Refraction of light rays

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Starter for 10. . .

1. I'll swap you reflexion GCSE revision sheets for a reading memo & your homework!

Reflexion I

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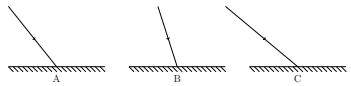
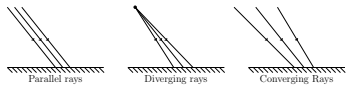
1. Copy out and complete:
   "Light travels in . . . lines, which are drawn as lines called . . . ."
2. A laser beam can be bounced off the Moon (from a retro-reflector left by astronauts). The light travels there and back in 2.6 s. If light travels at 300 000 000 m/s, calculate the distance to the moon.
3. Copy out and complete the following diagrams, showing the reflected ray. Don't forget to include the direction (arrow) on the reflected ray.



4. Copy out and complete the following:
   The law of reflexion says
   "The angle of . . . equals the angle of . . . ."
5. (a) Copy out and complete the following diagrams, showing the reflected rays.



   (b) Label your diagrams to show which diagram has
   i. converging rays after reflexion,
   ii. parallel rays after reflexion,
   iii. diverging rays after reflexion.

Reflexion II

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1. The image in a plane mirror is a virtual image. Explain what is meant by the word virtual.
2. An object is placed 6 cm from a plane mirror, as shown below

   COPY THE DIAGRAM IN FULL SIZE, and carefully locate the image by reflecting the two rays.
3. Where would you see the sign below, and why is it written that way?

AMBULANCE

4. A boy is 155 cm tall, and stands 5 m from a mirror.
   (a) How tall is his image?
   (b) How far behind the mirror is his image?
   (c) How far away from him is his image?
   (d) He approaches the mirror at 1 m/s. How fast does he approach his image?
5. The angle between an incident ray and a plane mirror is 30 degrees.
   (a) What is the angle of incidence?
   (b) What is the angle of reflexion?

2. BPhO AS Challenge 16 March 2012, training sessions 7 February & 13 March

Lesson Objectives

1. To understand the refraction notes.
2. To be able to answer refraction questions.
3. (if there's time) to discuss the homework.

Textbook pp. 188–192

REMINDER: Office hours are week 2 Tuesdays 3.45–5.0 p.m. in room 19.
Next office hours: Tuesday 23 February 2012

Specification Requirement

Refraction at a plane surface

Refractive index of a substance s, $n = \frac{c}{c_s}$

Candidates are not expected to recall methods for determining refractive indices.

Law of refraction for a boundary between two different substances of refractive indices n_1 and n_2 in the form

$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$

Total internal reflection including calculations of the critical angle at a boundary between a substance of refractive index n_1 and a substance of lesser refractive index n_2 or air;

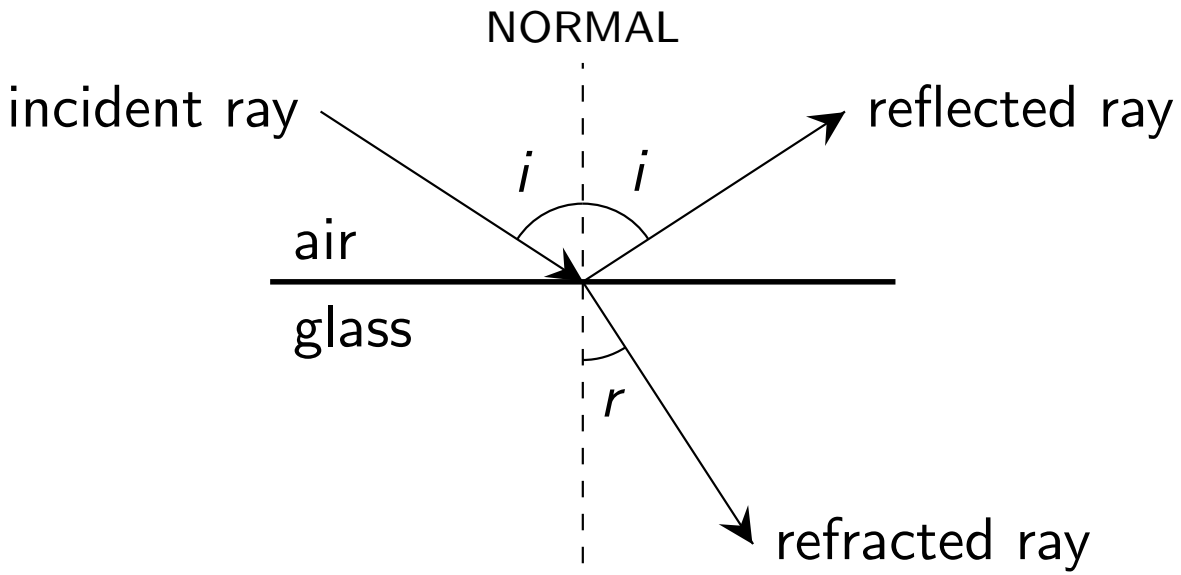
$$\sin\theta_c = \frac{n_2}{n_1}$$

Simple treatment of fibre optics including function of the cladding with lower refractive index around central core limited to step index only; application to communications.

[AQA GCE AS and A Level Specification Physics A, 2009/10 onwards]

Reading memos. . .

Refraction


NORMAL
incident ray
reflected ray
i
i
air
glass
r
refracted ray