

Sec 3 Physics e-Learning Revision

Topics: Chapter 8 Refraction of light

Date : _____

Name : _____ ()

Class: _____

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From <http://johnlittlephysics.pbwiki.com/>

→ Ch 7: Refraction of light → [Online revision cum quiz!](#)

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8.1 Introduction

- In **Figure 8.1.1**, label the angle of incidence i , angle of refraction r at the first air to glass boundary.
- The incident ray is _____ to the emergent ray.
- Complete the path of the light ray in **Figure 8.1.2**.

Figure 8.1.1

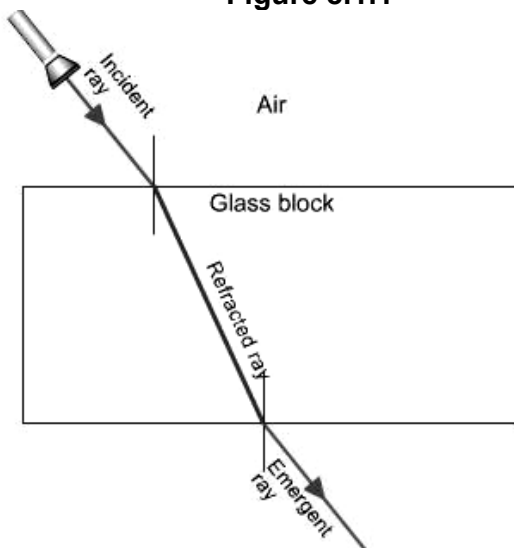
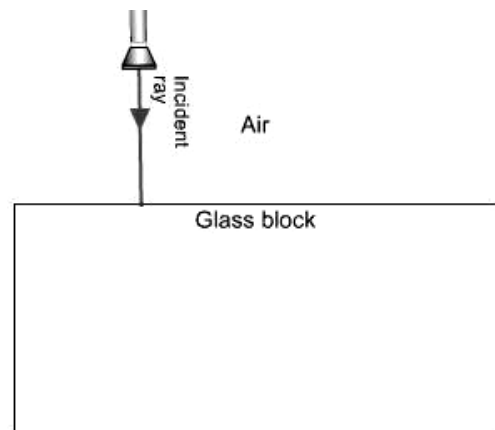


Figure 8.1.2



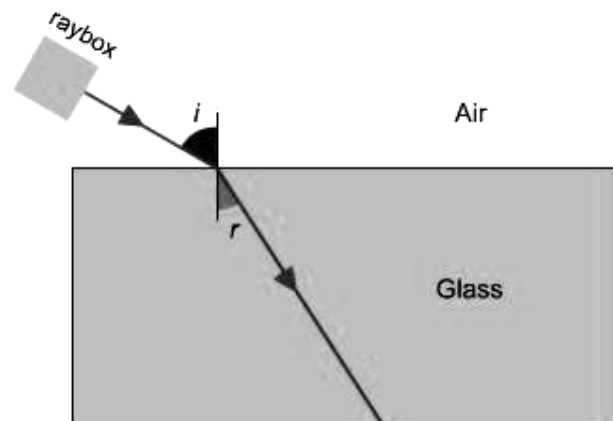
8.2 Laws of refraction (highlight or underline the key words!)

- 1st law states that _____

- 2nd law states that _____

8.3 Optically less dense to denser medium

- When a light ray travels from an optically less dense medium to a denser medium, the angle of incidence is _____ than the angle of refraction.



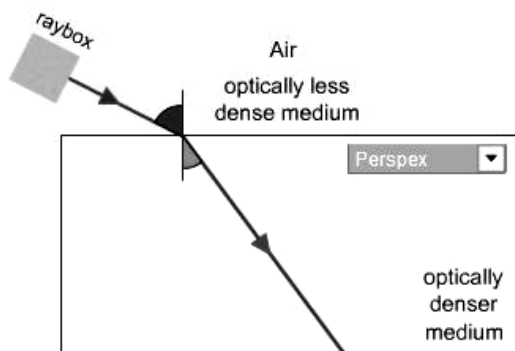


Figure 8.3.1 shows a light ray travelling from air into perspex. The angle of incidence is 58° and the angle of refraction is 34.7° . Calculate the refractive index of perspex.

