FREE REVISION PACK

Hooke's Law & Force–Extension Graphs

AQA A-level Physics · 7407 / 7408 · Specification 3.4.2.1

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Naming a material that snaps without deforming	AQA June 2017 · AS Paper 2 · Q17	1 mark
2	Easy	What brittle fracture means	AQA June 2024 · AS Paper 2 · Q24	1 mark
3	Easy	Force–extension graph of a brittle material	AQA 2020 · AS Paper 2 · Q27	1 mark
4	Easy	Estimating the stiffness of a baby bouncer	AQA June 2022 · AS Paper 2 · Q6	1 mark
5	Easy	Comparing two wires on a force–extension graph	AQA June 2017 · AS Paper 2 · Q30	1 mark

Key ideas to have ready

- **Hooke's law**: $F = k\Delta L$ up to the limit of proportionality. The stiffness k (N m^{-1}) is the gradient of a force–extension graph.
- **Elastic** deformation disappears when the force is removed. **Plastic** deformation is permanent.
- A **brittle** material (e.g. glass, cast iron) breaks with little or no plastic deformation: its force–extension graph is a straight line that simply stops.
- For wires of the same length and area, the steeper force–extension line belongs to the material with the larger Young modulus. The area under the line is the energy stored.

How to use this pack

1. The questions are grouped into levels (Easy). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–5

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2017 · AS Paper 2 · Q17

1 What is the name given to a material that breaks without deformation when a force is applied to it?

[1 mark]

A Plastic ⬭

B Brittle ⬭

C Stiff ⬭

D Elastic ⬭

AQA June 2024 · AS Paper 2 · Q24

2 Which statement is true?

[1 mark]

A A brittle fracture occurs after little or no elastic deformation. ⬭

B A brittle fracture occurs after little or no plastic deformation. ⬭

C In a plastic deformation, energy stored is proportional to stress. ⬭

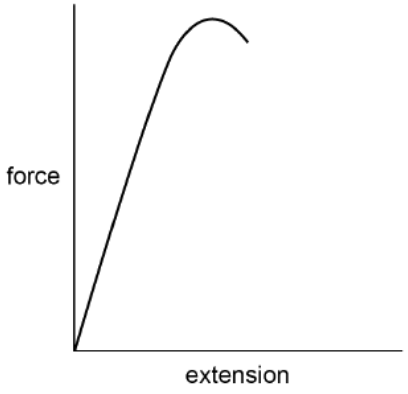
D In a plastic deformation, stress is proportional to strain. ⬭

AQA 2020 · AS Paper 2 · Q27

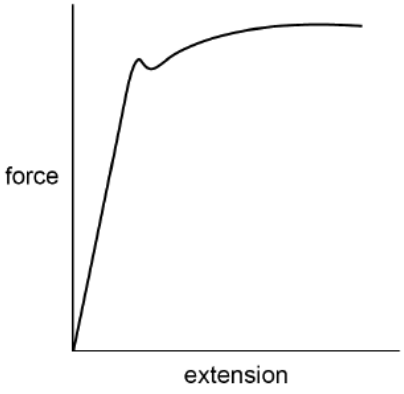
3 Which is a force–extension graph for a brittle material?

[1 mark]

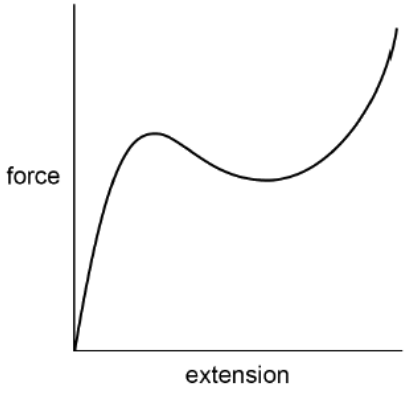
A



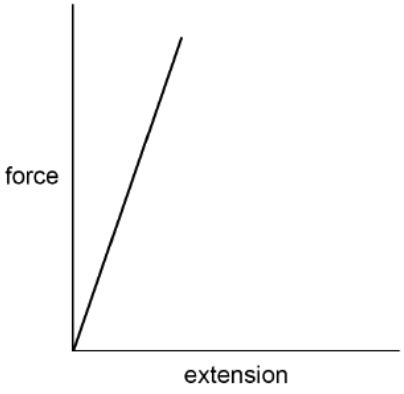
B



C

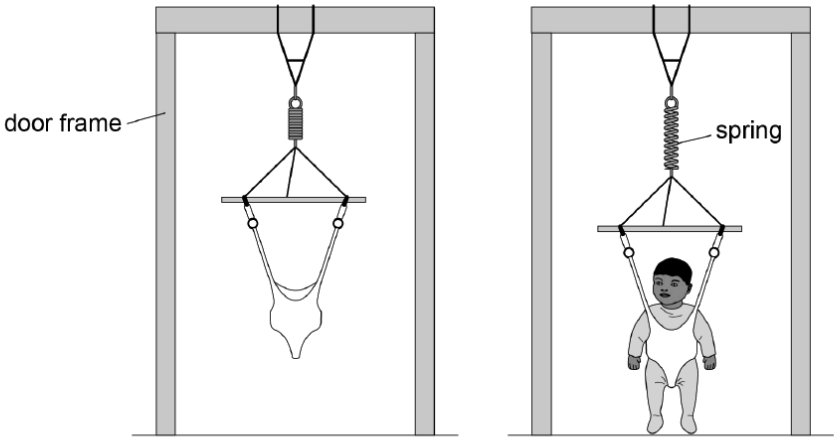


D



AQA June 2022 · AS Paper 2 · Q6

4 A baby bouncer consists of an inextensible harness attached to a spring.



The stiffness of the spring is in the range:

[1 mark]

A 1–10 N m^{-1} ⬭

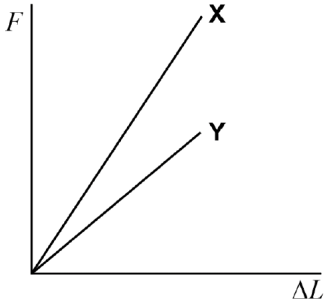
B 10–100 N m^{-1} ⬭

C 100–1000 N m^{-1} ⬭

D 1000–10 000 N m^{-1} ⬭

AQA June 2017 · AS Paper 2 · Q30

5 Two separate wires **X** and **Y** have the same original length and cross-sectional area. The graph shows the extension ΔL produced in **X** and **Y** when the tensile force F applied to the wires is increased up to the point where they break.



Which statement is **incorrect**?

[1 mark]

A For a given extension more energy is stored in **X** than in **Y**. ⬭

B The Young modulus of the material of wire **Y** is greater than that of wire **X**. ⬭

C Both wire **X** and wire **Y** obey Hooke's law. ⬭

D Wire **X** has a greater breaking stress than wire **Y**. ⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**