294.3\text{N}}{2 \sin 4.6^\circ}$$

$$T_2 = 1.8 \times 10^3\text{N}$$

$$T_1 = 1.8 \times 10^3\text{N}$$