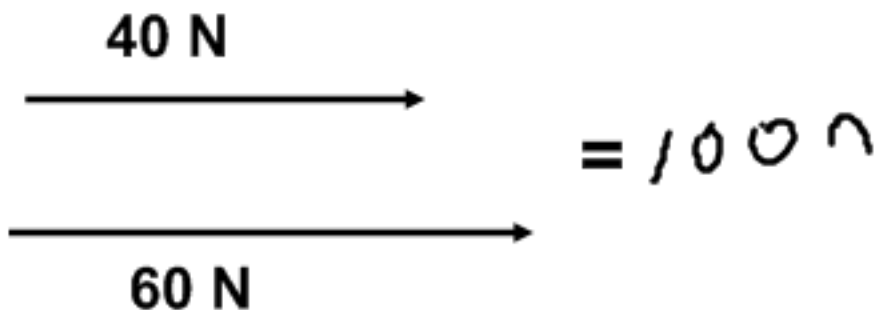
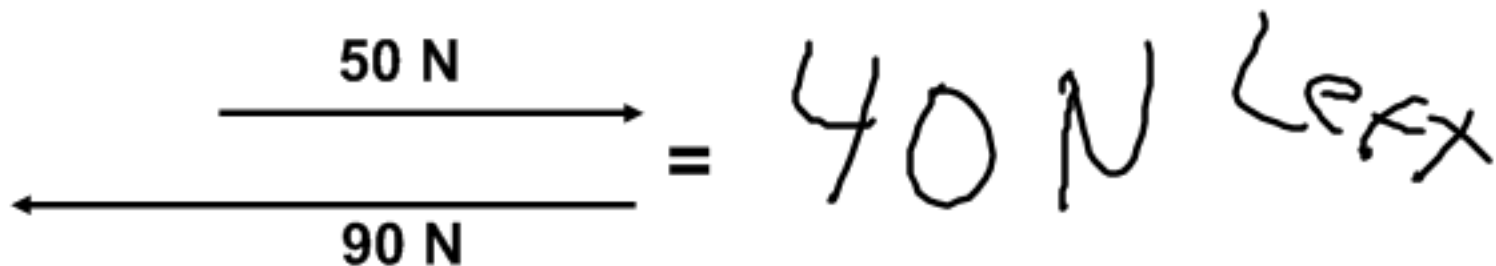


# Finding Net Force:

If forces going the same direction, ....



If forces are going opposite directions, ...



What force is required to accelerate a 25 kg object at 3.5 m/s/s?

$F: ?$

$$F = m a$$

$$F = 25 \text{ (kg)}$$

$m: 25 \text{ kg}$

$a: 3.5 \text{ m/s}^2$

$$F = 87.5 \text{ N}$$

A force of 280 N is applied to a 20 kg object. Find the acceleration of the object.

$$\begin{aligned} F &= 280 \text{ N} \\ m &= 20 \text{ kg} \\ a &= ? \end{aligned}$$

$$F = \frac{m a}{m}$$

$$\frac{F}{m} = a$$

$$\frac{280}{20} = 14 \text{ m/s}^2$$

A force of 500 N is applied to a 45 kg object. What is the rate of acceleration of the object?

$$\begin{aligned} F &= 500 \text{ n} \\ m &= 45 \text{ kg} \\ a &= ? \\ &0 \end{aligned}$$

$$\begin{aligned} F &= ma \\ \frac{F}{m} &= \frac{ma}{m} \end{aligned}$$

$$\frac{F}{m/a}$$

$$\frac{500 \text{ n}}{45 \text{ kg}}$$
$$a = 11.1 \text{ m/s}^2$$

A car has a mass of 2400 kg. How much does the car weigh?

$$F_g = ?$$

$$M = 2400 \text{ kg}$$

$$g = 9.80$$

$$F_g = 2400 \cdot 9.8$$

$$F_g = 23520 \text{ N}$$

Determine the mass of a 3000 N boulder.

