Light

Very Short Answer Type Questions

Question 1.
What is meant by 'incident ray'?
Answer:
A ray of light that strikes a surface or falls on a surface before being reflected, transmitted or absorbed is known as incident ray.

Question 2.
What is meant by 'reflected ray'?
Answer:
The light ray reflected by a surface, when an incident ray strikes the same surface is the reflected ray. The reflected ray corresponds to the incident ray always.

Question 3.
How many reflected rays can there be for a given single incident ray falling on a plane mirror?
Answer:
For a single incident ray falling on a plane mirror, there is always a single reflected ray. The angle of incidence is always equal to the angle of reflection, this is by the law of reflection.

Question 4.
What do you understand by the term 'point of incidence'?
Answer:
The point of incidence is the point where the incident ray strikes the mirror.

Question 5.
What is 'normal' in the reflection of light from a plane mirror?
Answer:
Normal is an imaginary line perpendicular to the surface, in the reflection of light from a plane mirror.

Question 6.
Define the angle of incidence.
Answer:
The angle which incident ray makes with the perpendicular to the surface at the point of incidence.

Question 7.
Define the angle of reflection.
Answer:
The angle between the reflected ray and the line perpendicular to the reflecting surface at the point of incidence is known as the angle of reflection.

Question 8.
A ray of light is incident on a plane mirror at an angle of 30°. What is the angle of reflection?
Answer:
The angle of reflection will be 30 degree. This is by the law of reflection that angle of incidence is equal to the angle of reflection.

Question 9.
An incident ray makes an angle of 75° with the surface of a plane mirror. What will be the angle of reflection?
Answer:
The angle made by the normal will be 90 – 75 = 15. Angle made by normal is equal to angle of incidence. So i = 15 degree. And by the law of reflection which states that angle of incidence is equal to the angle of reflection, the angle of reflection will be 15 degree.

Question 10.
A ray of light is incident normally (perpendicularly) on a plane mirror. Where will this ray of light go after reflection from the mirror?
Answer:
When a ray of light is incident normally (perpendicularly) on a plane mirror, the ray reflects and follows the same path.

Question 11.
What is the angle of incidence when a ray of light is incident normally on a plane mirror?
Answer:
The angle of incidence when a ray of light is incident normally on a plane mirror is zero degree because the ray is incident normally.

Question 12.
What is the angle of reflection when a ray of light is incident normally on a plane mirror?
Answer:
The angle of reflection when a ray of light is incident normally on a plane mirror will be zero degree because the angle of incidence will be zero degree as the ray is incident normally. By law of reflection, angle of incidence = angle of reflection.

Question 13.
What is the angle of incidence of a ray of light if the reflected ray is at an angle of 90° to the incident ray?
Answer:
the angle of incidence = angle of reflection.
According to the question, given i + r = 90 degree
i = r
hence i + i = 90 degree
2i = 90 degree.
I = 45 degree.
Therefore, the angle of incidence is 45 degree.

Question 14.
Name the apparatus which is used to obtain a thin beam of light.
Answer:
The apparatus used to obtain a thin beam of light is known as Ray box. The rays are bright enough to be viewed easily. A ray box is a standard source of light used in optics experiments.

Question 15.
What type of reflection of light takes place from:
(a) a rough surface?
(b) a smooth surface?
Answer:
a) Diffused reflection takes place from a rough surface. The reflected rays are not parallel in diffused

reflection.
b) Regular reflection takes place from a smooth surface. The reflected rays are parallel in regular reflection.

Question 16.
Which type of reflection of light, regular reflection or diffuse reflection, leads to the formation of images?
Answer:
Regular reflection, wherein the reflected rays are parallel to each other, lead to the formation of images because all the rays get reflected in a particular direction. Regular reflection always occurs from a smooth surface.
Diffused reflection does not lead to the formation of images because the rays do not reflect in one particular direction.

