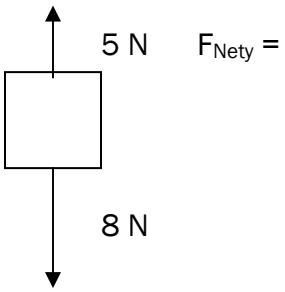
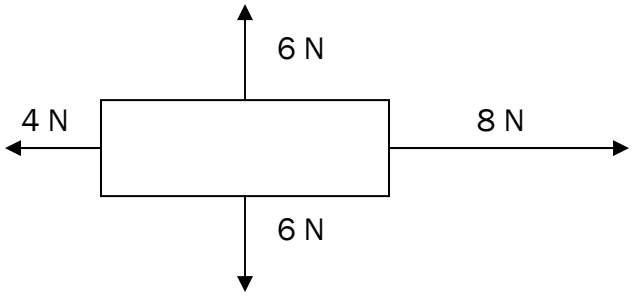
The Net Force is the sum of forces acting in a specific direction. We will examine systems to determine the net force for objects in equilibrium and objects undergoing acceleration.

Example #1: Horizontal and Vertical Forces



F_{Nety} =

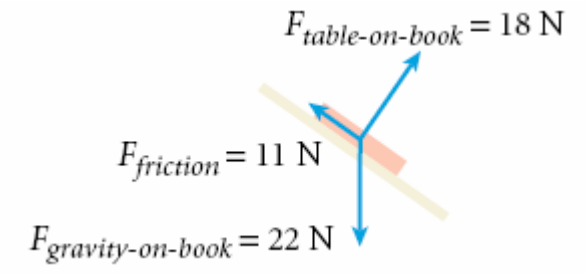


F_{Nety} = F_{Netx} =

Is there any acceleration in either of the above examples? _____

Example #2: Forces acting at an angle

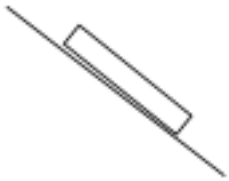
Derek leaves his physics book on top of a drafting table that is inclined at a 35° angle. The free-body diagram at right shows the forces acting on the book. Find the net force acting on the book.



Determine the Net Force in the x-direction (parallel to place of motion)

Redraw the system above and add the component vectors. Label all vectors

Determine the Net Force in the y-direction (perpendicular to place of motion)



NAME _____ DATE _____ CLASS _____

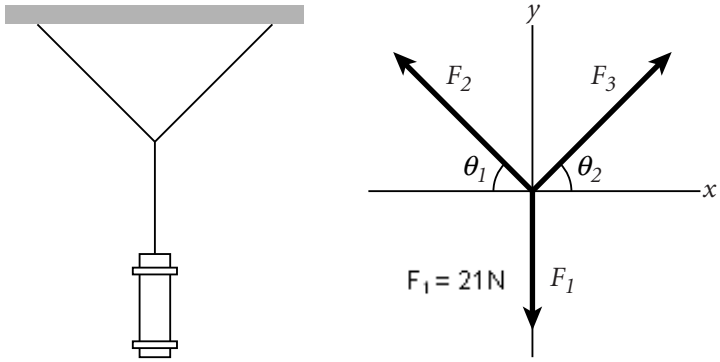
Forces and the Laws of Motion

HOLT PHYSICS

Diagram Skills

Newton's First Law

A lantern of mass *m* is suspended by a string that is tied to two other strings, as shown in the figure below. The free-body diagram shows the forces exerted by the three strings on the knot.



1. In terms of $\mathbf{F_1}$, $\mathbf{F_2}$, and $\mathbf{F_3}$, what is the net force acting on the knot? (Hint: The lantern is in equilibrium.)

_____

2. Find the magnitudes of the *x* and *y* components for each force acting on the knot. (Assume the positive directions are to the right and up.)

String 1 (F_1) *x* component _____ *y* component _____

String 2 (F_2) *x* component _____ *y* component _____

String 3 (F_3) *x* component _____ *y* component _____

3. In terms of F_1, F_2, and F_3, what is the magnitudes of the net force acting on the knot in the *x* direction? in the *y* direction?

$F_{x\,net}$ = _____

$F_{y\,net}$ = _____

4. Assume that $\theta_1 = 30°$, $\theta_2 = 30°$, and the mass of the lantern is 2.1 kg. Find F_1, F_2, and F_3.

F_1 = $F_1 = mg = (2.1\ kg)(9.8 m/s^2) = 20.58N = 21N$

F_2 = _____

F_3 = _____