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Q1. Defect: Myopia; Corrected by using concave lens.
Q2.
(a) Hypermetropia
(b) Myopia
Q3.
(a) Myopia
(b) Hypermetropia
Q4.
(a) Convex lens
(b) Concave lens
Q5.
(A) Near Sightedness
(B) Far Sightedness
Q6.
(a) Myopia
(b) Hypermetropia
Q7.
(a) Concave lens
(b) Convex lens
Q8. True
Q9. Presbyopia
Q10. Cataract
Q11. Presbyopia
Q12.
(a) Myopia
(b) Hypermetropia
Q13. Cataract
Q14. Eye
Q15. Less than infinity.
Q16. The near point of a person suffering from hypermetropia is farther away from the normal near point (25 cm).
Q17.
(a) Short-sighted
(b) Diverging lenses
Q18.
(a) Hypermetropia (Long Sightedness)
(b) Convex lens
Q19.
(a) Myopia (Short - Sightedness)
(b) Concave lens
Q20.
(a) distant, concave
(b) nearby, convex

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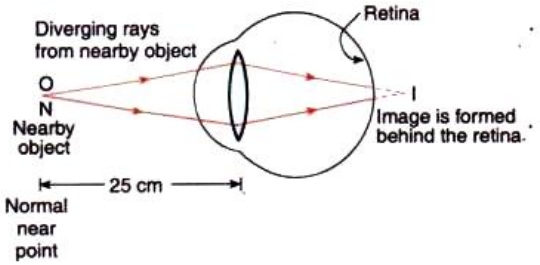
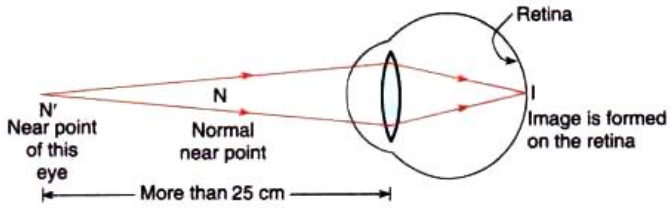
Q21.
The two most common defects of vision are myopia and hypermetropia. Myopia can be corrected by using a concave lens and hypermetropia can be corrected by using a convex lens.
Q22.
In myopia, a person can see nearby objects clearly but cannot see distant object clearly. In hypermetropia, a person can see distant objects clearly but cannot see nearby objects clearly.

A person having the defects of myopia as well as hypermetropia should wear spectacles having bifocal lenses in which upper part consists of concave lens and lower part consists of convex lens. The upper part corrects myopia and the lower part corrects hypermetropia.

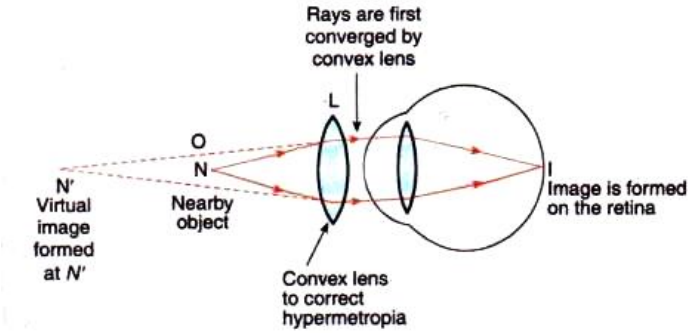
Q23. Hypermetropia can be corrected by a converging lens.
Correction of hypermetropia is given in the following diagram:



(*a*) In a hypermetropic eye, the image of nearby object lying at normal near point *N* (at 25 cm) is formed behind the retina.

