GET BETTER AT PHYSICS · MARK SCHEME

Refraction & Total Internal Reflection: tiered multiple choice

Edexcel IAL Physics · Unit 2 (WPH12) · Specification points 45–48 · 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	D	A	C	A

Easy

Questions 1–3

1 **B**

Speed of light from refractive index · Edexcel IAL June 2025 · Unit 2 · Q1

$n = c/v$, so $v = c/n = (3.00 \times 10^8) \div 1.47 = 2.04 \times 10^8$ m s^{-1}.

2 **D**

Light at a glass–air boundary above the critical angle · Edexcel IAL January 2021 · Unit 2 · Q8

Light travelling from glass towards air with an angle of incidence greater than the critical angle (42°) is totally internally reflected. At 45° all the light is reflected. At 40°, below the critical angle, most is refracted but some is still reflected, so 'all refracted' is wrong.

3 **A**

Light hitting glass below the critical angle · Edexcel IAL January 2024 · Unit 2 · Q1

Total internal reflection can only happen when light travels from a denser to a less dense medium above the critical angle. Here light goes from air into glass, so some is reflected and most is refracted (transmitted) into the glass, bending towards the normal.

How students did: 52% of students got this right in January 2024.

Medium

Questions 4–5

4 **C**

Where total internal reflection could happen · Edexcel IAL January 2022 · Unit 2 · Q6

From L to M the ray bends towards the normal, so light is slower in M than in L (M is optically denser). Total internal reflection needs light to travel from a denser medium towards a less dense one, so it could happen for light travelling from M to L.

How students did: Examiners listed this among the least successful multiple-choice questions on the January 2022 paper. The most common wrong answer was A.

5 **A**

Can total internal reflection happen here? · Edexcel IAL January 2023 · Unit 2 · Q3

Total internal reflection only happens when light travels from a medium with a higher refractive index towards one with a lower refractive index. Here light goes from air into glass, so TIR cannot happen at any angle of incidence.

> **Watch out:** The textbook condition ‘angle greater than the critical angle’ is only half the story: the light must also be going into the less dense medium.

How students did: Only 36% of students got this right in January 2023. The most common wrong answer was C, the textbook TIR condition; but the light was going into a denser medium, so TIR could not happen.

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**

GET BETTER AT PHYSICS · WHAT NEXT?

Got some of these wrong?

Good. The questions you got wrong show you exactly what to work on next. The quickest way to fix them is to work through them with someone who marks these papers.

Book a free 15-minute call

Tell me which questions caught you out. We'll talk about what's going wrong and whether 1-to-1 or small-group tuition would help. There's no obligation.

Book your free call

calendly.com/getbetteratphysics/freechat

Scan to book

Current AQA examiner

I know what the mark schemes reward and where marks are lost.

Matched to your exam board

Sessions follow your specification and the topics you find hardest.

Pay per session

No block booking. 1-to-1 or small groups of up to 4.

More free packs

Tiered past-paper questions with full mark schemes, sorted by topic.
getbetteratphysics.co.uk/free-revision-packs

Masterclasses are coming

Want to hear first? Email **helpme@getbetteratphysics.co.uk** and I'll let you know when dates are announced.

Parents: I use these packs in my own tutoring sessions. Tuition options and prices:
getbetteratphysics.co.uk/tuitionpricing