

Definitions and Concepts for OCR (B) Physics GCSE

Topic 4: Explaining Motion

*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 m/s^2 .

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

Balanced Forces: A resultant force of zero.

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.

Contact Force: A force that acts on an object through physical contact.

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.

Distortion: The changing of an object's size or shape as a result of a deforming force.

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Elastic Deformation: A non-permanent deformation for which the object will return to its original shape when the deforming forces are removed.

Elastic Limit: The force beyond which an object will no longer deform elastically, and will instead deform plastically.

Electric Field: A region where a charge will experience a non-contact electrostatic force.

Force Field: A region where an object will experience a non-contact force.

Force Vectors: An arrow that represents a force. The length represents the force's magnitude and the arrowhead shows the direction in which it acts.

Free Body Diagram: A visual representation of the forces that act on an object.

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

Friction: A resistive contact force that acts to oppose the relative motion between two surfaces.

Gears: A simple mechanism that can transmit the rotational effect of a force. They can act as force multipliers.

Gravitational Field: A region where a mass will experience a non-contact gravitational force. All matter produces a gravitational field around it, and the greater its mass, the stronger the field.

Gravitational Force: A force that all matter experiences when placed in a gravitational field. This force is always attractive.

Gravitational Potential Energy: The store of energy that all raised matter has. It is directly proportional to the mass of the object, the distance that it is raised, and the gravitational field strength at that point.

Hooke's Law: The extension of a spring is directly proportional to the force applied to it, up to the limit of proportionality. The constant in this relationship is known as the spring constant.

Hydraulic Lift: A system that can act as a force multiplier by connecting two platforms with different areas by a fluid. The pressure in the fluid is the same throughout and so the platform with the smaller area experiences a greater force.

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

Joule: The unit used for energy.



Kinetic Energy: The store of energy that all moving matter has. It is directly proportional to the object's mass and to the square of its velocity.

Lever: A simple mechanism that can transmit the rotational effect of a force. It can act as a force multiplier.

Limit of Proportionality: The point beyond which the extension of an elastic object is no longer directly proportional to the force applied to it.

Linear Relationship: A relationship between two variables where if one variable increases, so does the other by the same factor. They produce straight lines when plotted.

Magnetic Field: A region where a magnetic material will experience a non-contact magnetic force.

Moment: The turning effect of a force, equal to the product of the magnitude of the force and the perpendicular distance from the pivot to the line of action of the force.

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

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.

Non-Contact Force: A force that acts on an object at a distance. There is no physical contact, and instead the force acts through a field.

Pivot: The point around which something rotates.

Plastic Deformation: A permanent deformation for which the object will no longer return to its original shape when the deforming forces are removed.

Power: The rate at which energy is transferred, or the rate at which work is done. It is calculated by dividing the work done by the time taken.

Principle of Moments: For an object in equilibrium, the sum of the clockwise moments about any point on the object must equal the anticlockwise moments about that same point.



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

Resultant Moment: The single moment that has the same effect as the sum of all the other clockwise and anticlockwise moments acting on an object.

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.

Spring Constant: A measure of a spring's stiffness. The higher the spring constant, the smaller the extension is for a given force.

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 of the graph 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.

Work Done: Work is done on an object when a force causes it to move through a distance. It is equal to the product of the distance travelled and the magnitude of the force in the direction of motion.