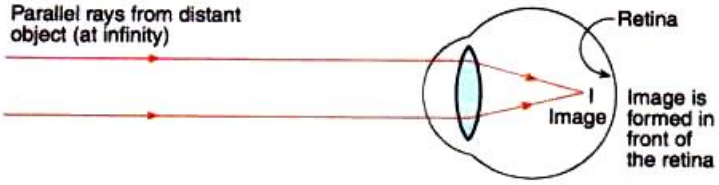


(*b*) The near point *N'* of hypermetropic eye is farther away from the normal near point *N*

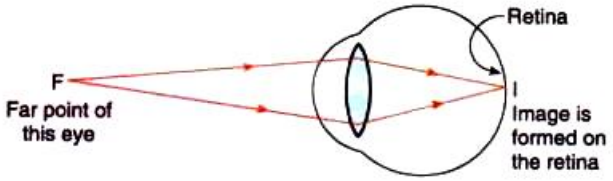


(*c*) *Correction of hypermetropia*. The convex lens forms a virtual image of the object (lying at normal near point *N*) at the near point *N'* of this eye.

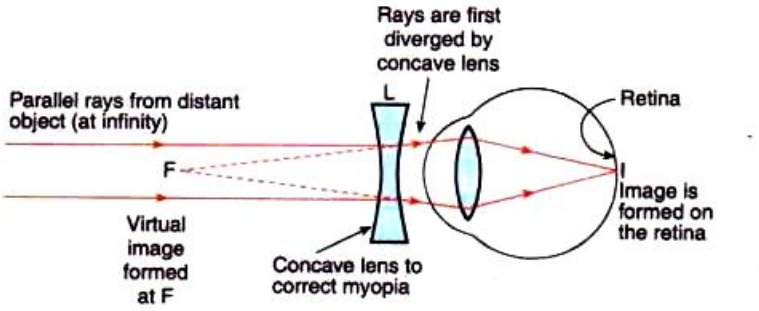
Q24.
Myopia can be corrected by a diverging lens.
Correction of myopia is given in the following diagram:



(*a*) In a myopic eye, image of distant object is formed in front of the retina (and not on the retina)

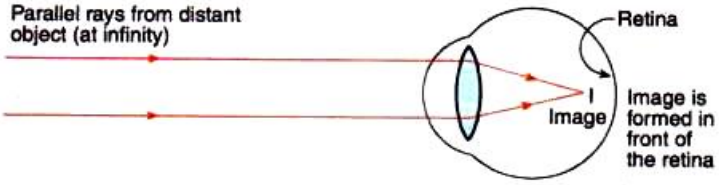


(*b*) The far point (*F*) of a myopic eye is less than infinity

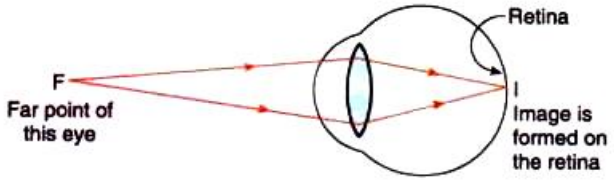


(*c*) *Correction of myopia*. The concave lens placed in front of the eye forms a virtual image of distant object at far point (*F*) of the myopic eye

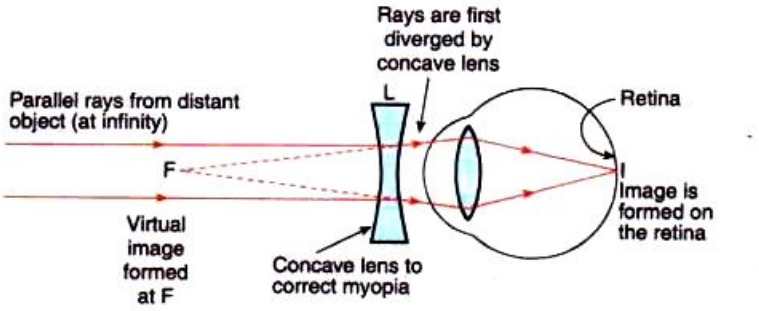
Q25.
Myopia or short sightedness is that defect of vision due to which a person cannot see the distance objects clearly (though he can see the nearby objects clearly). This eye defect can be corrected by using a concave lens.
Myopic eye and its correction is given in the following diagrams



(*a*) In a myopic eye, image of distant object is formed in front of the retina (and not on the retina)

