Force: A push or a pull.

What are some different forces?

push
gravity
pull
friction
air resistance
pressure
magnets
electrical

Forces are measured in Newtons.

$$1\ N = 1\ \frac{kg\ m}{s^2}$$

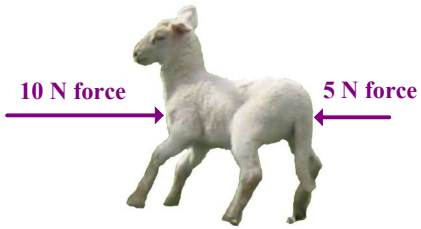
1 Newton of force is approximately equal to the force on your hand when you hold 100 ml of water.

A can of soda contains contains 355 ml, so the force on your hand from a full can of soda is approximately 3.5 Newtons.

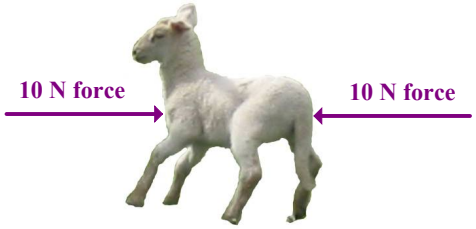
Newton's 3 Laws of Motion

1. An object moving in a straight line will continue moving in a straight line, unless acted on by an unbalanced force. Also, an object at rest will stay at rest unless acted on by an unbalanced force. The word for this is inertia.

Unbalaned force: There are forces on the object that do not add up to zero. There is a net force on the object.



Balanced forces: There are forces on the object, but they cancel each other out and add up to zero. The net force is zero, so there is no net force on the object.



Inertia: the resistance an object has to a change in its velocity

Inertia is measured with mass. Something with a large mass has a lot of inertia, something with a small mass has little inertia.

For example, it is easy to change the velocity of a shopping cart by pushing it. It is difficult to change the velocity of a school bus by pushing it.

2. Net force will cause a change in the motion of an object. The change in motion depends on the amount of force and the mass of the object. There is a formula for this F=ma (force equals mass times acceleration).

Important: Force causes acceleration, it does not cause motion.

Mass is measured in kilograms.

Example problem:

How much force must be exerted on a box with a mass of 70kg in order to accelerate it at 3 m/s^2?

$F = m\ a$

$F = (70\ kg)\ (3\ m/s^2)$

$F = 210\ kg\ m/s^2$

$F = 210\ N$

3. For each action, there is an equal and opposite reaction.

Summary:

A force is a push or a pull.

Newton's 3 laws

1. **Force is required to change velocity.**
2. **F=ma**
3. **For every action there is an equal and opposite reaction.**