# 2.2: Newton's laws

## Inertia

- a resistance to a change in motion
- directly proportional to mass and resultant force needed to change the motion •

## Newton's first law of motion

• An object will remain at rest or in uniform motion unless acted upon by an external resultant force.

## **Resultant force**

- produces change in a body's motion •
- The acceleration of a body is directly proportional to the resultant force, and indirectly proportional to the body's mass.

#### Newton's second law of motion

• resultant force = mass × acceleration

## Weight (in N)

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## Gravitational field strength (in N/kg)

10 N/kg on Earth

## Terminal (constant) speed

- no resultant force
- e.g. When a skydiver jumps, they fall faster, and air resistance or drag forces increase. As the drag forces increase, the resultant force is reduced. When the drag forces become the same as the weight or the thrust, then the forces become balanced. There is now no resultant force and the skydiver stops accelerating but continues to fall at constant speed.

the amount of matter in an object

## Newton's third law of motion

If Body A exerts a force on Body B then Body B exerts an equal and opposite force on Body A.