GET BETTER AT PHYSICS · MARK SCHEME

Diffraction & Gratings: tiered multiple choice

Edexcel IAL Physics · Unit 2 (WPH12) · Specification points 50–53 · 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	A	D	D	B

Easy

Questions 1–3

1 **A**

Meaning of d in nλ = d sin θ · Edexcel IAL January 2023 · Unit 2 · Q4

d is the grating spacing: the distance between adjacent lines (slits) on the grating. The number of lines per metre is 1/d.

2 **A**

Naming the spreading of waves · Edexcel IAL June 2023 · Unit 2 · Q1

Diffraction is the spreading of waves as they pass through a gap or around an obstacle. Interference is the superposition of two waves; reflection and refraction change a wave's direction at a boundary.

3 **D**

Wavelength from a diffraction grating set-up · Edexcel IAL June 2022 · Unit 2 · Q5

d = 1/300 000 m (300 lines per mm = 300 000 per m). For the first-order maximum, λ = d sin θ, and from the diagram sin θ = opposite/hypotenuse = 0.378/2.035. So λ = (1/300 000) × (0.378/2.035).

> **Watch out:** sin θ uses the hypotenuse (2.035 m), not the perpendicular distance to the screen (2.000 m), which would give tan θ.

Medium

Questions 4–5

4 **D**

Moving the first-order maximum closer · Edexcel IAL June 2023 · Unit 2 · Q8

For n = 1, sin θ = λ/d. A smaller wavelength gives a smaller angle, so the first-order maximum moves closer to the centre. More lines per mm means smaller d, which increases θ; a longer grating-to-screen distance spreads the pattern further.

How students did: Examiners reported that fewer than half of students got this right in June 2023. Students mixed up the terms in the grating equation, and confused it with the double-slit equation.

5 **B**

Spreading the maxima further apart · Edexcel IAL October 2019 · Unit 2 · Q10

sin θ = nλ/d. Decreasing the line spacing d increases θ for each order, so the maxima spread further apart. Moving the screen closer or using a shorter wavelength would bring them closer; intensity makes no difference.

How students did: Examiners singled this out as one of the hardest multiple-choice questions on the October 2019 paper. The most common wrong answer was D.

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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