GET BETTER AT PHYSICS · MARK SCHEME

Elastic Strain Energy: tiered multiple choice

Edexcel IAL Physics · Unit 1 (WPH11) · Specification points 32 · 6 questions · 6 marks

1 mark per correct letter | Worked reasoning for every question

How students did = from Pearson examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5	Q6
A	B	B	D	C	C

Easy

Questions 1–3

1 **A**

Extension from elastic strain energy · Edexcel IAL January 2024 · Unit 1 · Q3

Elastic strain energy $E = \frac{1}{2}F\Delta x$, so $\Delta x = 2E/F = (2 \times 0.04) \div 3.0$ m.

2 **B**

Work done stretching a rubber band · Edexcel IAL October 2022 · Unit 1 · Q6

Work done = area under the force–extension graph. While the band is being stretched (loading), the work done on it is the area under the loading curve. The unloading curve is lower; the area between the two curves is energy dissipated as heat.

3 **B**

Work done from a force–extension graph · Edexcel IAL June 2023 · Unit 1 · Q4

Work done = area under the force–extension graph. At 0.30 m the force is 2.5 N, and the graph is a straight line through the origin, so the area is a triangle: $\frac{1}{2} \times 0.30 \times 2.5$ J.

Medium

Questions 4–6

4 **D**

Springs in series and in parallel · Edexcel IAL June 2022 · Unit 1 · Q7

In P (series) each spring carries the full force F, so each stores E and the total is 2E. In Q (parallel) each spring carries F/2; energy $\propto F^2$, so each stores E/4 and the total is E/2.

5 **C**

Comparing elastic strain energy in two springs · Edexcel IAL October 2021 · Unit 1 · Q3

Elastic strain energy = $\frac{1}{2}F\Delta x$. S_1: $\frac{1}{2}(mg)(x) = E$. S_2: $\frac{1}{2}(2mg)(x/3) = mgx/3 = (2/3) \times \frac{1}{2}mgx = 2E/3$.

6 **C**

Energy stored in springs in parallel · Edexcel IAL October 2022 · Unit 1 · Q8

In parallel, the three identical springs share the 2F force equally, so each carries 2F/3. For a spring, $E = F^2/(2k)$, so energy $\propto F^2$: each spring stores $(2/3)^2E = 4E/9$. Three springs store $3 \times 4E/9 = 4E/3$.

> **Watch out:** Energy depends on force squared, so you cannot simply scale E by the force.

How students did: Examiners singled this out as one of the hardest multiple-choice questions on the October 2022 paper.

End of mark scheme. Answers from Pearson's published mark schemes; explanations written for this pack. Pearson Edexcel material is © Pearson Education Ltd. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

GET BETTER AT PHYSICS · WHAT NEXT?

Got some of these wrong?

Good. The questions you got wrong show you exactly what to work on next. The quickest way to fix them is to work through them with someone who marks these papers.

Book a free 15-minute call

Tell me which questions caught you out. We'll talk about what's going wrong and whether 1-to-1 or small-group tuition would help. There's no obligation.

Book your free call

calendly.com/getbetteratphysics/freechat

Scan to book

Current AQA examiner

I know what the mark schemes reward and where marks are lost.

Matched to your exam board

Sessions follow your specification and the topics you find hardest.

Pay per session

No block booking. 1-to-1 or small groups of up to 4.

More free packs

Tiered past-paper questions with full mark schemes, sorted by topic.
getbetteratphysics.co.uk/free-revision-packs

Masterclasses are coming

Want to hear first? Email **helpme@getbetteratphysics.co.uk** and I'll let you know when dates are announced.

Parents: I use these packs in my own tutoring sessions. Tuition options and prices:
getbetteratphysics.co.uk/tuitionpricing