

# Definitions

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The definition of these terms is either directly required by the current syllabus or had appeared in O Level exams within the current syllabus. (However, it cannot be ruled out that definition of other terms might appear in this year's O Level exams though)

## General Physics

### Measurements

**Scalar quantities** are physical quantities that have **magnitude only**.

**Vector quantities** are physical quantities that have **both magnitude and direction**.

### Kinematics

**Speed** is the **rate of change of distance**.

**Average Speed** is **total distance moved divided by total time taken**.

**Velocity** is the **rate of change of displacement**.

**Uniform velocity** is **constant rate of change of displacement**.

**Uniform acceleration** is a **constant rate of change of velocity**.

### Dynamics

No definition required by syllabus or had appeared in O Level exams.

### Mass, Weight & Density

**Mass** is a measure of the **amount of substance** in a body.

**Inertia** is **the resistance of a body to a change in its state of rest or of constant motion, due to its mass**.

A **gravitational field** is a **region** in which a mass experiences a force due to **gravitational attraction**.

**Gravitational field strength,  $g$** , is the **gravitational force acting per unit mass**.

## Turning Effect of Forces

The **moment** of a force is the **product of the force and the perpendicular distance from the pivot to the line of action of the force**.

When a body is **in equilibrium**, the **sum of clockwise moments about a pivot is equal to the sum of anticlockwise moments about the same pivot**.

## Energy, Work & Power

The **Principle of Conservation of Energy** states that **energy cannot be created or destroyed**. It can be **converted from one form to another**, but **the total energy in an isolated system is constant**.

**Work done** by a force is **the product of the force and the distance moved by the body in the direction of the force**.

**Power** is the **rate of work done or rate of energy conversion**.

**Efficiency** is the **percentage of useful energy output from the total energy input**.

## Pressure

**Pressure** is the **force acting per unit area**.

## Thermal Physics

### Kinetic Model of Matter

No definition required by syllabus or had appeared in O Level exams.

### Transfer of Thermal Energy

No definition required by syllabus or had appeared in O Level exams.

### Temperature

No definition required by syllabus or had appeared in O Level exams.

## Thermal Properties of Matter

**Internal energy** is the total energy contained within a body. It consists of **both the kinetic energy and potential energy of the molecules.**

**Heat capacity** is the **amount of thermal energy needed to raise the temperature of a body by 1 K (or 1 °C).**

**Specific heat capacity** is the **amount of thermal energy needed to raise the temperature of 1 kg of a substance by 1 K (or 1 °C).**

**Latent heat** is the **amount of thermal energy needed to change a substance from one state to another, without a change in temperature.**

**Specific latent heat** is the **amount of thermal energy needed to change 1 kg of a substance from one state to another, without a change in temperature.**

**Latent heat of fusion** is the **amount of thermal energy needed to change a body from solid to liquid state, or vice versa, without a change in temperature.**

**Specific latent heat of fusion** is the **amount of thermal energy needed to change 1 kg of a substance from solid to liquid state, or vice versa, without a change in temperature.**

**Melting** is the **change of state from solid to liquid state, without a change in temperature, as heat is gained.**

**Solidification** is the **change of state from liquid to solid state, without a change in temperature, as heat is lost.**

**Latent heat of vaporisation** is the **amount of thermal energy needed to change a body from liquid to gas state, or vice versa, without a change in temperature.**

**Specific latent heat of vaporisation** is the amount of thermal energy needed to change **1 kg** of a substance from its liquid to gas state, or vice versa, without a change in temperature.

**Boiling** is the change of state from liquid to gas state, without a change in temperature, as heat is gained.

**Condensation** is the change of state from gas to liquid state, without a change in temperature, as heat is lost.

## Waves

### Light

**Angle of incidence** is the angle between the incident ray and the normal of the surface.

**Refractive index** of a medium is the ratio of the speed of light in vacuum to the speed of light in the medium.

**Critical angle** is the angle of incidence in an optically denser medium for which the angle of refraction in the optically less dense medium is  $90^\circ$ .

When a light ray travels from an optically denser medium towards an optically less dense medium and strikes the boundary at an angle greater than the critical angle, the entire light ray gets reflected back into the optically denser medium. This is known as **total internal reflection**.

The **focal length** is the distance between the optical centre and the focal point.

## Wave Properties

A **wave motion** is a travelling disturbance that transfers energy from one point to another. The particles of the medium **oscillate** but there is **no net transfer of the medium**.

A **transverse wave** is a wave that the **oscillation of the particles** of the medium is perpendicular to the direction of travel of the wave.

A **longitudinal wave** is a wave that the **oscillation of the particles** of the medium is **parallel** to the direction of travel of the wave.

A **wavefront** is an **imaginary line** on a wave that **joins all adjacent points that are in phase**.

**Wavelength** is the **distance between two consecutive points of a wave that are in-phase**.

**Amplitude** is the **maximum displacement** of a point **from its equilibrium position**.

Any of the below definitions for **period** can be used:

**Period** is the **time taken for a complete wave to pass a point**.

**Period** is the **time taken for one point on a wave to complete one oscillation**.

Any of the below definitions for **frequency** can be used:

**Frequency** is the **number of waves that pass a point in one second**.

**Frequency** is the **number of oscillations that a point on a wave makes in one second**.

**Wave speed** is the **distance moved by a wave in one second**.

## Electromagnetic Spectrum

**Ionisation** is the process of **converting an atom or molecule into an ion** by adding or removing electrons.

## Sound

**Compression** is a region where **particles are closer together** and where **pressure is higher** than the surrounding.

**Rarefaction** is a region where **particles are further apart** and where **pressure is lower** than the surrounding.

**Ultrasound** is sound with a **frequency above the upper limit of the human hearing range**. It has a frequency of **above 20 kHz**.

*Echo* is a **reflection of sound**.

## Electricity and Magnetism

### Static Electricity

An **electric field** is a **region in which an electric charge experiences a force**.

### Current Electricity

An **electric current** is the **rate of flow of electric charge**.

**Electromotive force** (e.m.f.) is the **work done by a source in driving a unit charge around a complete circuit**.

The **potential difference** (p.d.) across a component in a circuit is the **work done to drive a unit charge through the component**.

**Resistance** is the **ratio of the potential difference across a component to the current flowing through it**.

**Ohm's Law** states that the **current passing through a metallic conductor is directly proportional to the potential difference across its ends, provided that physical conditions (such as temperature) are constant**.

### D.C. Circuits

**Alternating current (a.c.)** is an electric current that **reverses direction periodically**.

**Alternating voltage** is a voltage that **reverses direction periodically**.

### Practical Electricity

**Power rating of 100 W** means the **rate of energy conversion is 100 joules per second**.

**Live wire** is the wire with **high voltage**. It is through this wire that **voltage arrives at the circuit**.

**Neutral wire** is the wire with **zero voltage**. It **completes the circuit with the live wire** so that current can flow.

**Earth wire** is the wire that is **connected to ground**. It has zero voltage.

**Double insulation** means **two layers of insulation**. A device that is **double-insulated** **does not require a connection to earth**.

## Magnetism

**N pole** is the pole of a magnet that points towards the Earth's North Magnetic Pole when the magnet is freely suspended.

## Electromagnetism

No definition required by syllabus or had appeared in O Level exams.



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