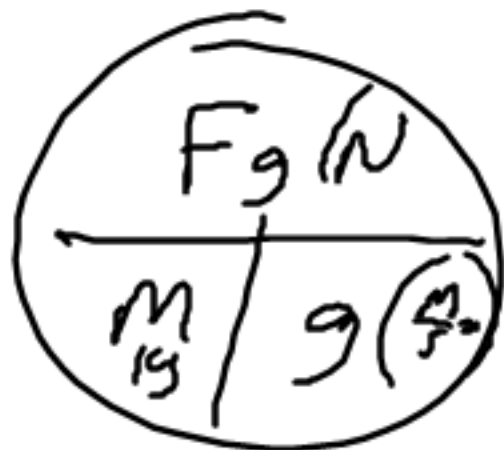
$$m = ?$$

$$F_g = 3000$$

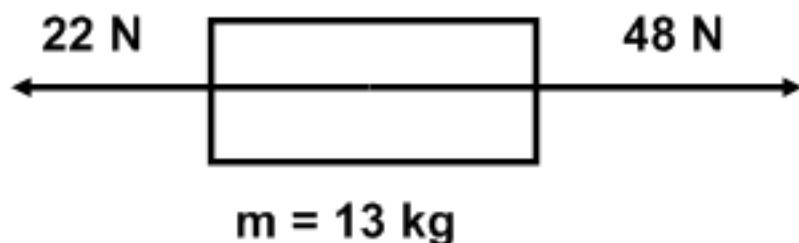
$$g = 9.80$$

$$m = 306.1 \text{ kg}$$

$$\frac{F_g}{g} = \frac{m \times g}{g}$$



Find the unknown:



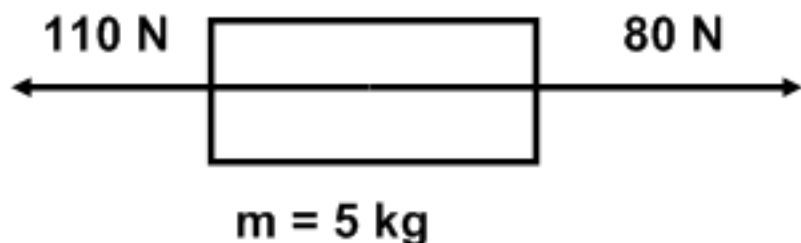
$$a = ?$$

$$F = 26$$
$$m = 13 \text{ kg}$$
$$a = ?$$

$$a = \frac{F}{m}$$
$$a = \frac{26}{13}$$

$$a = 2 \text{ m/s}^2 \rightarrow$$

Find the unknown:



$$F = 30 \text{ N}$$
$$m = 5 \text{ kg}$$
$$a = ?$$

$$F = m \times a$$
$$\frac{F}{m} = a$$

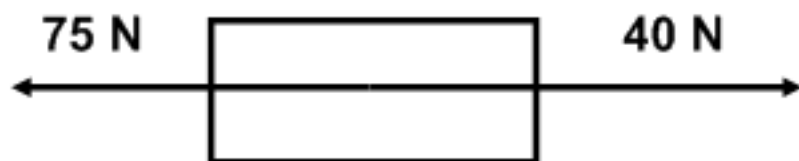
$$a = ?$$

$$a = \frac{F}{m}$$

$$\frac{30}{5} = 6 \text{ m/s}^2 \text{ left}$$



Find the unknown:



$$m = ?$$

$$a = 5 \text{ m/s/s Left}$$

35

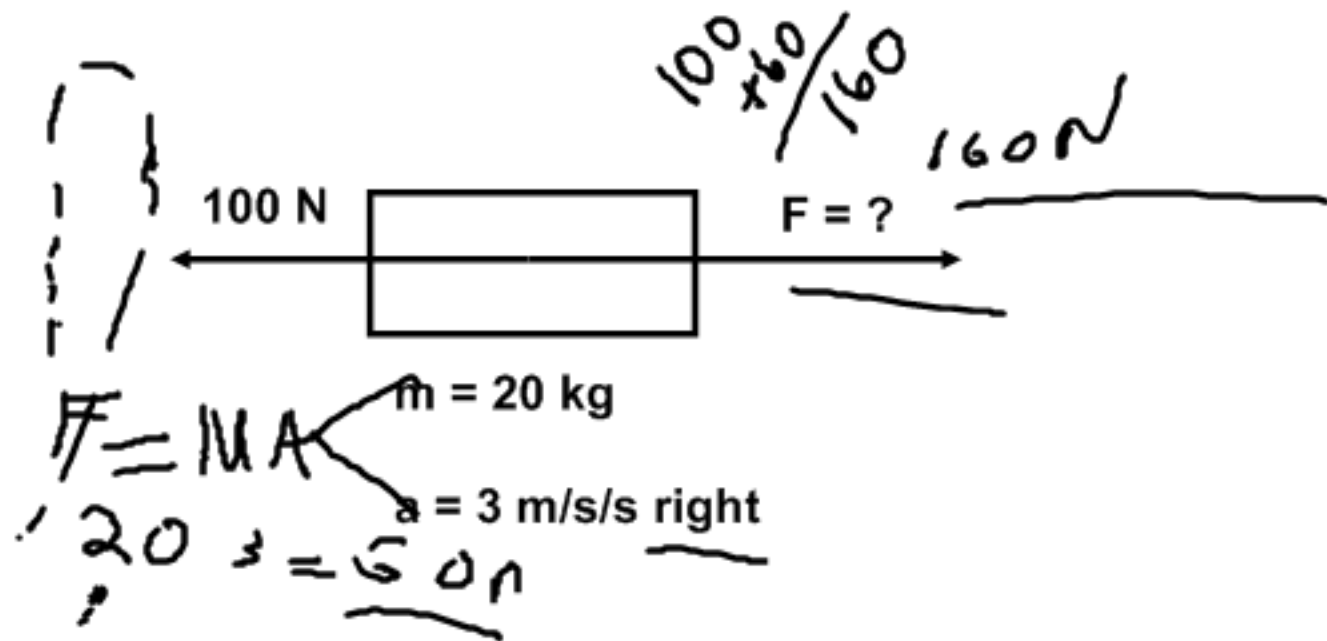
$$m = ?$$

$$a = 5 \quad \frac{35}{5}$$

$$\frac{F}{a} = m \quad a = 7 \text{ m/s}^2$$

kg

Find the unknown:



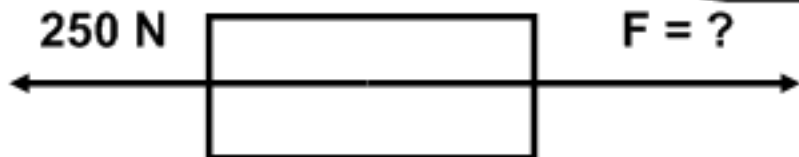
Find the unknown:

$$\begin{array}{r} 250 \\ - 205 \\ \hline 45 \text{ N} \end{array}$$

$$F = ma$$
$$a = \frac{F}{m} = \frac{45}{15}$$
$$a = 3 \text{ m/s}^2$$

$$F = ma$$

$$F = 15(3) = 45$$



$m = 15 \text{ kg}$

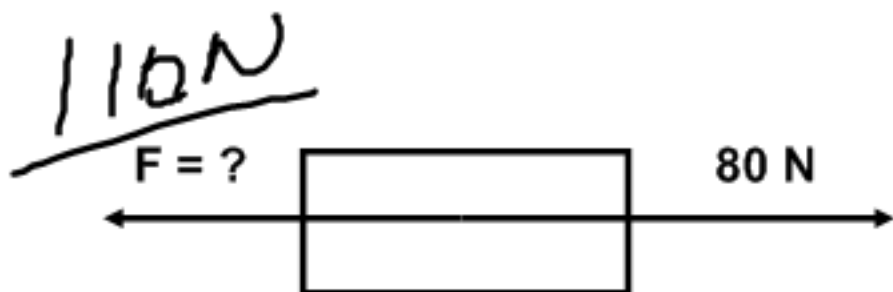
$a = 3 \text{ m/s}^2 \text{ left}$

205 N

$$\begin{array}{r} 250 \\ - 45 \\ \hline 205 \end{array}$$

Find the unknown:

