

Definitions and Concepts for CAIE Physics A-level

Topic 6: Deformation of Solids

Compression: The result of two coplanar forces acting into an object. Compression usually results in a reduction in the length of the object.

Compressive Deformation: The changing of an object's shape due to compressive forces.

Elastic Deformation: If a material deforms with elastic behaviour, it will return to its original shape when the deforming forces are removed. The object will not be permanently deformed.

Elastic Limit: The force beyond which an object will no longer deform elastically, and instead deform plastically. Beyond the elastic limit, when the deforming forces are removed, the object will not return to its original shape.

Elastic Potential Energy: The energy stored in an object when it is stretched. It is equal to the work done to stretch the object and can be determined from the area under a force-extension graph.

Extension: The increase of an object's length.

Force-Extension Graph: A plot showing how an object extends as the force applied increases. For an elastic object, the gradient should be linear up to the limit of proportionality. The gradient gives the spring constant.

Hooke's Law: The extension of an elastic object will be directly proportional to the force applied to it up to the object's limit of proportionality.

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: If a material deforms with plastic behaviour, it will not return to its original shape when the deforming forces are removed. The object will be permanently deformed.

Spring Constant: The constant of proportionality for the extension of a spring under a force. The higher the spring constant, the greater the force needed to achieve a given extension.

Strain: The ratio of an object's extension to its original length. It is a ratio of two lengths and so has no unit.

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Stress: The amount of force acting per unit area. Its unit is the Pascal (Pa).

Tension: The result of two forces acting on an object in opposite, outwards directions.

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.

Young Modulus: The ratio of stress to strain for a given material. Its unit is the Pascal (Pa).

