GET BETTER AT PHYSICS · MARK SCHEME

Photoelectric Effect: tiered multiple choice

Edexcel IAL Physics · Unit 2 (WPH12) · Specification points 59–62 · 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
C	C	C	B	B

Easy

Questions 1–5

1 **C**

Definition of threshold frequency · Edexcel IAL June 2024 · Unit 2 · Q6

The threshold frequency is the minimum frequency of light that can release an electron from a metal surface. Below it, a photon's energy hf is less than the work function, whatever the intensity.

2 **C**

Evidence for the photon model · Edexcel IAL January 2021 · Unit 2 · Q4

The photoelectric effect can only be explained if light arrives in packets of energy (photons) of size hf. Diffraction, Huygens' construction and polarisation are all explained by the wave model.

How students did: Examiners reported that at least three-quarters of students got this right in January 2021.

3 **C**

What affects photoelectric emission · Edexcel IAL June 2025 · Unit 2 · Q9

Each electron absorbs a single photon of energy hf, so the maximum kinetic energy (hf − φ) depends on the frequency, not the intensity. The intensity only changes how many photons arrive per second, and so how many electrons are emitted per second.

4 **B**

An observation of the photoelectric effect · Edexcel IAL January 2020 · Unit 2 · Q6

Experiments show that increasing the frequency increases the maximum kinetic energy of the emitted electrons. Emission is immediate (no delay), intensity affects only the number of electrons, and there is a threshold frequency, which means a maximum wavelength, not a minimum.

5 **B**

Planck constant from a graph of 1/λ against KE · Edexcel IAL June 2024 · Unit 2 · Q10

Einstein's equation: $hc/\lambda = \varphi + \frac{1}{2}mv^2_{max}$. Dividing by hc: $1/\lambda = (1/hc) \times \frac{1}{2}mv^2_{max} + \varphi/(hc)$. So the gradient of this graph is 1/(hc), and h = 1/(c × gradient).

Watch out: Rearrange into y = mx + c with the graph's own axes before reading off the gradient.

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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