Quick check

1. When light travels, at an angle, from an optically less dense to a denser medium,

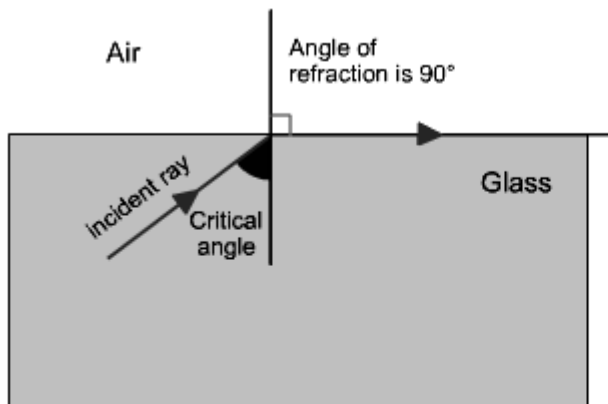
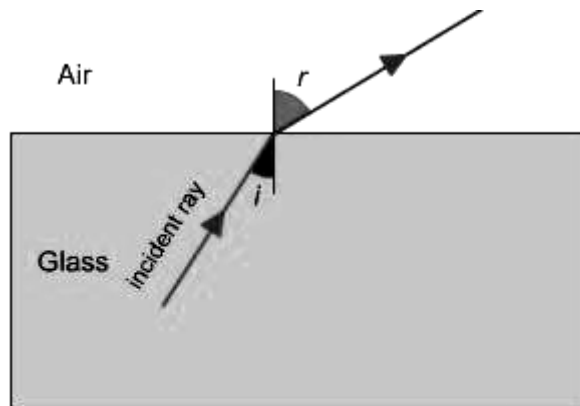
- A. it keeps to its original path.
- B. bends towards the normal.
- C. bends away from the normal.

2. The ratio $\sin i / \sin r$

- A. increases with the angle of incidence, i .
- B. decreases with the angle of incidence, i .
- C. remains constant for a particular medium.

8.4 Optically denser to less dense medium

- When a light ray travels from an optically denser medium to a less dense medium, and refraction occurs, the angle of incidence is _____ than the angle of refraction.



When a light ray passes from an optically denser medium to a less dense medium, the ray is bent away from the normal.

The formula is, $n = \sin r / \sin i$

- The critical angle is defined as the angle of incidence in the optically denser medium for which the angle of refraction in the less dense medium is 90° .
- Total internal reflection occurs when
 - 1) the ray of light passes from a denser medium to a less dense medium.
 - 2) the angle of incidence in the denser medium is greater than the critical angle.

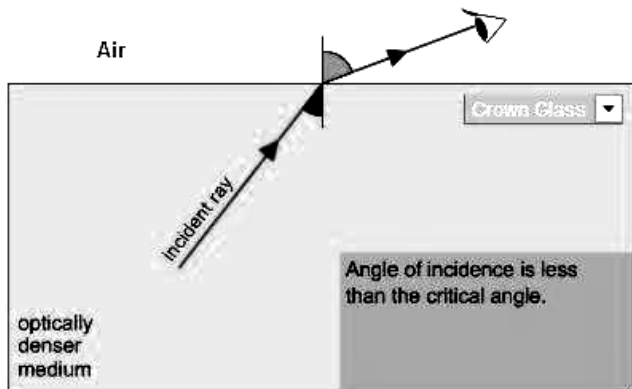
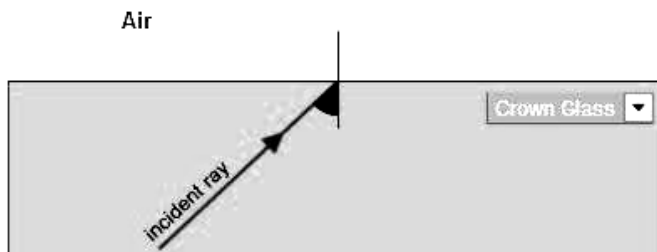


Figure 8.4.1 on the left shows a light ray travelling from crown glass into air. The angle between the incident ray and the boundary is 38° . The angle of refraction is 69.4° .

