MAY THE FORCE BE WITH YOU!

What is a Force?

A **force** is a push or pull resulting from the object's *interaction* with another object. Whenever there is an *interaction* between two objects, there is a force upon each of the object. All forces (interactions) between objects can be placed into two broad categories: (a) contact forces, and (b) forces resulting from action-at-a-distance.

Contact forces are those types of forces that result when the two interacting objects are perceived to be physically in contact with each other such as frictional forces, air resistance and applied forces.

Action-at-a-distance forces are those types of forces that result even when the two interacting objects are not in physical contact with each other, yet are able to exert a push or pull despite their physical separation such as gravitational forces.

Representing Forces

Force is measured in Newtons (N) where 1 N is equal to 1 kg·m/s². It is a vector quantity with both magnitude and direction. Therefore, vector arrows are used to represent them. These representations are called "free-body diagrams" or FBD's.

For example, a rightward force of 10 N is applied on an object that is initially at rest on a horizontal surface. As a result, a 5-N friction force is experienced between the surfaces in contact. Sketch an FBD for the situation and determine the net force acting on the object.



The choice of coordinates is important. By convention, let us choose rightward forces as positive and leftward forces as negative. Similarly, upward is positive and downward is negative.

The net force is the sum of all the forces acting on an object that changes its state of rest or motion. In the example above, the net force is given by the expression $F_T = F_A + F_f$ where F_T is the net force, F_A is the applied force and F_f is the friction force.

Therefore, $F_T = 10 \text{ N} + (-5 \text{ N}) = 5 \text{ N}$

The net force is 5 N to the right which means that the object will accelerate to the right. Notice that the direction of the net force is the direction of the greater force.

Source: <u>www.physicsclassroom.com</u>

LET'S PRACTICE!

Find the net force acting on the object then describe what will happen to the object given the magnitude and direction of the net force.