Question 17.
What type of reflection of light takes place from:
(a) a cinema screen?
(b) a plane mirror?
Answer:
a) Regular reflection occurs from a cinema screen because the surface of the screen is smooth.
b) Regular reflection occurs from a plane mirror because the surface of a plane mirror is smoot/ even.

Question 18.
If an object is placed at a distance of 7.5 cm from a plane mirror, how far would it be from its image?
Answer:
The object would be 15cm far away from its image if it is placed at a distance of 7.5cm from the plane mirror.

The object is at 7.5cm from the mirror, then the image of the object is 7.5cm on the other side of the mirror. Hence, the image is a total of 15cm from object (7.5cm to the mirror + 7.5cm to the image).

Question 19.
Is the image of an object in a plane mirror: virtual or real?
Answer:
The image of an object in a plane mirror is virtual. Virtual image cannot be projected onto the screen because it is not real.

A virtual image is a copy of the object, formed on the plane mirror. The light rays never come from the image. They appear to come from the object.

Question 20.
Name the phenomenon responsible for the following effect:
When we sit in front of a plane mirror and write with our right hand, it appears in the mirror that we are writing with the left hand.
Answer:
the phenomenon is known as Lateral inversion. The effect produced by a plane mirror in reversing the images from left to right and right to left while forming images is lateral inversion.

Question 21.
Name a device which works on the reflection of reflected light.

Answer:
Periscope is one such device which works on the reflection of reflected light.

The light from the object falls on one mirror that is placed at 45o to the object and the light gets reflected. This reflected light in turn falls on another mirror and is again reflected until it reaches the eyepiece.

Question 22.
How are the two plane mirrors in a periscope arranged:
(a) with respect to one another?
(b) with respect to sides of the tube?
Answer:
a) The 2 plane mirrors are parallel to one another.

b) The plane mirrors make an angle of 45 degrees with respect to the sides of the tube.

Question 23.
What will be the number of images formed when an object is placed between two parallel plane mirrors facing each other?
Answer:
Infinite number of images are formed when an object is placed between two parallel plane mirrors facing each other. The object undergoes multiple reflection to produce image of the distant object. The distance between the mirror and the object is inconsiderable in formation of infinite images. No matter how much the distance be, number of images formed will be infinite.

Question 24.
Name an instrument or toy which works by producing multiple reflections from three plane mirrors to form beautiful patterns.
Answer:
Kaleidoscope is the instrument that works by producing multiple reflections. It consists of 3 plain mirrors inside a tube (cylinder) with colored glass pieces at one end and a glass to view on the other.

Question 25.
State one use of kaleidoscope.
Answer:
A Kaleidoscope is a toy mostly used by children for enjoyment. It is made of a tube with plain mirrors and colored glass pieces inside it at one of the end.

Kaleidoscope having object chambers are used for hiding valuables.

Question 26.
Name the device used to split white light into seven colours.
Answer:
A Glass Prism. It is a device used to split white light into seven colors. It has 2 triangular ends and 3 rectangular sides which help in splitting the white ray of light into a band of 7 colors, also known as spectrum.

Question 27.
What happens when a beam of sunlight is passed through a glass prism?
Answer:

When a beam of sunlight is passed through a glass prism, it splits up into a band of 7 colors, also known as a spectrum.

Question 28.
What type of lens (convex or concave) is present in the human eye?
Answer:
The human eye has convex type of lens. Light that hits the lens of the eye is focused by the lens so that it hits the retina. Retina has photoreceptor cells (rods and cones) which get stimulated and sends signals to the brain for viewing.

Question 29.
What is the range of vision of a normal human eye?
Answer:
The range of vision of a normal human eye is from 25cm to infinity. The minimum distance for an object to be viewed clearly for a normal human eye is 25cm and the view may extend to infinity.

Question 30.
Name the point inside the human eye where the image is not visible.
Answer:
Blind spot is the point in human eye where the image is not visible. This is because there are no photoreceptors, i.e., rods and cones present in the optical disk.

