

Physics: Motion and Forces

Why things move the way they do

WHAT IS IT?

Classical mechanics explains how objects move and why. A few simple laws apply to everything from a rolling ball to a planet.

$$F = m \times a$$



THE BIG IDEAS

- 1 Newton's first law: an object keeps its velocity (staying still, or moving straight at a steady speed) unless a net force acts on it.
- 2 Newton's second law: net force = mass $\times$ acceleration ($F = ma$): a bigger push gives more acceleration.
- 3 Newton's third law: if A pushes on B, then B pushes back on A equally and oppositely (the forces act on different objects).
- 4 In a closed system, energy is not created or destroyed, only changed from one form to another.

YOU SEE IT WHEN ...

Seat belts and braking cars

Throwing and catching a ball

Roller coasters and swings

WORDS YOU WILL MEET

Velocity

speed in a given direction

Acceleration

how quickly velocity changes

Force

a push or a pull

Mass

how much matter an object has, and how hard it is to speed up or slow down

Momentum

mass times velocity

Energy

the ability to cause change or do work

GOOD TO KNOW FIRST

Algebra and basic graphs; trigonometry helps later.

IN YOUR COURSE YOU WILL ...

- Describe motion with graphs and equations
- Work, energy and power
- Apply Newton's laws
- Momentum and collisions

Start tip: Draw a diagram showing every force on the object.