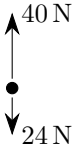
Name: Date: Period:

Net Force and Free-Body Diagrams

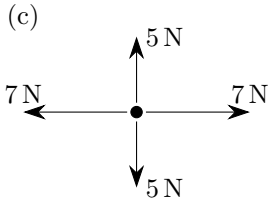
1. In each of the free-body diagrams below, calculate the **magnitude** and **direction** of the net force and draw it.

(a)

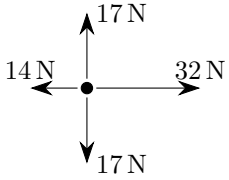
(b)



(c)

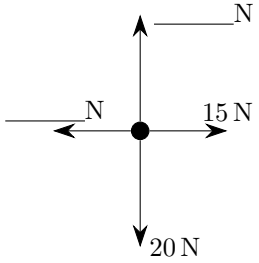


(d)



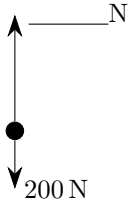
2. In each of the free-body diagrams below, the net force is given, but one or more of the applied forces is missing. Find the missing forces.

(a)



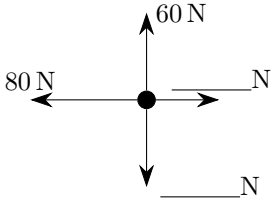
$\Sigma\vec{F} = 0\,\text{N}$

(b)



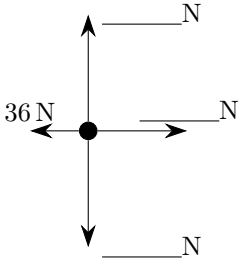
$\Sigma\vec{F} = 150\,\text{N, up}$

(c)



$\Sigma\vec{F} = 45\,\text{N, left}$

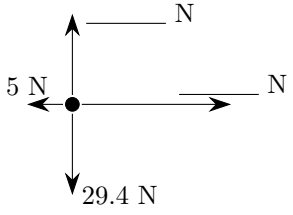
(d)



$\Sigma\vec{F} = 23\,\text{N, right}$

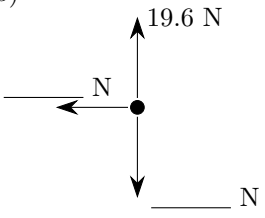
3. Fill in the blanks in each of the situations depicted below. Draw the net force.

(a)



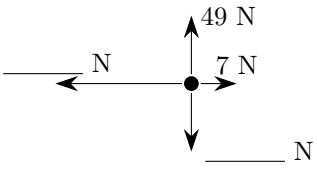
$m =$ 3 kg
$a =$ _____ m/s^2, _____
$\Sigma\vec{F} =$ 23 N, right

(b)



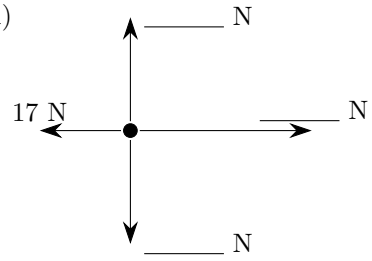
$m =$ 2 kg
$a =$ 8 m/s^2, left
$\Sigma\vec{F} =$ _____ N, _____

(c)



$m =$ 5 kg
$a =$ 12 m/s^2, left
$\Sigma\vec{F} =$ _____ N, _____

(d)



$m =$ 3 kg
$a =$ 18 m/s^2, right
$\Sigma\vec{F} =$ _____ N, _____

4. For each of the sketches below, identify all the forces applied on all objects and draw a free body diagram. Then come up with an expression for the net force.

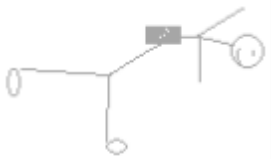
(a) Lamp hanging from a chain

(b) A car moving at a constant speed.

(c) A car accelerating

(d) A box being pushed forward on the ground (constant speed)

(e) A skydiver before opening her parachute



(f) Object sliding down an inclined plane.