Answer on Question 51681, Physics, Optics

16. How far from a magnifying glass do you place an object to view it?

a) closer than the focal length

b) distance equal to the focal length

c) greater than the focal length but less than twice the focal length

d) at twice the focal length

Answer:

A magnifying glass is a convex lens which produces a magnified (larger) image of an object. For a magnified image to be observed the distance between the object and the lens must be shorter (closer) than the focal length of the lens. So, the correct answer is

a) closer than the focal length.

17. Telescopes that use mirrors as the objectives are known as ---

a) refractors

b) reflectors

c) Galilean telescopes

d) terrestial telescopes

Answer:

Reflector is the type of the telescope that uses a curved mirror called the primary mirror instead of the objective lens to gather light. The primary mirror in a reflector is positioned at the bottom of the tube that forms the body of the telescope (unlike the objective lens in a refractor telescope which is at the upper end). Because the light entering the telescope is reflected by the primary mirror back into the tube, reflectors have a small flat mirror called the secondary mirror. The secondary mirror, in the Newtonian design, is placed opposite the primary mirror at an angle of 45 degrees. At this angle, the mirror deflects the image out through the side, into the eyepiece.

So, the correct answer is b) reflectors.

18. The property of light waves that determines its brightness is its ---

a) wavelength

b) velocity

c) frequency

d) amplitude

Answer:

The amplitude of a light wave determines the brightness of the light, so the correct answer is d) amplitude.

19. The speed of light in glass is approximately --- that in air

a) 100 times faster than

b) 100 times slower than

c) 50% faster than

d) 33% slower than

Solution:

We know, that the speed of light in air is $c_{air} = 3 \cdot 10^8 \frac{m}{s}$. Then, the speed of light in glass will be:

$$c_{glass} = \frac{c_{air}}{n_{glass}} = \frac{3 \cdot 10^8 \frac{m}{s}}{1.5} = 2 \cdot 10^8 \frac{m}{s},$$

So, let's obtain how slower the light in glass that in air:

$$\frac{c_{air} - c_{glass}}{c_{air}} \cdot 100\% = \frac{3 \cdot 10^8 \frac{m}{s} - 2 \cdot 10^8 \frac{m}{s}}{3 \cdot 10^8 \frac{m}{s}} \cdot 100\% = 0.33 \cdot 100\% = 33\%$$

Answer: d) 33% slower than in air.