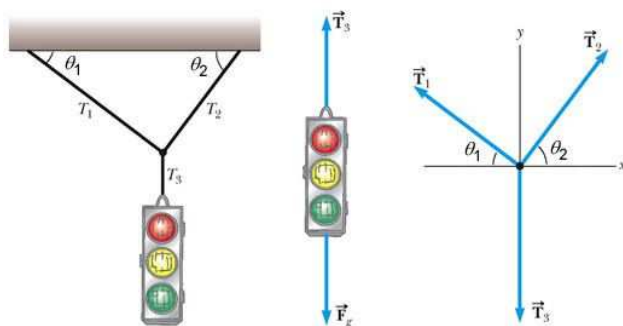


### PH 105-3 Quiz 4: Newton's Laws

A traffic light weighing 123 N hangs from a cable tied to two other cables fastened to a support, as in the figure below. The upper cables make angles of  $\theta_1 = 40^\circ$  and  $\theta_2 = 50^\circ$  with the horizontal.



1. What is the magnitude of  $\vec{T}_3$ ? Hint: draw the free body diagram for the traffic light and cable 3 alone.

1.  154 N
2.  123 N
3.  60 N
4.  79 N

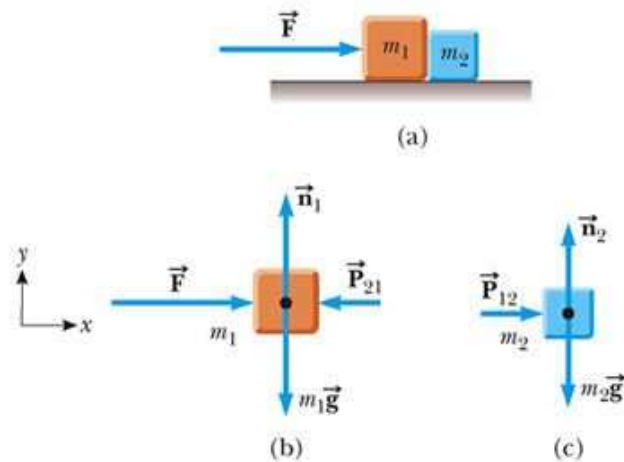
2. Which is the sum of the forces in the **x direction** at the point where all three cables meet?

1.   $T_1 \cos 50^\circ - T_2 \cos 40^\circ$
2.   $T_2 \sin 50^\circ - T_1 \sin 40^\circ$
3.   $T_2 \cos 50^\circ - T_1 \cos 40^\circ$
4.   $T_1 \sin 40^\circ + T_2 \sin 50^\circ$

3. Which is the sum of the forces in the **y direction** at the point where all three cables meet?

1.   $T_1 \cos 50^\circ - T_2 \cos 40^\circ - 123\text{N}$
2.   $T_2 \sin 50^\circ - T_1 \sin 40^\circ - 123\text{N}$
3.   $T_2 \cos 50^\circ - T_1 \cos 40^\circ + 123\text{N}$
4.   $T_1 \sin 40^\circ + T_2 \sin 50^\circ - 123\text{N}$

Two blocks of masses  $m_1$  and  $m_2$  ( $m_1 > m_2$ ) are placed in contact on a horizontal, frictionless surface, as shown in the figure below. A constant horizontal force of  $\vec{F} = 115\text{N}$  is applied to  $m_1$  as shown.



4. If  $m_1 = 15\text{kg}$  and  $m_2 = 10\text{kg}$ , find the magnitude of the acceleration of the system of two blocks.

1.   $113\text{m/s}^2$
2.   $4.6\text{m/s}^2$
3.   $9.2\text{m/s}^2$
4.   $1.5\text{m/s}^2$

5. Newton's third law dictates that  $P_{12} = P_{21}$ . What is the magnitude of  $P_{12}$ ?

1.   $69\text{N}$
2.   $113\text{N}$
3.   $92\text{N}$
4.   $46\text{N}$