

## Definitions and Concepts for Edexcel Physics GCSE

### Topic 2: Motion and Forces

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*Definitions in **bold** are for higher tier only*

*Definitions marked by '\*\*' are for separate sciences only*

**Acceleration due to Gravity:** The acceleration,  $g$ , experienced by an object travelling in free-fall. Its value at the surface of Earth is  $10 \text{ m/s}^2$ .

**Acceleration:** The rate of change of velocity. It can be calculated from the gradient of a velocity-time graph.

**Braking Distance:** The distance a vehicle travels under the braking force. This can be affected by adverse road and weather conditions as well as the condition of the vehicle.

**Centripetal Force:** The resultant force that acts towards the centre of the circular path of an object travelling with circular motion.

**Circular Motion:** The motion of an object travelling in a circle. An object travelling in circular motion is always accelerating due its continual direction change. This means that a centripetal force is always required.

**Conservation of Momentum:** The total momentum of a system before an event is always equal to the total momentum of the system after the event.

**Displacement:** A measure of how far an object moves in a given direction. It is the straight line between the starting and finishing points and is a vector quantity.

**Distance-Time Graph:** A plot of how an object's distance changes over time. The gradient of the graph at any point, equals the object's speed at that point.

**Distance:** A measure of how far an object moves. It doesn't depend on direction and is therefore a scalar quantity.

**Free-Fall:** Motion under the force of gravity alone.

**Human Reaction Time:** The time it takes for the brain to react to a stimulus. Typical human reaction times are in the range of 0.2-0.9 seconds.

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**Inertial Mass:** A measure of how hard it is to change an object's velocity. It equals the ratio of force over acceleration.

**Momentum:** The product of an object's mass and velocity.

**Newton:** The unit of force.

**Newton's First Law:** If a stationary object's resultant force is zero, the object will remain stationary. If a moving object's resultant force is zero, the object will continue to move at a constant velocity (same speed and direction).

**Newton's Second Law:** An object's acceleration is directly proportional to the resultant force acting on it, and inversely proportional to the object's mass.

**Newton's Third Law:** The forces that two objects exert on each other when they interact are equal and opposite.

**Resultant Force:** The single force that can replace all the individual forces acting on an object, and have the same effect.

**Scalar Quantities:** Quantities that only have a magnitude, not a direction.

**Speed:** A scalar quantity that is a measure of the rate of change of distance. The average speed is calculated by dividing the distance travelled by the speed taken.

**Stopping Distance:** The sum of the thinking and braking distances.

**Thinking Distance:** The distance a vehicle travels during the driver's reaction time. This reaction time may be affected by tiredness, drugs or alcohol.

**Vector Quantities:** Quantities that have both a magnitude and direction. They are represented by an arrow, with the length representing the magnitude and the arrowhead representing the direction.

**Velocity-Time Graph:** A plot of how an object's velocity changes over time. The gradient at any point, equals the object's acceleration at that point. The area under the graph equals the object's displacement.

**Velocity:** A vector quantity that is a measure of the rate of change of displacement. It is the speed in a given direction.

**Weight:** The force acting on an object due to gravity. It is equal to the product of the object's mass and the gravitational field strength at its location. It can be measured using a Newton Meter.

