Leaving Cert Exam Paper and *Test* Questions

1. Define (i) a Real Image, and (ii) a Virtual Image.

2. State the laws of refraction of light. [2002]

3. Draw a diagram to show how an image is formed in a convex lens when the object is placed between f and 2f.

4. A converging lens is used as a magnifying glass. Draw a ray diagram to show how an erect image is formed by a magnifying glass. [2006]

5. A diverging lens cannot be used as a magnifying glass. Explain why. [2006]

6. A converging lens has a focal length of 8 cm. Determine the two positions that an object can be placed to produce an image that is four times the size of the object. [2006]

7. An object is placed 12 cm in front of a *concave lens* of focal length 20 cm. Find the position, nature and magnification of the image.

8. Draw a diagram to show how an image is formed in a concave lens. State whether the image is Real/virtual, Magnified/Diminished, Upright/Inverted.

9. Two converging lenses, each with a focal length of 10 cm, are placed in contact.
   What is the power of the lens combination? [2004]

10. A concave lens of power 0.08 m^{-1} and a convex lens of power 0.04 m^{-1} are placed in contact.
    Calculate (i) the power of the combination
    (ii) the focal length of the combination
    (iii) Does the combination behave as a concave or a converging lens?

11. [2006]

The power of an eye when looking at a distant object should be 60 m^{-1}.

A person with defective vision has a minimum power of 64 m^{-1}.

(i) Calculate the focal length of the lens required to correct this defect.
(ii) What type of lens is used?
(iii) Name the defect.

12. [2002]

The power of a normal eye is +60 m^{-1}. A person with defective vision has a minimum power of +65 m^{-1}.

(i) Calculate the power,
(ii) Calculate the focal length of the contact lens required to correct the person's short-sightedness.

13. Draw a labelled diagram showing the optical structure of the eye. [2002]

14. How does the eye bring objects at different distances into focus? [2002]

15. Show with the aid of a labelled diagram how short-sightedness can be improved with the use of an appropriate lens.

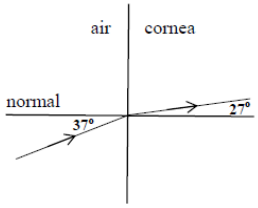
16. [2003]
The following is part of a student's report of an experiment to measure the focal length of a converging lens.
"I found the approximate focal length of the lens to be 15 cm.
I then placed an object at different positions in front of the lens so that a real image was formed in each case."
The table shows the measurements recorded by the student for the object distance *u* and the image distance *v*.

u/cm	20.0	25.0	35.0	45.0
v/cm	66.4	40.6	27.6	23.2

(i) How did the student find an approximate value for the focal length of the lens?
(ii) Describe, with the aid of a labelled diagram, how the student found the position of the image.
(iii) Use the data to calculate a value for the focal length of a converging lens.
(iv) Give two sources of error in measuring the image distance and state how one of these errors can be reduced.

17. [2008]
An eye contains a lens system and a retina, which is 2.0 cm from the lens system. The lens system consists of the cornea, which acts as a fixed lens of power 38 m^{-1}, and a variable internal lens just behind the cornea. The maximum power of the eye is 64 m^{-1}. Calculate:
(i) How near an object can be placed in front of the eye and still be in focus;
(ii) The maximum power of the internal lens.

18. [2008]
Light is refracted as it enters the cornea from air as shown in the diagram.
(i) Calculate the refractive index of the cornea.
(ii) Draw a diagram to show the path of a ray of light as it passes from water of refractive index 1.33 into the cornea.



19. [2008]
A swimmer cannot see properly when she opens her eyes underwater. When underwater (and using information from question 17):
(i) Why does the cornea not act as a lens when underwater?
(ii) What is the maximum power of the eye when underwater?
(iii) Why do objects appear blurred?
(iv) Explain how wearing goggles allows objects to be seen clearly.