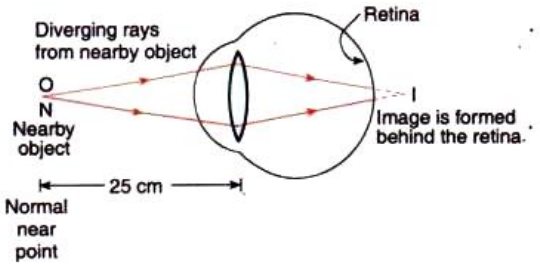


(*b*) The far point (*F*) of a myopic eye is less than infinity

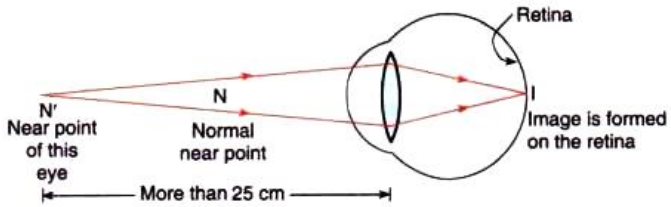


(*c*) *Correction of myopia*. The concave lens placed in front of the eye forms a virtual image of distant object at far point (*F*) of the myopic eye

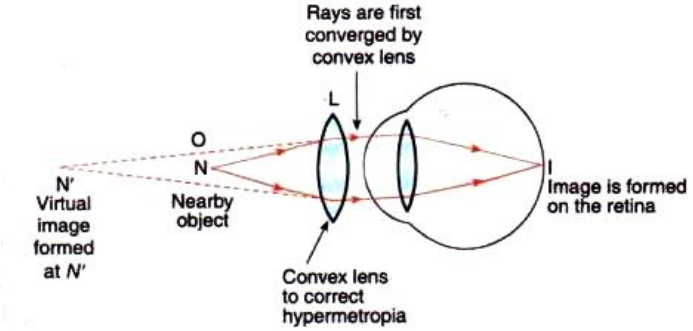
Q26.
Hypermetropia (or long-sightedness) is that defect of vision due to which a person cannot see the nearby objects clearly (though he can see the distant object clearly). This eye defect can be corrected by using a convex lens.
Hypermetropic eye and its correction is given in the following diagrams:



(*a*) In a hypermetropic eye, the image of nearby object lying at normal near point *N* (at 25 cm) is formed behind the retina.



(*b*) The near point *N'* of hypermetropic eye is farther away from the normal near point *N*



(*c*) *Correction of hypermetropia*. The convex lens forms a virtual image of the object (lying at normal near point *N*) at the near point *N'* of this eye.

Q27.

The person needs a concave lens to rectify this defect.
Calculation of power of the lens:
Here, far point of myopic eye = 2m
The object kept at infinity can be seen clearly if the image of this object is formed at 2m.
So, object distance, u=∞
Image distance, v=2m

$$\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$$

$$\frac{1}{-2}-\frac{1}{\infty}=\frac{1}{f}$$

$$f=-2m$$

$$P=\frac{1}{f}=\frac{1}{-2}=-0.5D$$

Q28.

The person needs a convex lens to rectify this defect.

Calculation of power of the lens:

This hypermetropic eye can see the nearby object kept at 25 cm clearly if the image is formed at its own near point i.e. 50 cm.

Object distance, u=-25cm
Image distance, v=-50cm

$$\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$$

$$\frac{1}{-50}-\frac{1}{-25}=\frac{1}{f}$$

$$f=50cm$$

$$P=\frac{100}{f}=\frac{100}{50}=2D$$

Q29.

