GET BETTER AT PHYSICS · MARK SCHEME

# Pulse–Echo Techniques: tiered multiple choice

Edexcel IAL Physics · Unit 2 (WPH12) · Specification points 55–56 · 5 questions · 5 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 |
|---|---|---|---|---|
| B | C | D | A | B |

## Easy

Questions 1–5

**1** **B**

Why one ultrasound pulse gives several echoes · Edexcel IAL October 2022 · Unit 2 · Q9

At each boundary between different tissues, part of the ultrasound is reflected and the rest carries on. So a single pulse produces echoes from several layers at different depths, which arrive back at different times.

**How students did:** Examiners reported that at least three-quarters of students got this right in October 2022.

**2** **C**

Distance from a pulse-echo time · Edexcel IAL January 2025 · Unit 2 · Q3

In time t the sound travels to the object and back, a total distance vt. The distance to the object is half of this: 0.5vt.

**3** **D**

Distance to an object located by a bat · Edexcel IAL October 2025 · Unit 2 · Q6

The pulse travels to the object and back in 4 ms, covering $340 \times 4 \times 10^{-3}$ m. The object is half that distance away: $(340 \times 4 \times 10^{-3}) \div 2$.

**4** **A**

Speed of sound from an echo · Edexcel IAL October 2024 · Unit 2 · Q3

The sound travels to the wall and back, a distance 2d, in time t. So v = 2d/t.

**5** **B**

Getting more detail in an ultrasound scan · Edexcel IAL October 2023 · Unit 2 · Q3

The smallest detail that can be resolved is roughly one wavelength. Increasing the frequency of the ultrasound shortens its wavelength ($v = f\lambda$, same speed), so finer detail can be seen.

**Watch out:** Longer pulses make detail worse, not better: the echoes from close boundaries overlap.

**How students did:** 70% of students got this right in October 2023.

**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**

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