Forces

Class 9

Physics

Force: a push or pull

Newton's Laws of Motion:

1. If an object is at rest, or is moving in a steady speed in a straight line, it will continue to do so until an external resultant force acts on it
2. If an object of constant mass has a resultant force acting on itt, it will accelerate in the direction of the force

$$F = ma$$

3. Every action has an opposite and equal reaction

However, certain conditions have to apply for this law to be obeyed:

- The forces have to act on different bodies
- The forces have to be equal in magnitude
- The forces have to be opposite in direction
- Forces have to be in the same line of action

Some common types of forces are:

- Weight
- Tension
- Contact force
- Friction
- Air resistance/viscous force
- Magnetic force
- Electric force

Resultant force is the unbalanced force

Q. the sliding frictional force between of a box of mass 4 kg and the floor is 15 N. it is pushed across the floor with a constant force such that it accelerates at 0.8 m/s^2 .

a) What is the force applied to the box?

$F = ma$

$F - f = ma$

$F = f + ma$

$= 15 + (4\ x\ 0.8)$

$= 18.2\ N\ which\ is\ the\ required\ force.$

b) If this same force is applied to the box which is now placed in a frictionless floor, what is the new acceleration produced?

For frictionless, $f = 0$

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

$= \frac{18.2}{4}$

$= 4.6$ m/s^2.