(i) For distant vision:

P = -5.5D

P = 1/f

f = 1/P = 1/(-5.5) = -0.1818 m = -18.18cm

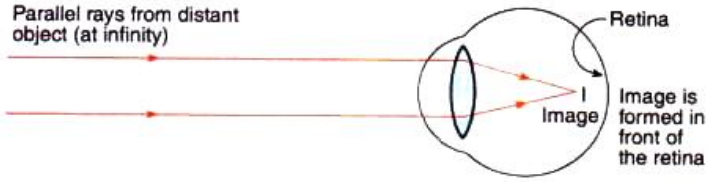
(ii) For Near Vision:

P = 1.5D

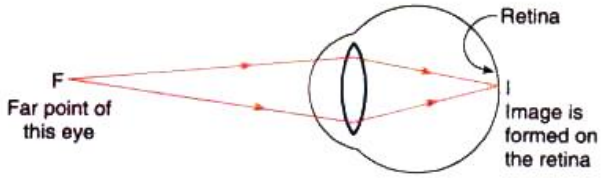
P = 1/f

f = 1/P = 1/1.5 = 0.6666 = 66.66 cm

Q30.
Presbyopia is that defect of vision due to which an old person cannot see the nearby objects clearly due to loss of power of accommodation of the eye.
Causes: Gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.
It can be corrected by using convex lenses.
Q31.
A person is said to have developed cataract when the eye lens becomes progressively cloudy resulting in blurred vision.
The vision of a person having cataract can be restored after getting surgery done on the eye having cataract. The opaque lens is removed from the eye by surgical operation and a new artificial lens is inserted in its place.
Q32. long, concave, short, convex, retina
Q33.
(a) Short Sightedness is that defect of vision due to which a person can see nearby objects clearly but cannot see distant objects clearly.
Causes:
1. Excessive curvature of the eye lens
2. Elongation of the eyeball
Ray diagram for:
(i) eye-defect short sightedness

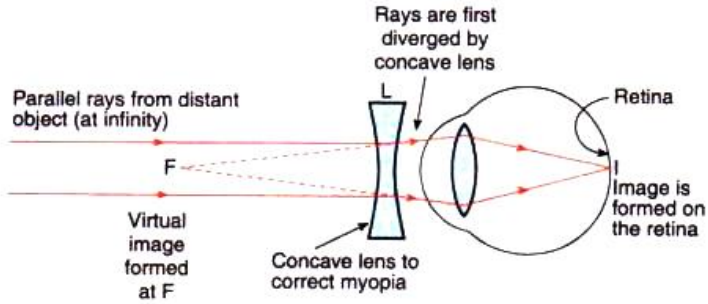


In a myopic eye, image of distant object is formed in front of the retina (and not on the retina)



The far point (F) of a myopic eye is less than infinity

(ii) Correction of short-sightedness by using a lens



Correction of myopia. The concave lens placed in front of the eye forms a virtual image of distant object at far point (F) of the myopic eye

(b) Concave lens should be used to restore proper vision.

Calculation of power:

Here, far point of myopic eye = 1.5m
The object kept at infinity can be seen clearly if the image of this object is formed at 1.5m.
So, object distance, u=∞
Image distance, v=1.5m

$$\frac{1}{v}-\frac{1}{u}=\frac{1}{f}$$

$$\frac{1}{-1.5}-\frac{1}{\infty}=\frac{1}{f}$$

$$f=-1.5m$$

$$P=\frac{1}{f}=\frac{1}{-1.5}=-0.67D$$

Q34.
(a) Long-sightedness is that defect of vision due to which a person cannot see the nearby objects clearly but he can see the distant objects clearly.
Causes:
1. Focal length of the eye lens is too long.
2. The eyeball has become too small.
Ray diagram for:
(i) eye-defect long-sightedness

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Q47.
If the spectacle lenses are convex, the person was long sighted and if the spectacle lenses are concave, the person was short sighted.
Q48.
Half moon spectacles are used for reading. so, the person has long-sightedness.
These particular spectacles are useful to him since the convex lenses of spectacles form the image of nearby object (like a book in hand) at the near point of his eye.
Q49.
(a) (i) No, (ii) Yes, (iii) No
(b) Concave lenses
Q50.
(a) (i) No, (ii) Yes
(b) Converging lenses
Q51.
(a) Presbyopia
(b) Hypermetropia

********** END **********