$$\frac{30\text{ N}}{10}$$
$$3\frac{\text{m}}{\text{s}^2}$$

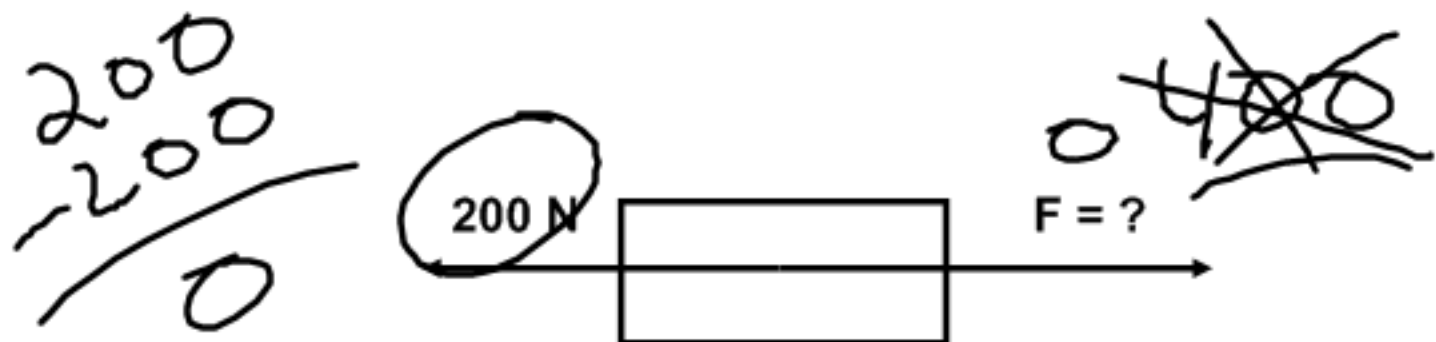


$$F < \begin{cases} m = 10 \text{ kg} \\ a = 3 \text{ m/s/s left} \end{cases}$$

$$F = 30\text{ N}$$

$$\begin{array}{r} 80 \\ + 30 \\ \hline 110 \end{array}$$

Find the unknown:



$F$   $\leftarrow$   $m = 20 \text{ kg}$   
 $a = 10 \text{ m/s/s left}$

$$F = 200 \text{ N}$$

Find the unknown:

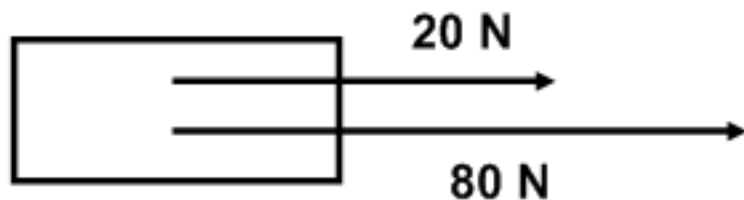
$$F = 100 \text{ N}$$

$$F = ma$$

$$a = \frac{F}{m}$$

$$= \frac{100 \text{ N}}{20 \text{ kg}}$$

$$a = 5 \text{ m/s}^2$$



$$m = 20 \text{ kg}$$

$$a = ?$$

Find the unknown:

30 N Left



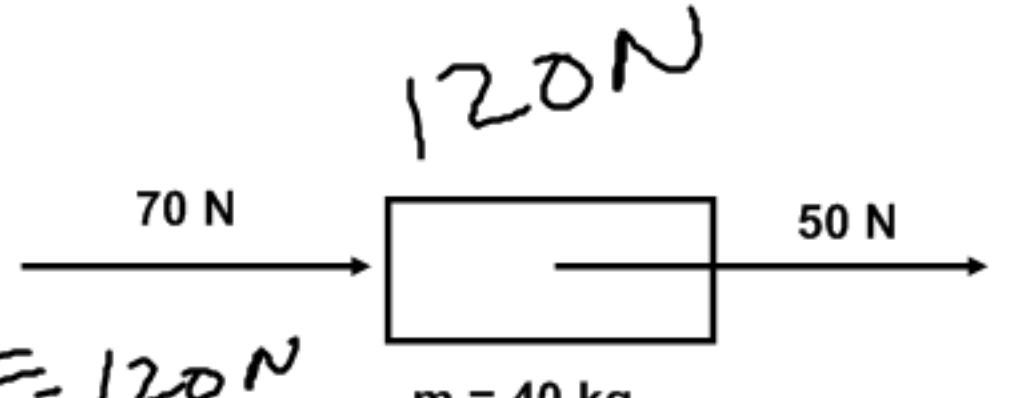
$$F = ma$$

$$m = 10 \text{ kg}$$

$$a = ?$$

$$a = \frac{F}{m} = \frac{30}{10} = 3 \text{ m/s}^2 \text{ Left}$$

Find the unknown:



A diagram showing a rectangular block with a mass  $m = 40 \text{ kg}$ . A force of  $70 \text{ N}$  is applied to the left side of the block, pointing to the right. A force of  $50 \text{ N}$  is applied to the right side of the block, pointing to the right. Above the block, the value  $120 \text{ N}$  is written, representing the net force.

Handwritten notes and calculations:

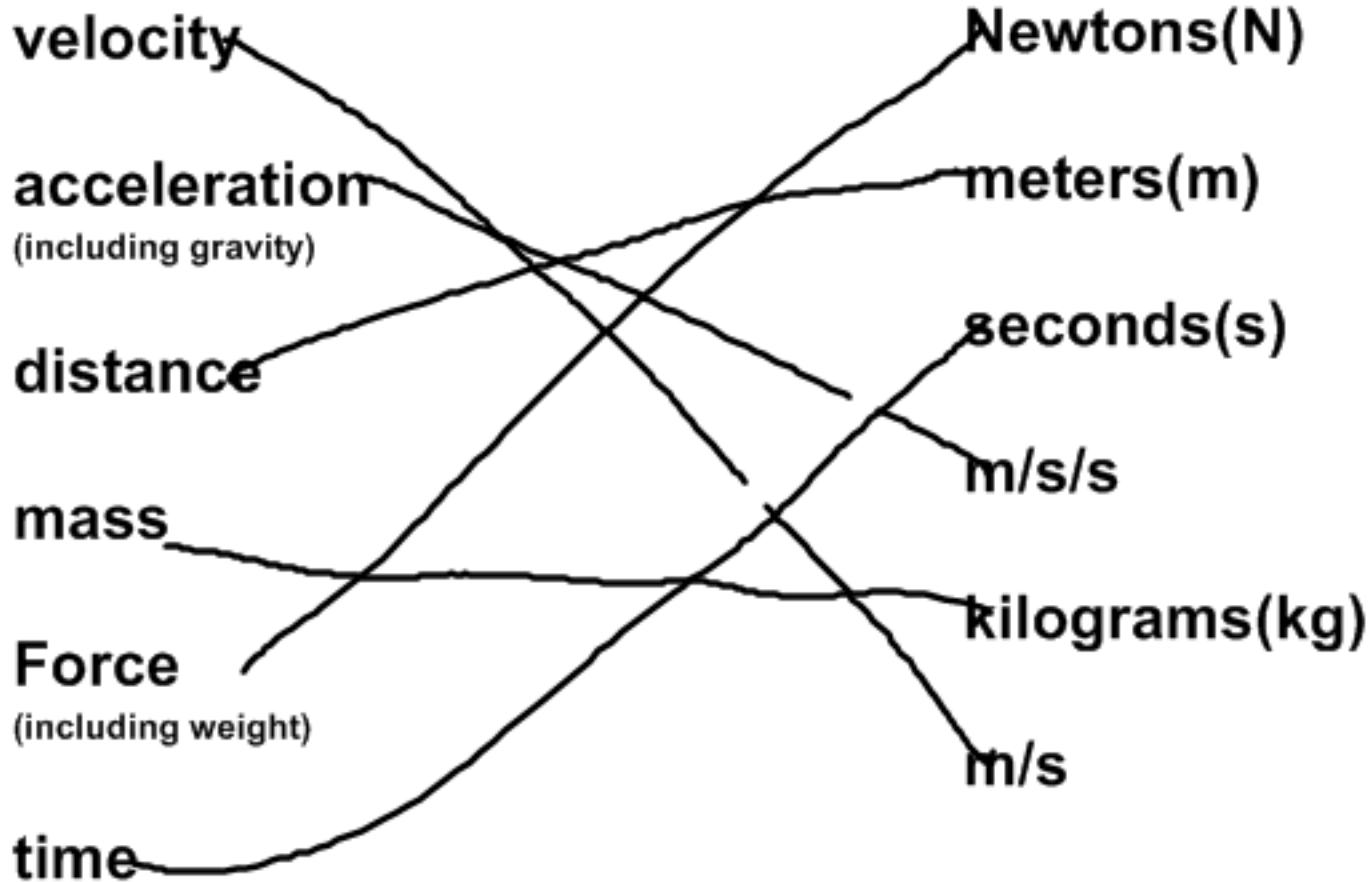
$F = 120 \text{ N}$   
 $m = 40 \text{ kg}$   
 $a = ?$

