SUPER PHYSICS

Chapter 3 Notes

Dynamics

Dynamics

- The study of how objects move and the relationship of this motion to physical concepts e.g. force, mass

Force

- A force is something capable of changing an object's state of motion

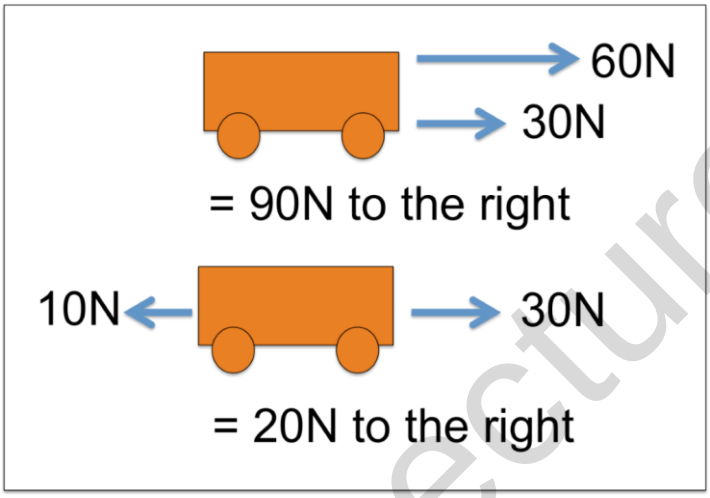
Contact Force physical contact between 2 objects	**Field Forces (non-contact forces)** - between 2 disconnected objects
Frictional Force Only occurs when there is a *capability* for something to move	Magnetic Force
Normal force Must always be *perpendicular* to surface	Electrical Force
Spring force	Gravitational Force
Tensional force	
Air resistance force	
Applied force	

Chapter 3: Dynamics

Free Body Diagrams

Addition of Vectors

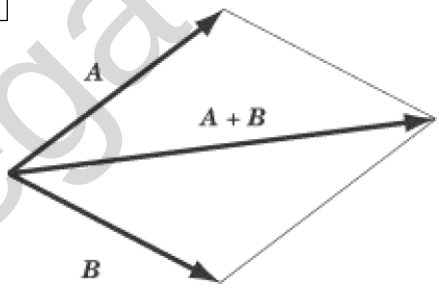
- When a number of forces act on an object, we can replace these forces with a single force → NET/RESULTANT force



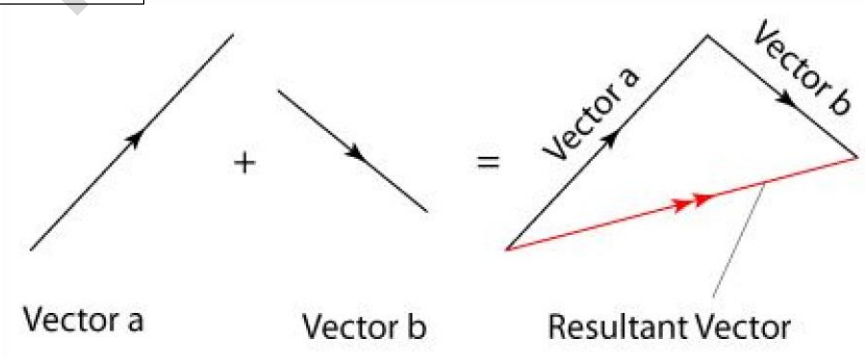
Vector Diagrams

2 methods:

- Parallelogram Method



- Triangle Method



Chapter 3: Dynamics

Net force

When net force is…

- Zero
  - Forces of equal magnitude act in opposite direction
  - referred to as balanced forces
  - Combined effect of all the forces is zero, does not mean that there are no forces acting on an object
- Non-zero
  - Forces of unequal magnitude act in different direction
  - referred to as unbalanced forces

Newton's 1st Law (Balanced Forces)

- *An object will remain at rest OR continue to move at a constant velocity if there is no resultant force acting on it*
- Implies that matter has a built-in reluctance to change its state of rest/motion → INERTIA
  - The mass of a body is a measure of its inertia.
  - A smaller mass will have a smaller inertia.

Newton's 2nd Law (Unbalanced Forces)

- *The acceleration of a body is proportional to the net force acting on it and occurs in the direction of the force.*

$\underline{F_{net} = ma}$ where Fn_{et} = net force (N)

m = mass (kg)

a = acceleration (ms^{-2})

- The acceleration produced by the net force will be in the direction of the net force

Newton's 3rd Law

- *For every action, there is an* ***equal and opposite reaction***
- These forces act on mutually opposite bodies

- action = -reaction
- force = -opposite force

Note: - sign represents opposite direction

Friction

- When **f** (frictional force) is **equal** to **F** (applied force), there is **no net force** acting on the object, so there is no acceleration, and it has a **constant velocity**
- **Applied force = Frictional force + Net force** (force applied has to overcome friction)

Summary