



Unit 10 • Wave: refraction and total internal reflection

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 32

1 Key words

[4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

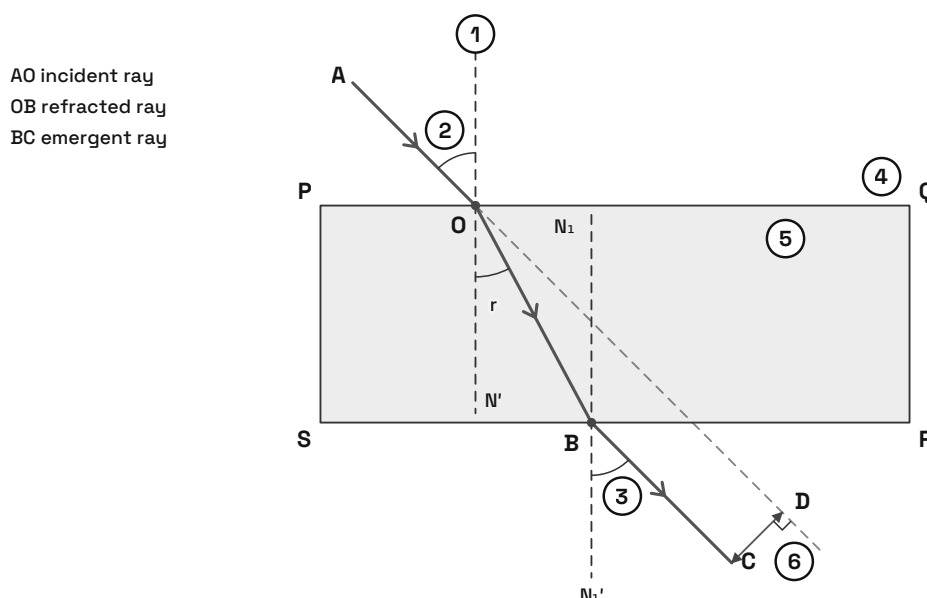
apparent depth cladding critical angle dispersion emergent ray optically denser
refraction refractive index Snell's law total internal reflection

The bending of light as it passes from one medium into another is called _____. Of two media, the one in which light travels more slowly is the _____ medium. The ratio $\sin i \div \sin r$ is the _____, and the law that it is constant is _____. A pool looks shallower than it is: its _____ is less than its real depth. The angle of incidence in the denser medium for which the angle of refraction is 90° is the _____. At a larger angle, all the light is reflected back into the denser medium: this is _____. In an optical fiber, the glass core is wrapped in a _____ of glass with a lower refractive index.

2 Label the diagram

[3]

The diagram shows light passing through a rectangular glass slab. Write the name of each line, angle, distance or medium numbered 1 to 6. Each carries 0.5 mark.



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____



3 Multiple choice

[5]

Choose the correct option for each of the following questions.

- i. Which of these rules applies during the refraction of light? [1]
- a. Light bends only while passing from a rarer medium into a denser medium.
 - b. Light bends towards the normal as it passes from a denser medium into a rarer medium.
 - c. When light passes from a rarer medium into a denser medium, the angle of incidence is smaller than the angle of refraction.
 - d. The angle of refraction is greater than the angle of incidence when light travels from a denser medium into a rarer medium.
- ii. Light in medium 1 meets the boundary with medium 2 at 15° to the normal, and goes on in medium 2 at 30° to the normal. Which statement is correct? [1]
- a. Medium 2 is denser and medium 1 is rarer.
 - b. The speed of light in medium 2 is less than in medium 1.
 - c. The speed of light in medium 1 is twice that in medium 2.
 - d. Medium 1 is denser and medium 2 is rarer.
- iii. Which result is obtained from observing refraction through a glass slab? [1]
- a. $\angle i = \angle e < \angle r$
 - b. $\angle i > \angle r = \angle e$
 - c. $\angle i < \angle e = \angle r$
 - d. $\angle i = \angle e > \angle r$
- iv. What is the critical angle of glass? [1]
- a. 42°
 - b. 49°
 - c. 24°
 - d. 47°
- v. Which of these does NOT depend on total internal reflection? [1]
- a. the sparkle of a diamond
 - b. the silver shine of an air bubble in water
 - c. a mirage on a hot road
 - d. a pencil looking bent in water

4 Very short answers

[4]

Write very short answers to the following questions.

- a. What is the unit of refractive index? [1]
-
-
- b. What is the cause of the refraction of light? [1]
-
-
- c. Light passes from glass into air at a slant. Does it bend towards or away from the normal? [1]
-
-
- d. Name the instrument, made with optical fibers, that doctors pass down the food pipe to see inside the stomach. [1]
-
-



[4]

Write short answers to the following questions.

[2]

[2]

[4]

Write a long answer to the following question.

A ray of light inside a glass block travels towards the glass–air surface. The critical angle of glass is 42° . What happens to the ray if it meets the surface at

- 30°?
- 42°?
- 60°?
- Name one device that uses what happens in (iii).

[6]

Solve the following problems. Show your working.

[2]

[illegible]

Answer:

[4]



