

Q6. A myopic person has been using spectacles of power -1.0 dioptre for distant vision. During old age, he also needs to use separate reading glass of power $+2.0$ dioptres. Explain what may have happened.

Solution:

Myopic person uses spectacles of power -1.0 dioptre or concave lens of focal length $f = 1/p = -100$ cm in order to observe clearly object at infinity. Far point of the person can be calculated as

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad \text{or} \quad \frac{1}{v} - \frac{1}{-\infty} = \frac{1}{-100} \quad \text{or} \quad v = -100 \text{ cm.}$$

Similarly, if the person uses spectacles of power $+2.0$ dioptre then he must be using convex lens of power $+2.0$ dioptre. Focal length and near point can be calculated as

$$f = \frac{1}{P} = \frac{1}{+2} = 0.5 \text{ m} = 50 \text{ cm}$$

For near point, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$$\frac{1}{v} - \frac{1}{-25} = \frac{1}{50} \quad \text{or} \quad \frac{1}{v} = \frac{1}{50} - \frac{1}{25}$$

$$\frac{1}{v} = \frac{1-2}{50} \quad \text{or} \quad v = -50 \text{ cm}$$

Thus, the person also has the defect of hypermetropia and has a near point 50 cm. So having both defects he needs different lenses for distant vision and to see closer objects.