$$\frac{F}{m} = \frac{Ma}{m} = \frac{F}{m} = \frac{120}{40}$$

$a = 3 \frac{1}{5} \text{ m/s}^2$



# Match the following:



# Match the following:

Newton's 1st Law

Newton's 2nd Law

Newton's 3rd Law

Newton's Law of  
Universal Gravitation

Law that relates force, mass and acceleration in the equation  $F = ma$

Law that states that any 2 objects have a force of attraction between them!!

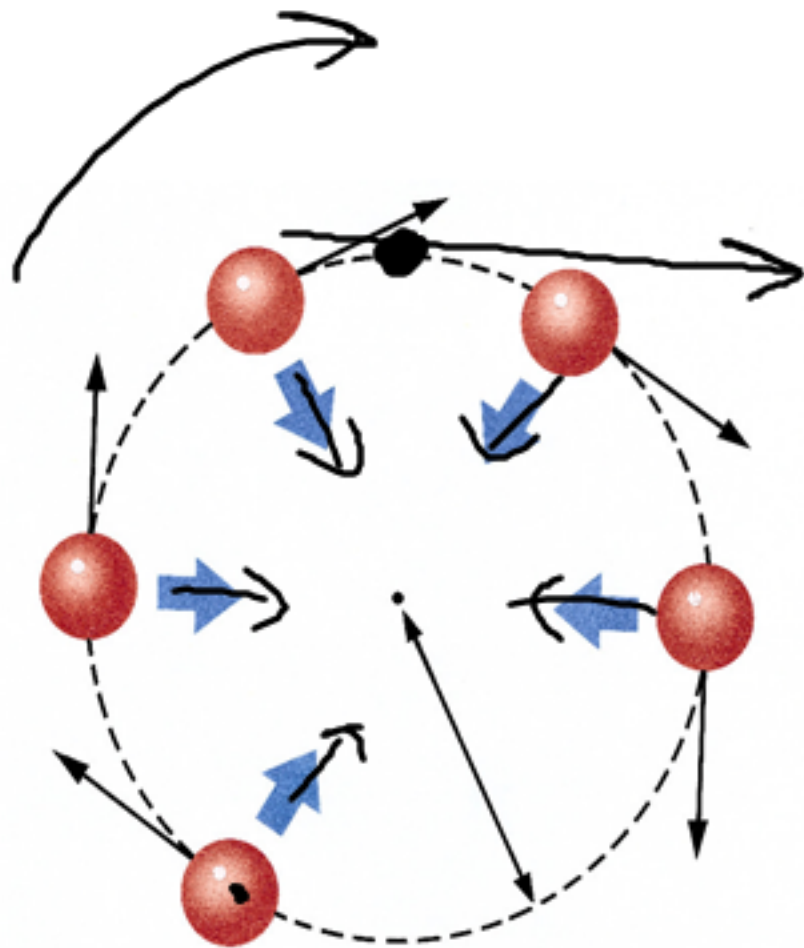
Law that states that an object at rest will remain at rest and an object in motion will remain in motion unless acted on by some unbalanced force!

Law that states for every action, there is an equal but opposite reaction!!

This man is twirling a rubber stopper at a constant speed in a horizontal path around his head. Is the velocity constant? Is the object accelerating? What happens when he lets go?



<http://www.practicalphysics.org/ImageLibrary/peg4001083.jpg>



<http://www.dkmages.com/discover/previews/831/20114114.JPG>

