# Year 12 Science: Light: mirrors, refraction, total internal reflection and lenses

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

## Practice

1. Light goes from air into glass (n = 1.50) at an angle of incidence of 35°. Find the angle of refraction.

2. Use the table: what is the speed of light in diamond (n = 2.4)?

3. Find the critical angle for light going from water (n = 1.33) into air.

4. A converging lens has f = 20 cm, and an object is 60 cm away. Find the image distance and the magnification.

5. A concave make-up mirror has f = 30 cm, and a face is 10 cm in front of it. Find the image distance and describe the image.

## Exam-style question: the magnifying glass

**Hemi reads the small print on a museum label with a glass magnifying lens. The lens is converging, with a focal length of 8.0 cm. The letters are 2.0 mm tall, and he holds the lens 6.0 cm from the label.**

6. Describe the nature of the image Hemi sees.

7. Calculate the image distance and the height of the image of a letter.

8. Hemi lifts the lens until it is 12 cm from the label. Explain what happens to the image, with a calculation.

9. Explain, in terms of the speed of light, why the glass lens changes the direction of the light.

## Fix the mistake

10. Correct this statement: "The ray hits the surface at 30°, so I put 30° into Snell's law."

11. Correct this statement: "For the diverging lens I used f = +12 cm and got a real image."

12. Correct this statement: "Light changes frequency when it goes into glass, which is why its wavelength changes."

13. Correct this statement: "Total internal reflection happens when light goes from air into glass at a big angle."