Question 31.
Name the phenomenon which enables us to see movies in a cinema hall.
Answer:
The phenomenon which enables us to see movies in a cinema hall is known as Persistence of Vision. The property of this phenomenon is that the image formed on the retina of the eye persists for about 1/16th of a second, hence if 16 frames are shown on a screen in succession, they are viewed by the retina as an ongoing action.

Question 32.
Name an eye ailment (or eye-disease) caused by the deficiency of vitamin A in the diet.
Answer:
Deficiency of Vitamin A in the diet causes night blindness.

Vitamin A helps in transforming the nerve impulses into images in the retina. Deficiency of vitamin A (also known as retinol) causes night blindness. Night blindness is the inability to see properly at night or in poor light.

Question 33.
What is the name of transparent front part of an eye?
Answer:
Cornea is the transparent front part of an eye. It covers the front portion of the eye.

Question 34.
What is the name of a small opening in the iris of an eye?
Answer:
A small opening in the iris of an eye is known as pupil. Pupil controls the amount of light that enters the eye.

Question 35.
Which part of the eye gives it its distinctive color?
Answer:
Iris, the part of our eye, contains pigment and gives the eye its distinctive color. Iris also helps in controlling the size of the pupil by constricting and dilating it, thus reducing and increasing the amount of light entering the eye.

Question 36.
Write the names of the main parts of the human eye.
Answer:
The main parts of the human eye are-

IRIS- The muscles of the iris dilate and constrict the pupil and thus increases and reduces the amount of light reaching the retina.

RETINA- Retina receives the light focused by the lens, the photoreceptors In the retina (rods and cones) convert this light into signals and the signals are then passed onto the brain for viewing.

LENS- Lens focuses the light rays passing through it onto the retina and thus creates a clear image of the objects in sight.

PUPIL- Pupil controls the amount of light that enters the eye. It is controlled by the iris.

CORNEA- Cornea acts as the outermost layer of the eye. It protects the eye with the eyelids.

CILIARY MUSCLES- The ciliary muscle fibers affect the zonular fibers in eye and thus change the lens shape and thus changes the converging power.

OPTIC NERVE- The optic nerve transmits signals from photoreceptors in the retina to the brain through electric impulses

Question 37.
What happens to the size of the pupil of our eye in dim light?
Answer:
In dim light the size of the pupil of our eye becomes larger or dilates to increase the amount of light going inside the eye. This dilation in size is facilitated by the muscles of iris.

Question 38.
What happens to the size of the pupil of our eye in bright light?
Answer:
In bright light the size of the pupil of our eye constricts and becomes small to reduce the amount of light going inside the eye. This reduction in size is facilitated by the muscles of iris.

Question 39.
State whether the following statements are true or false:
(a) The moon is an illuminated object.
(b) Diffuse reflection means the failure of the laws of reflection of light.
(c) In a kaleidoscope, a pattern seen once can never be seen again.
Answer:

(a) True. Moon is a non-luminous object. It does not have light of its own, it reflects the light of sun and it is an illuminated object.

(b) False. Diffuse reflection does not mean the failure of laws of reflection of light. Diffused reflection is caused by the irregularity of a surface.

(c) True. The pattern once seen through the eye hole can never be seen again in a kaleidoscope. The mirrors in the tube and the colored glass pieces continuously make different patterns.

Question 40.
Fill in the following blanks with suitable words:
(a) The angle of …… equals the angle of reflection.
(b) A person 1 m in front of a plane mirror seems to be…… m away from his image.
(c) If you touch your……ear with right hand in front of a plane mirror, it will be seen in the mirror that your right ear is touched with…….
(d) The size of pupil becomes…….when you see in dim light.
(e) Night birds have……cones than rods in their eyes.
(f) The image of an object persists on the retina of an eye for about……second even after the object has disappeared.
(g) If the still pictures of a moving object are flashed on our eyes at a rate faster than……..pictures per second, the eye perceives the object as moving.
(h) In a movie, the still pictures in proper sequence are projected on the screen usually at the rate of …….pictures per second.
Answer:
a) Incidence. This is by law of reflection. The angle of incidence equals the angle of reflection.
b) 2m. Image formed by a plane mirror is far behind the mirror as the object is in front of the mirror.
c) Left ear; left hand. Images formed by a plane mirror are opposite in direction.

