

OCR B Physics A Level

3.2.2 - Mechanical Properties of Materials

Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



What is elastic deformation?



What is elastic deformation?

An elastic deformation is one where the object will return to its original shape, once the deforming forces are removed.



What is plastic deformation?



What is plastic deformation?

A plastic deformation is one where the object remains permanently deformed, even once the deforming forces are removed.



What is the condition for an object to experience tension?



What is the condition for an object to experience tension?

There must be a pair of forces, acting on the object in opposite directions, causing it to stretch.



What is the condition for an object to experience compression?



What is the condition for an object to experience compression?

There must be a pair of forces, acting on the object in opposite directions, causing it to compress.



What is the yield stress of an object?



What is the yield stress of an object?

The stress at and beyond which the object will undergo plastic deformation.



What is the fracture stress of an object?



What is the fracture stress of an object?

The fracture stress is the stress that causes the material to break.



What does it mean if an object is stiff?



What does it mean if an object is stiff?

A stiff object is one that only produces a small extension per unit force.



What does ductile mean?



What does ductile mean?

If an object is ductile, it means that it can be easily stretched into wires.



What does brittle mean?



What does brittle mean?

If an object is brittle, it will undergo very little plastic deformation before a fracture occurs.



What can be said about an object if it is described as 'tough'?



What can be said about an object if it is described as 'tough'?

A tough object is one that can absorb a lot of energy before fracture.



What law governs the extension of an elastic object?



What law governs the extension of an elastic object?

Hooke's Law



State Hooke's Law in words.



State Hooke's Law in words.

The extension of an object is directly proportional to the force applied to it, up to the limit of proportionality, given that external conditions remain constant.



State Hooke's Law as an equation.



State Hooke's Law as an equation.

Force = Spring Constant \times Extension

$$F = kx$$



What is the unit for a spring constant?



What is the unit for a spring constant?

Nm^{-1}



What is the limit of proportionality?



What is the limit of proportionality?

The point beyond which the object will no longer obey Hooke's law.



What type of energy is stored when an object is stretched or compressed?



What type of energy is stored when an object is stretched or compressed?

Elastic potential energy.



What quantity is represented by the area under a force-extension graph?



What quantity is represented by the area under a force-extension graph?

The area under a force-extension graph is equal to the energy stored.



State the equation for the energy stored when a spring is stretched.



State the equation for the energy stored when a spring is stretched.

$$E = \frac{1}{2} kx^2$$



What is stress?



What is stress?

Stress is the force per unit area applied to an object.



What is strain?



What is strain?

Strain is the ratio of extension to original length.



What is the Young Modulus of a material?



What is the Young Modulus of a material?

- The Young Modulus is the ratio of stress to strain.
- It is a measure of a material's stiffness.



What is the unit of stress?



What is the unit of stress?

Stress is measured in Pascals.



What is the unit for Young Modulus?



What is the unit for Young Modulus?

Since stress is measured in Pascals and strain doesn't have a unit, the unit of Young Modulus is **Pascals**.



What was the aim of Rayleigh's Oil Drop experiment?



What was the aim of Rayleigh's Oil Drop experiment?

Rayleigh's Oil Drop experiment was designed to estimate the size of an atom.

