GET BETTER AT PHYSICS · MARK SCHEME

Wave–Particle Duality: tiered multiple choice

Edexcel IAL Physics · Unit 2 (WPH12) · Specification points 53–54 · 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
A	C	A	B	B

Easy

Questions 1–5

1 **A**

Electron speed from its de Broglie wavelength · Edexcel IAL January 2024 · Unit 2 · Q3

$\lambda = h/(mv)$, so $v = h/(m\lambda) = (6.63 \times 10^{-34}) \div (9.11 \times 10^{-31} \times 3.5 \times 10^{-10})$.

How students did: 84% of students got this right in January 2024.

2 **C**

Evidence that electrons behave as waves · Edexcel IAL June 2024 · Unit 2 · Q4

Diffraction is a wave property. Electrons passing through a thin sheet of graphite produce a diffraction pattern (rings), which shows they can behave as waves.

3 **A**

Speed from de Broglie wavelength · Edexcel IAL January 2022 · Unit 2 · Q2

$v = h/(m\lambda)$. Use the electron mass 9.11×10^{-31} kg: $v = (6.63 \times 10^{-34}) \div ((9.11 \times 10^{-31})(5.47 \times 10^{-10}))$.

Watch out: 1.60×10^{-19} is the electron's charge, not its mass.

4 **B**

de Broglie wavelength of an electron · Edexcel IAL October 2025 · Unit 2 · Q4

$\lambda = h/(mv)$ with the electron mass: $\lambda = (6.63 \times 10^{-34}) \div (9.11 \times 10^{-31} \times 2 \times 10^{7})$. Option A uses the mass of a proton.

5 **B**

Particle with a quarter of the wavelength · Edexcel IAL October 2024 · Unit 2 · Q7

$\lambda = h/(mv)$, so a quarter of the wavelength needs four times the momentum mv. Row B: $0.5m \times 8v = 4mv$.

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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