d) Large. The size of pupil dilates, facilitated by the iris, so that maximum amount of possible light enters the eye and a person views things clearly.

e) Fewer. Night birds have fewer cones and more rods because rods function in less amount of light. Cones function in bright light.

f) 1/16th. The phenomenon is known as Persistence of Vision. The property of this phenomenon is that the image formed on the retina of the eye persists for about 1/16th of a second even after the object has disappeared.

g) 16. The is due to the phenomenon Persistence of Vision. The property of this phenomenon is that the image formed on the retina of the eye persists for about 1/16th of a second, hence if 16 frames are flashed in front of the eyes, they are viewed by the retina as an ongoing action

h) 24. The frame rate for motion pictures is 24 pictures per second. Frame rate is the rate at which consecutive images are displayed in a display.

Short Answer Type Questions

Question 41.
Suppose you are in a dark room. Can you see objects in the room? Can you see objects outside the room? Explain.

Answer:
The objects in a dark room cannot be seen because there is no light. We can only see something when a certain amount of light falls on it. The objects outside the room can only be seen if there is light outside the room.

Question 42.
What makes things visible to us? Why cannot we see a book which is placed (a) behind a wooden screen, and (b) in a dark room?
Answer:
Light makes things visible to us. We see an object when light passing through it is reflected.
We cannot see a book which is placed
a- Behind a wooden screen because the wooden screen is opaque so it does not allow light to pass through it.

b- In a dark room because there is no light to be reflected by the book. Thus, due to no reflection, the book is not visible.

Question 43.
We can see the sun because it is glowing. How are we able to see the moon?
Answer:
We are able to see the moon because the light of sun falls on moon and is reflected onto the earth. Hence, we are able to see the moon.

Question 44.
Name the two types of reflection of light. Which type of reflection makes us see an object from all directions?
Answer:
The two types of reflection of light are Regular reflection of light and Diffused reflection of light.

Regular reflection of light makes us see an object from all directions as the reflected rays are all parallel and in a particular direction so the image of the object can be viewed from all directions. In diffused reflection of light the reflected rays are neither parallel nor in a specific direction so the image of the object isn't visible from any direction.

Question 45.
A wall reflects light and a mirror also reflects light. What difference is there in the way they reflect light?
Answer:
Reflection of light from a wall is diffused reflection because the surface of the wall is uneven so the light is reflected in different directions and also the reflected rays are not parallel

Reflection of light from a mirror is regular reflection because the surface of mirror is an even surface which is polished. The light gets reflected from the mirror surface in one particular direction and the reflected rays are all parallel.

Question 46.
Explain why, a book lying on a table in a room can be seen from all the parts of the room.
Answer:
A book lying on a table in a room can be seen from all the parts of the room because of reflection by the light falling on the book. The light is reflected by the book and it reaches our eye at any part of the room.

Question 47.
What is the full form of i and r? What is the relation between them?
Answer:
i = angle of incidence and r = angle of reflection
By law of reflection, the angle of incidence is equal to the angle of reflection.

Question 48.
You see your image in a plane mirror? State two characteristics of the image so formed.
Answer:
Characteristics of the image formed by a plane mirror are

The images formed by a plane mirror are virtual and erect
Image formed is of the same size as the object and is laterally inverted.
mage is far behind the mirror as the object is in front of the mirror.

Question 49.
What is a periscope? How many mirrors are there in a periscope?
Answer:
A periscope is a device that reflects the reflected ray again. It consists of a tube attached to a set of mirrors. There are 2 mirrors in a periscope.

The light from the object falls on one mirror that is placed at 45o to the object and the light gets reflected. This reflected light in turn falls on another mirror and is again reflected until it reaches the eyepiece.

