

Forces : Notes-10

Basic Definitions

Mass - It is the quantity of matter. Units are in kilograms (kg).

Force - It is a push or a pull. Units are in newtons (N).

Gravity - It is the force of attraction between any two objects. Units are in Newtons (N).

Weight - It is the force of gravity acting on an object. Units are in Newtons (N).

Friction - It is a force which resists motion. Units are in Newtons (N).

Speed - It is the rate of change of distance per unit time. Units are meters/second (m/s).

Acceleration - It is the rate of change of speed. Units are in (m/s²).

Net Force - It is the sum of all of the forces acting on a body. (units are in Newtons).

Effects of Forces

An object may have one or more forces acting on it. The sum of these forces is called the **net force**.

If the net force acting on an object is zero, the speed of the object is equal to zero or some constant.

If the net force is **not** zero, then one or more of the following things can happen;

the speed may change,

the direction of motion may change,

or the shape of the object may change.

Gravity

The force of gravity of the Earth will cause objects to accelerate downward with an acceleration of 9.8 m/s^2 . This means that the speed of the object increases at a rate of 9.8 m/s every second.

The force of gravity on Earth (weight) is given by the equation:

$$F = 9.8 \bullet \text{mass}$$

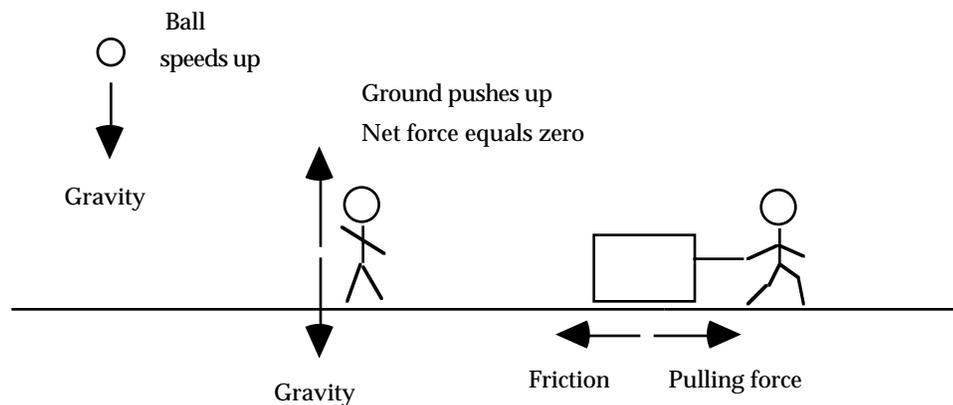
For the moon, the force of gravity (weight) is:

$$F = 1.6 \bullet \text{mass}$$

The force of gravity is smaller on the moon because the moon has a smaller mass.

It is important to note that the mass of an object doesn't change. It is the same everywhere.

Examples:



In the first diagram above, the net force on the ball is NOT zero, so the ball's speed changes. In the second diagram, the boy has TWO forces acting on him; gravity acting down, and an equal but opposite force which the ground exerts upward on him. In this case, the net force IS equal to zero, and his speed (zero) doesn't change. In the third diagram, the boy pulls a box to the right with a (+) force. An equal, but opposite (-) force of friction also acts on the box. The net force is zero, so the speed of the box is constant.