

Definitions and Concepts for Edexcel Physics A Level

Topic 4: Materials

Archimedes' Principle: When a body is fully or partially submerged in a fluid, it experiences an upthrust equal to the weight of the fluid it has displaced.

Breaking Stress: The maximum stress a material can withstand without fracturing.

Brittle: A material that fractures without plastic deformation first.

Density: Mass per unit volume, with units kgm^{-3} .

Ductile: A material that can withstand large plastic deformation without breaking, this allows these materials to be stretched into long wires.

Elastic Deformation: When a material can return to its original shape, after an applied stress, without a permanent change to its shape. Any work done in elastically deforming an object is stored as elastic strain energy.

Elastic Limit: The maximum stress that can be applied to an object without plastic deformation.

Hooke's Law: The extension of an object is directly proportional to the force being applied to the object.

Laminar Flow: A state of flow where layers of fluid move together in parallel with little or no mixing between layers.

Limit of Proportionality: The point at which the stress on an object is so great that Hooke's law no longer applies to an object.

Plastic Deformation: When a material is permanently deformed after an applied stress due to the atoms moving relative to one another in the material. Work is done in plastically deforming the material and is dissipated as heat.

Stoke's Law: The magnitude of the force of viscosity acting on a spherical body as it moves through a fluid is proportional to its radius, its velocity and the fluid's viscosity. This only applies to spherical bodies travelling in laminar, non-turbulent, flow.

Tensile Strain: The extension of an object divided by its original length.

Tensile Stress: The internal resistance of an object against a force that acts to deform it. It is the force applied per unit cross-sectional area.



Turbulent Flow: A state of flow where layers of fluid mix together unpredictably causing a chaotic state.

Viscosity: A quantity measuring the internal friction of a fluid, it acts to reduce the flow of a fluid. It is temperature dependent.

Upthrust: The force felt against the weight of an object when fully or partially submerged in a fluid. It is equal to the weight of the fluid displaced by the object.

Yield Point: The point on a force-extension graph at which a material begins to rapidly extend without any additional stress.

Young's Modulus: The ratio of stress to strain of an object. It is a measure of how stiff a material is.

