FREE REVISION PACK

Refraction & Total Internal Reflection

Pearson Edexcel International Advanced Level Physics · Unit 2 (WPH12) · Specification points 45–48

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Speed of light from refractive index	Edexcel IAL June 2025 · Unit 2 · Q1	1 mark
2	Easy	Light at a glass–air boundary above the critical angle	Edexcel IAL January 2021 · Unit 2 · Q8	1 mark
3	Easy	Light hitting glass below the critical angle	Edexcel IAL January 2024 · Unit 2 · Q1	1 mark
4	Medium	Where total internal reflection could happen	Edexcel IAL January 2022 · Unit 2 · Q6	1 mark
5	Medium	Can total internal reflection happen here?	Edexcel IAL January 2023 · Unit 2 · Q3	1 mark

Key ideas to have ready

- $n = c/v$; Snell's law $n_1 \sin\theta_1 = n_2 \sin\theta_2$.
- Entering a denser medium, light slows and bends towards the normal; frequency is unchanged.
- TIR needs light going from higher to lower n, at an angle greater than the critical angle.
- $\sin C = n_2/n_1$ (= 1/n for a material–air boundary).

How to use this pack

1. The questions are grouped into levels (Easy and Medium). 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 1–3

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

Edexcel IAL June 2025 · Unit 2 · Q1

1 The refractive index of vegetable oil is 1.47

Which of the following is the speed of light, in $m\,s^{-1}$, in vegetable oil?

☒ **A** 1.59×10^8

☒ **B** 2.04×10^8

☒ **C** 3.00×10^8

☒ **D** 4.41×10^8

Edexcel IAL January 2021 · Unit 2 · Q8

2 A ray of light travels through glass, towards a boundary between glass and air.
The critical angle for this boundary is 42°.

Which row of the table is correct?

	Angle of incidence	What happens at the boundary?
☒ **A**	40°	All of the light is refracted
☒ **B**	40°	All of the light is reflected
☒ **C**	45°	All of the light is refracted
☒ **D**	45°	All of the light is reflected

Edexcel IAL January 2024 · Unit 2 · Q1

3 A ray of light in air is incident on a glass surface. The angle of incidence is less than the critical angle.

Which of the following describes what happens to the ray of light?

☒ **A** partially reflected and partially transmitted

☒ **B** refracted away from the normal

☒ **C** totally internally reflected

☒ **D** transmitted along the normal

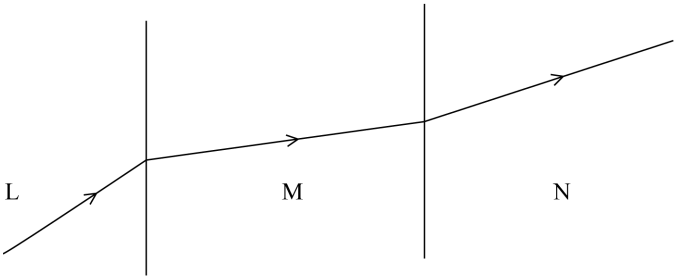
Medium

Two or three steps. Roughly a third to a half of students get these right.

Questions 4–5

Edexcel IAL January 2022 · Unit 2 · Q6

4 The diagram shows refraction of a ray of light as it passes through three transparent substances, L, M and N. The speeds of light in the three substances are v_L, v_M and v_N, respectively.



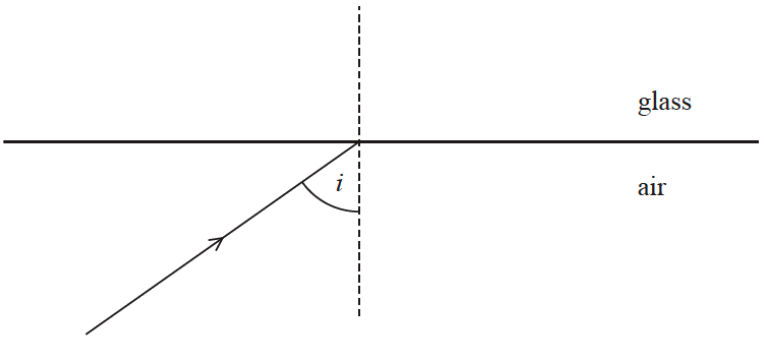
Which of the following could result in a ray of light undergoing total internal reflection?

- ☒ **A** light travelling from L to M
- ☒ **B** light travelling from L to N
- ☒ **C** light travelling from M to L
- ☒ **D** light travelling from N to M

Edexcel IAL January 2023 · Unit 2 · Q3

5 A ray of light approaches a boundary between air and glass, as shown.

The angle of incidence is i.



Which of the following statements about total internal reflection (TIR) is correct for the ray of light at this boundary?

- ☒ **A** TIR cannot take place.
- ☒ **B** TIR takes place if i is equal to the critical angle.
- ☒ **C** TIR takes place if i is greater than the critical angle.
- ☒ **D** TIR takes place if i is less than the critical angle.

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