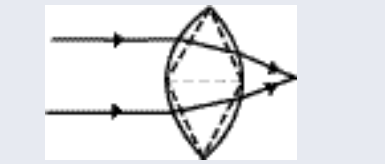
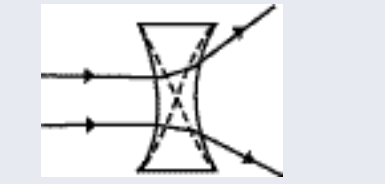
REFRACTION IN CONVEX AND CONCAVE SPHERES

Fig. 1: Refraction in a convex lens



A *convex lens* (plus lens) is like two prisms placed base to base. Light passing through a convex lens is converged. Convex lenses are used to treat presbyopia, hypermetropia and aphakia. If parallel light is brought to a focus at 1 metre the lens is said to have 1 dioptre of power. If the focus is at 1/2 metre, 2 dioptres, and at 1/3 metre, 3 dioptres (Fig. 1).

Fig. 2: Refraction in a concave lens



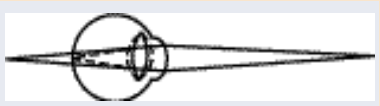
A *concave lens* (minus lens) is like two prisms placed apex to apex. Light passing through a concave lens is diverged. Concave lenses are used to treat myopia (Fig. 2).

REFRACTION OF THE EYE

Fig. 3: Refraction of the eye

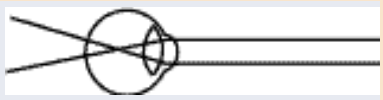
Light entering the eye is converged at the cornea and then the lens acts as a focusing mechanism to converge the light to a point on the retina, so that the object is seen clearly (Fig. 3).

Fig. 4: Refraction of the eye when the object is close: accommodation



If the object is close to the eye then the lens changes shape so that the light rays can still be focused on the retina. This is called accommodation. (The ability to accommodate begins to fail after the age of 40, so that spectacles are need for close work). (Fig. 4).

Fig. 5: Refraction in the eye: myopia



In myopia light rays are focused in front of the retina, so that a *minus* concave lens is needed to diverge the rays (Fig.5).

Fig.6: Refraction in the eye: hypermetropia (hyperopia)

In hypermetropia, it is the opposite, the rays are focused behind the retina so that a *plus* convex lens is needed (Fig.6).

REFRACTION IN CYLINDERS

A cylindrical lens has different powers in the vertical and horizontal axes. Thus, light passing through a cylindrical lens does not focus at one point, but forms two foci, one for the horizontal and the other for the vertical. Cylindrical lenses may be convex, concave or mixed. They are used to treat astigmatism.

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From: Hanyane: A Village Struggles for Eye Health
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Published by the International Centre for Eye Health.
(Also available in French)

Available from:
International Resource Centre, ICEH
11–43 Bath St., London, EC1V 9EL
Price: £5/$9
Postage and Packing:
Overseas: add £3/$5 (surface)
or £5/$9 (airmail) for each item
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