INKPHYSICS FLASHCARDS

Materials

Year 12 · 34 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in mark-scheme wording, the equations that are not on the AQA data sheet, each lesson's check question, and the misconceptions that lose marks. The same cards run on the website with spaced-repetition scheduling, at inkphysics.co.uk/physics/flashcards.

DEFINITION

Define: Density.

DENSITY AND HOOKE'S LAW

RECALL

State the unit of density.

DENSITY AND HOOKE'S LAW

DEFINITION

Define: Hooke's law.

DENSITY AND HOOKE'S LAW

DEFINITION

Define: Limit of proportionality.

DENSITY AND HOOKE'S LAW

DEFINITION

Define: Elastic limit.

DENSITY AND HOOKE'S LAW

RECALL

Explain how to convert a density in grams per cubic centimetre.

DENSITY AND HOOKE'S LAW

RECALL

State the unit of the spring constant.

DENSITY AND HOOKE'S LAW

RECALL

State how to find the energy stored from a force-extension graph.

DENSITY AND HOOKE'S LAW

RECALL

kg m^{-3}, kilograms per cubic metre.

DENSITY AND HOOKE'S LAW

DEFINITION

Mass per unit volume: $\rho = m/V$.

DENSITY AND HOOKE'S LAW

DEFINITION

The point beyond which force is no longer proportional to extension, so Hooke's law ceases to apply.

DENSITY AND HOOKE'S LAW

DEFINITION

The force needed to stretch a spring is proportional to the extension, $F = k\Delta L$, up to the limit of proportionality.

DENSITY AND HOOKE'S LAW

RECALL

Multiply by 1000: 1 g cm^{-3} = 1000 kg m^{-3}.

DENSITY AND HOOKE'S LAW

DEFINITION

The point beyond which a stretched object no longer returns to its original length when the force is removed.

DENSITY AND HOOKE'S LAW

RECALL

The elastic strain energy equals the area under the force-extension graph.

DENSITY AND HOOKE'S LAW

RECALL

N m^{-1}, newtons per metre.

DENSITY AND HOOKE'S LAW

RECALL

Explain how to read the permanent extension from a force-extension graph.

DENSITY AND HOOKE'S LAW

SPOT THE ERROR

Say what is wrong with this claim:

Hooke's law holds right up until the spring snaps.

DENSITY AND HOOKE'S LAW

DEFINITION

Define: Tensile stress.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

State the unit of tensile stress.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Tensile strain.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Young modulus.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Breaking stress.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Ductile material.

STRESS, STRAIN AND THE YOUNG MODULUS

SPOT THE ERROR

Hooke's law fails well before the spring snaps: beyond the limit of proportionality, force is no longer proportional to extension.

DENSITY AND HOOKE'S LAW

RECALL

Read where the unloading line, parallel to the original straight section, meets the extension axis.

DENSITY AND HOOKE'S LAW

RECALL

The pascal, Pa, equal to N m^{-2}.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The force applied per unit cross-sectional area: stress = F/A.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The ratio of tensile stress to tensile strain for a material within the limit of proportionality.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The extension per unit original length: strain = $\Delta L/L$, a ratio with no unit.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

One that shows a large plastic deformation beyond its yield point before it fractures.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The maximum stress a material can withstand before it fractures.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Brittle material.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

State how to find the Young modulus from a stress-strain graph.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

Explain why a Young modulus test wire is long and thin.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Polymeric material.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Hysteresis loop.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

Explain why rubber is elastic but does not obey Hooke's law.

STRESS, STRAIN AND THE YOUNG MODULUS

SPOT THE ERROR

Say what is wrong with this claim:

The spring constant tells you how stiff the material is.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Upthrust.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

The gradient of the initial straight-line region.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

One that fractures at the end of its straight-line region with no plastic deformation.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

A material built from long tangled molecular chains, such as rubber or polythene, whose stress-strain curve stiffens as the strain grows.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

Both choices enlarge the extension, giving a smaller percentage uncertainty in ΔL.

STRESS, STRAIN AND THE YOUNG MODULUS

RECALL

It returns to its original length when unloaded, so the deformation is elastic, but the force is not proportional to the extension, so the graph is not straight and there is no single Young modulus.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The loop enclosed between the loading and unloading curves of a polymeric material; its area is the energy released as heat in one loading cycle.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

The upward force on a body in a fluid, equal to the weight of fluid displaced by the body.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

SPOT THE ERROR

The spring constant k describes one particular object: change its length or thickness and k changes. The Young modulus is stress over strain, which cancels the geometry and characterises the material itself.

STRESS, STRAIN AND THE YOUNG MODULUS

DEFINITION

Define: Viscosity.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

State how the viscosity of a liquid changes with temperature.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

State the condition for floating.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

State the condition for terminal velocity of a falling sphere.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

Define: Laminar flow.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

State the conditions for Stokes' law to apply.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

Define: Pressure.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

State how the pressure at a point in a fluid depends on direction.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

The viscosity of a liquid falls steeply as its temperature rises.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

The property of a fluid that measures its resistance to flow: the constant η in Stokes' law.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

Weight equals upthrust plus viscous drag, so the resultant force is zero and the velocity is constant.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

A body floats when it can displace its own weight of fluid before becoming fully submerged.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

The sphere must be small and slow-moving, so that the flow around it stays laminar.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

Smooth flow in layers that do not mix.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

RECALL

It does not. At a point in a fluid the pressure acts equally in all directions, and always at right angles to any surface it meets.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

The force acting at right angles to a surface, divided by the area of that surface: $p = F/A$, measured in pascals.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

Define: Derive the equation for hydrostatic pressure.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

SPOT THE ERROR

Say what is wrong with this claim:

Things float because they are light.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

SPOT THE ERROR

Floating depends on density, not on being light. An object floats when the upthrust, equal to the weight of fluid displaced, can equal the object's weight; that needs its average density below the fluid's.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY

DEFINITION

A column of fluid of cross-sectional area A and depth Δh has volume $A\Delta h$, mass $\rho A\Delta h$ and weight $\rho Ag\Delta h$. Dividing that weight by A gives $\Delta p = \rho g\Delta h$; the area cancels, which is why the container shape does not matter.

FLUIDS: PRESSURE, UPTHRUST AND VISCOSITY