Question 50.
State the various uses of a periscope.
Answer:

1. A periscope is used to see over, through or around any object.
2. It can be used to see over a wall, to see around a corner.
3. Periscopes are also used in warfare to keep an eye on the enemy.

Question 51.
Explain how, a hair dresser makes you see hair at the back of your head after the hair cut is complete.
Answer:
The phenomenon that applies here is multiple reflection that provides the image of back of the head to be viewed. A person is made to stand in front of a mirror and another mirror is held at the back of the head. The reflection from the mirror at the back is visible in the mirror in front of the person and hence the hair at the back of the head is visible to the person in the front mirror.

Question 52.
How many images of an object will be formed when the object is placed between two plane mirrors which are inclined at the following angles to one another?
(a) 120°
(b) 45°
(c) 180°
(d) 60°
(e) 90°
Answer:

The formula to calculate the no. of images of an object placed between 2 plane mirrors – (360/θ) − 1; where theta is the angle of inclination.

a- 2 (360/120) – 1 = 3 – 1 = 2

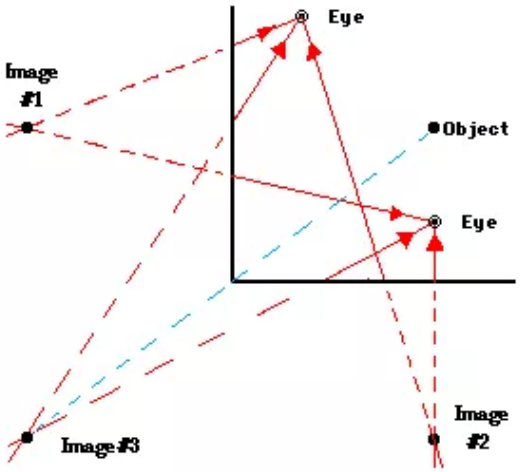
b- 7 (360/45) – 1 = 8 – 1 = 7

c- 1 (360/180) – 1 = 2 – 1 = 1

d- 5 (360/60) – 1 = 6 – 1 = 5

e- 3 (360/90) – 1 = 4 – 1 = 3

Question 53.
Two plane mirrors are set at right angles to each other. A coin is placed in-between these two plane mirrors. How many images of the coin will be seen?
Answer:
When 2 plane mirrors are set at right angles to each other and a coin is placed in-between these two plane mirrors, then three images will be formed, see the diagram below:



The formula for calculating the number of images, when two are kept at an angle θ, is given as: (360/θ) − 1
Now,θ = 90 degree.
Thus, the number of images formed will be
= (360/θ) − 1
= (360/90) – 1
= 4 – 1
= 3

Question 54.
How many images of a candle will be formed if it is placed between two parallel plane mirrors separated by 40 cm?
Answer:
Infinite number of images of the candle will be formed because the mirrors are placed parallel to each other.

Question 55.
Explain why, when an object is placed between two plane mirrors inclined at an angle, then multiple images are formed.

Answer:
Multiple images are formed due to multiple reflection when an object is placed between two plane mirrors at any angle.
N= (360/ θ) – 1
Say, the angle is 120
N = (360/120) – 1
N = 3 – 1
N = 2

Question 56.
How can you show that white light (say, sunlight) consists of seven colors?
Answer:
White light (say, sunlight) consists of seven colors can be shown by passing this light through a prism. The sunlight passes through the prism and splits into a band of 7 colors, also known as the spectrum.

Question 57.
What information do you get about sunlight from the formation of a rainbow?
Answer:
The information that we get about sunlight from the formation is about dispersion of light. The separation of white light into seven different colors is known as dispersion.

Question 58.
What is meant by dispersion of light'? Name a natural phenomenon which is caused by the dispersion of sunlight in the sky.
Answer:
Dispersion of light is the separation of white light or visible light into different colors is known as dispersion.

Formation of rainbow is a natural phenomenon which is caused by the dispersion of sunlight in the sky. The sunlight splits into 7 colors, namely, violet, indigo, blue, green, yellow, orange and red.

