FREE REVISION PACK

Pulse–Echo Techniques

Pearson Edexcel International Advanced Level Physics · Unit 2 (WPH12) · Specification points 55–56

Easy | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Why one ultrasound pulse gives several echoes	Edexcel IAL October 2022 · Unit 2 · Q9	1 mark
2	Easy	Distance from a pulse-echo time	Edexcel IAL January 2025 · Unit 2 · Q3	1 mark
3	Easy	Distance to an object located by a bat	Edexcel IAL October 2025 · Unit 2 · Q6	1 mark
4	Easy	Speed of sound from an echo	Edexcel IAL October 2024 · Unit 2 · Q3	1 mark
5	Easy	Getting more detail in an ultrasound scan	Edexcel IAL October 2023 · Unit 2 · Q3	1 mark

Key ideas to have ready

- A pulse travels to a boundary and back: distance = ½ × speed × time.
- Partial reflections at each boundary give several echoes from one pulse.
- Higher frequency (shorter wavelength) gives finer detail; short pulses avoid overlapping echoes.
- Air in the body reflects almost all ultrasound.

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 Pearson'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

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL October 2022 · Unit 2 · Q9

1 Ultrasound scans can be used to create an image of a patient's kidneys.

For each ultrasound pulse sent into the body, a number of pulses are detected.

Which of the following explains why a number of pulses are detected?

- ☒ **A** Interference occurs when the pulse is in the body.
- ☒ **B** The ultrasound reflects off different layers within the body.
- ☒ **C** The ultrasound has a very high frequency.
- ☒ **D** The ultrasound has a very large wavelength.

Edexcel IAL January 2025 · Unit 2 · Q3

2 A car has a distance sensor that uses a pulse-echo technique to determine the distance between the car and a nearby object.

The sensor emits a pulse of sound and then detects the echo after time t.
The speed of sound is v.

Which of the following gives the distance between the car and the object?

- ☒ **A** $2vt$
- ☒ **B** $2vt^{-1}$
- ☒ **C** $0.5vt$
- ☒ **D** $0.5vt^{-1}$

Edexcel IAL October 2025 · Unit 2 · Q6

3 A bat is an animal that locates objects using a pulse-echo technique. A bat emits a pulse of sound waves that travel to an object. The bat detects the reflected pulse 4 ms later.

speed of sound = $340\,\text{m}\,\text{s}^{-1}$

Which of the following expressions gives the distance, in metres, between the bat and the object?

- ☒ **A** $2 \times 340 \times 4 \times 10^{-3}$
- ☒ **B** $\dfrac{340}{2 \times 4 \times 10^{-3}}$
- ☒ **C** $340 \times 4 \times 10^{-3}$
- ☒ **D** $\dfrac{340 \times 4 \times 10^{-3}}{2}$

Edexcel IAL October 2024 · Unit 2 · Q3

4 A student stands a distance d from a wall. She makes a loud sound. She hears the echo of the sound from the wall after a time t.

Which of the following expressions gives the speed of the sound wave?

☒ **A** $\frac{2d}{t}$

☒ **B** $\frac{d}{t}$

☒ **C** $\frac{d}{2t}$

☒ **D** $\frac{2t}{d}$

Edexcel IAL October 2023 · Unit 2 · Q3

5 Which of the following would increase the detail in an ultrasound scan?

☒ **A** increasing the duration of the pulses

☒ **B** increasing the frequency of the ultrasound

☒ **C** increasing the intensity of the ultrasound

☒ **D** increasing the wavelength of the ultrasound

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