(a) Calculate the refractive index of crown glass.

(b) Calculate the critical angle.

(c) If the angle of incidence is increased to 47° , complete the path of the light ray in **Figure 8.4.2** on the right.



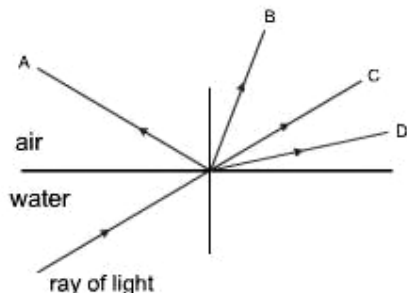
Quick check

1. When light travels, at an angle, from an optically dense to a less dense medium,
 - A. it keeps to its original path.
 - B. bends towards the normal.
 - C. bends away from the normal.

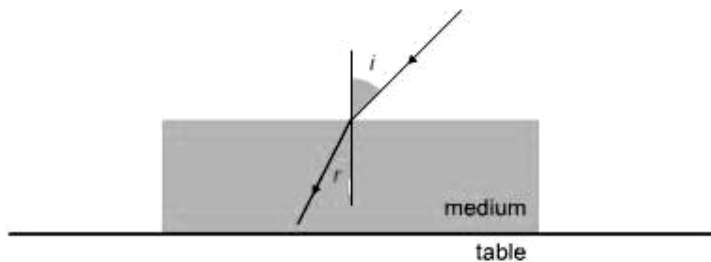
2. A ray of light is passing from a glass block and out into the air, at an angle to the glass block. What happens when the incident angle is equal to the critical angle?
 - A. Total internal reflection occurs.
 - B. The angle of refraction will be 90° .
 - C. The angle of refraction is less than 90° .

8.5 Quiz (5 questions)

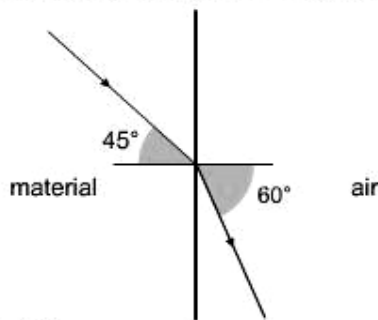
1. The diagram shows a light ray traveling in water and meets the water surface. Which one of the following labelled rays is most likely to be the resultant light ray?



- A. Ray A
 - B. Ray B
 - C. Ray C
 - D. Ray D
2. Total internal reflection of a ray of light is possible when the ray goes from
- A. a denser to less dense medium and the angle of incidence is greater than the critical angle.
 - B. a denser to less dense medium and the angle of incidence is less than the critical angle.
 - C. a less dense to denser medium and the angle of incidence is greater than the critical angle.
 - D. a less dense to denser medium and the angle of incidence is less than the critical angle.
3. The diagram shows a medium placed on a table. A ray of light traveling from the air meets the medium at an angle of incidence of 40° , and its angle of refraction is 24° . What is the refractive index of the medium?



- A. 0.56
 - B. 0.59
 - C. 1.58
 - D. 1.67
4. The refractive index of a glass material is 1.50. What is the critical angle of the material?
- A. 0.67°
 - B. 41.8°
 - C. 48.2°
 - D. 90.0°
5. The diagram shows a ray of light moving from an unknown material to air. What is the refractive index of the material?



- A. 0.71
- B. 0.82
- C. 1.22
- D. 1.41

Prepare well and do your best ©