Definitions and Concepts for Edexcel Physics IGCSE

Topic 1: Forces and Motion

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

Definitions marked by '' are for separate sciences only*

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.

Changes of Momentum:** **When a force acts on a moving object, or on an object that has the ability to move, a change of momentum will occur. The force is equal to the rate of change of momentum.

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.

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

Crumple Zone:** **A vehicle safety feature that compresses during a collision. It increases the time over which the momentum change occurs, and so reduces the force experienced by the occupants.

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.

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.

Equilibrium: An object is in equilibrium if the resultant force **and resultant moment** are both equal to zero.

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

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.

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.

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.

***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 Meter: A device used to measure the magnitude of a force. It is commonly used to measure an object's weight.

***Newton Metre:** **The unit of a moment.**

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.

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.

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

***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.

***Seat Belt:** **A vehicle safety device that increases the time over which the momentum change occurs during a collision, and so reduces the force experienced by the wearer.**

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.

Terminal Velocity: The maximum velocity an object can reach when falling through a fluid. It occurs when the resistive forces equal the object's weight.

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.