
IGCSE PHYSICS NOTES

Syllabus

[Syllabus Cambridge IGCSE Physics 0625](#)

General Physics

Length and time

- A ruler is used in measuring lengths by checking under which division the length is under.
- A micrometer screw gauge is used to measure very small distances
- A measuring cylinder is used to measure volumes by checking under which division the level of liquid comes under.
- An analogue clock is like a traditional clock whose hands move round the clock's face. You find the time by looking at where the hands are pointing on the scale.
- A digital clock is one that gives a direct reading of the time in numerals. For example, a digital stopwatch might show a time of 23.45
- Average for any measurement - Sum of measurements \div no: of measurements

Motion

Speed is the distance moved by an object per unit time

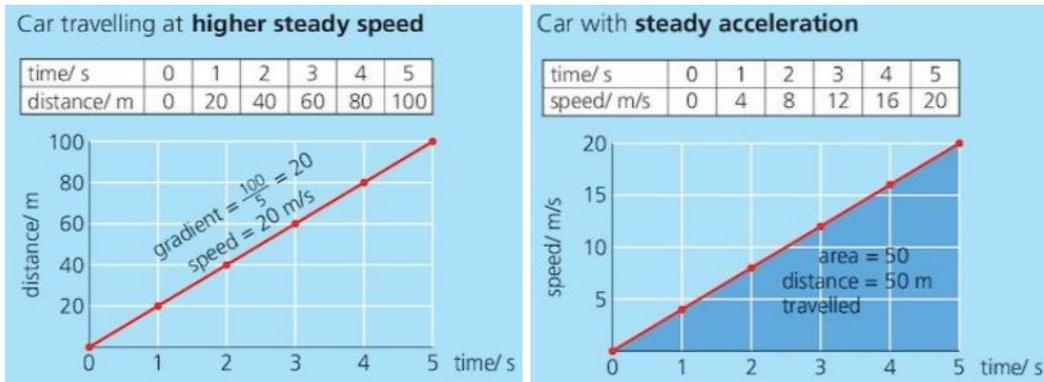
$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

Velocity is the speed of an object and its direction of movement

$$\text{Acceleration} = \frac{\text{change of velocity}}{\text{time taken}}$$

Deceleration is negative acceleration.

Acceleration and deceleration is related to changing speed



Speed in a distance-time graph is distance divided by time.

Acceleration in a speed time graph is the gradient of the graph

The shape of a speed–time graph when a body is:

- At rest - graph goes horizontally across 0 m/s
- Moving with constant speed - Horizontal line across any grid line except 0 m/s
- Moving with changing speed - A diagonal curved line

The area under a speed - time graph is the distance travelled by the object

The acceleration of free fall for a body near to the Earth is constant.

When a skydiver falls from a plane his speed increases and to match it the air resistance also increases. After some time both the forces match out and this is called terminal velocity. When he opens his parachute then as the area increases his air resistance will also increase causing her speed to decrease and then it balances again but this time the terminal velocity is much lesser.

Mass & weight

- Mass is a measure of matter in a body and the body's resistance to motion.
- Weight is the force of gravity on a body as a result of its mass.
- Also said as - weight is the effect of a gravitational field on a mass

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- Weight = Mass × Gravity
 - Mass can be compared in balance and weight in a spring balance

Density

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$$\rho = \frac{m}{V}$$

Measuring density of a liquid:

1. Measure the mass of the empty measuring cylinder and save it as a value called M_1 .
2. Measure the mass of the measuring cylinder with the liquid inside of it and save it as a value called M_2 .
3. Then measure the volume of the liquid using the measuring cylinder itself and save it as a value called V .
4. Calculate the mass by $M_2 - M_1$ and save the value as M .
5. Find the volume by dividing M by V . (M / V)

Measuring the density of a regular solid:

1. Measure the mass of the solid by placing it on a balance.
2. Measure the volume of the solid by using the formula ,
volume = length × width × height
3. Divide the mass by the volume to find out the density of the object.

Measuring the density of an irregularly shaped solid:

1. Measure the mass of the object by placing it on a balance.
2. Measure the volume of a moderate amount of liquid in a measuring cylinder and save it as V_1 .

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3. Submerge the object in the liquid in the measuring cylinder without overflowing the measuring cylinder.
 4. Measure the volume that is shown in the measuring cylinder now and save it as V_2 .
 5. Calculate the volume of the solid by calculating $V_2 - V_1$.
 6. Calculate the density of the solid by dividing the mass by the volume.



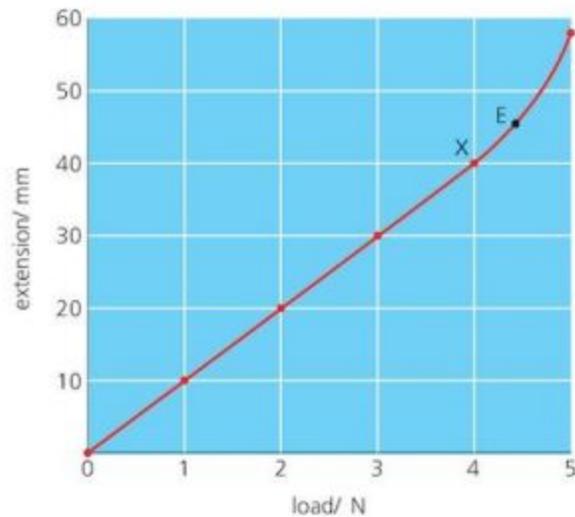
▲ Using a displacement can. Provided the can is filled to the spout at the start, the volume of water collected in the beaker is equal to the volume of the object lowered into the can.

If the density of the object is greater than that of a liquid, then it is probable that the object will float in that liquid.

Forces

Effect of forces

- A force may produce a change in size and shape of a body
- $F = k \times \mathcal{E}$, where k = spring constant, F = force, \mathcal{E} = extension
- Extension load graph - here X is the limit of proportionality



- Limit of proportionality is the point till which the object the graph is proportional
- A force can :
 - Change in the speed
 - Change its shape
 - Change its direction
 - Change in size
- $F=ma$, where F = force, m =mass, a =acceleration
- If 2 or more forces act on the same line then add them up if their direction is same or subtract if it is opposite .
- If there is no resultant force on a body then it continues to be in rest or in constant motion
- Centripetal force is the force that must be supplied to make an object go in a circular path and not a straight line. The force is towards the center and not along the circle.
- Friction is the force between two surfaces which impedes motion and results in heating
- Air resistance is a form of friction.