Question 59.
How many plane mirror strips are there in a kaleidoscope? How are they arranged?
Answer:
Kaleidoscope consists of 3 plain mirror strips which are arranged inside a tube (cylinder) with colored glass pieces at one end and a glass to view on the other.

Question 60.
How does eye adjust itself to deal with light of varying intensity?
Answer:
The iris adjusts the size of pupil according to the light of varying intensity.

When the amount of light is very high, the iris contracts the pupil and reduces the amount of light entering the eye. Whereas, when the amount of light is less, the iris expands the pupil so that more light can enter the eye and things can be viewed clearly.

Question 61.
Explain why, we cannot see our surroundings clearly when we enter a darkened cinema hall from bright sunshine but our vision improves after some time.
Answer:

In bright sunshine the size of the pupil of the eye is very small so when we enter a darkened cinema hall from bright sunshine very little amount of light enters the eye. The vision improves at some time later because the pupil dilates and more amount of light enters the eye easily.

Question 62.
How does the eye-lens differ from the ordinary convex lens made of glass?
Answer:
The eye lens is made up of living cells and the focal length of eye lens is adjustable. Whereas, an ordinary convex lens is made of glass and its focal length cannot be changed as it is fixed.

Question 63.
Name the part of the eye:
(a) which controls the amount of light entering the eye.
(b) which converges light rays to form the image.
(c) on which image is formed.
(d) which carries the image to brain.
(e) which changes the curvature (or thickness) of eye-lens to focus objects lying at various distances.
Answer:
(a) Iris controls the amount of light entering the eye by constricting and dilating the pupil in bright and dim light respectively.

(b) Lens. The lens may diverge or converge the light rays to form an image.

(c) Retina. An upside-down image is formed on the retina.

(d) Optic nerve carries the image to brain in form of electric impulses.

(e) Ciliary muscle changes the lens shape to focus objects lying at various distances.

Question 64.
Name the cells on the retina of an eye:
(a) which are sensitive to bright light.
(b) which are sensitive to dim light.
(c) which produce sensation of colour.
Answer:
(a) Cones are sensitive to bright light. Cone shaped cells present in the retina are sensitive to bright light.

(b) Rods are sensitive to dim light. Rod shaped cells present in the retina are sensitive to dim light. They are most important for vision in dim light

(c) Cones are the cells of retina that produce color sensation. These photoreceptor cells are responsible for color vision.

Question 65.
What are rods and cones in the retina of an eye?
Answer:
Rods are rod shaped cells present in the retina are sensitive to dim light. They are most important for vision in dim light.

Cones are cone shaped cells present in the retina are sensitive to bright light. These photoreceptor cells are responsible for color vision.

Question 66.
Name any one defect of the eye. How is it corrected?
Answer:
Myopia (nearsightedness) is the defect of vision wherein a person is unable to see the distant objects clearly as the light is unable to focus on the retina and thus distant objects appear to be blurred. The problem of nearsightedness is that the light is focused in front of the retina

Myopia is corrected by wearing glasses or contact lenses. A concave lens(diverging lens) with a minus power is used in the glass, which moves the image back to retina and thus clears the image. The diverging lens will diverge the light before it reaches the retina. The light will then be converged by cornea and lens thus producing an image on the retina.

Question 67.
What is cataract? How can the vision of a person having cataract be restored?
Answer:
Cataract is the clouding of the lens of human eye, that lies behind the iris and pupil. It leaves to a blurred vision or decrease in vision.

The lens that has becomes cloudy is replaced by an artificial lens to restore the normal and clear vision.

Question 68.
What is meant by 'persistence of vision'?
Answer:
Persistence of Vision- The property of this phenomenon is that the image formed on the retina of the eye persists for about 1/16th of a second, hence if 16 frames are shown on a screen in succession, they are viewed by the retina as an ongoing action.

Question 69.
Explain how you can take care of your eyes.
Answer:
One can take care of eyes by following or practicing some simple steps-
a- Watch television from a distance.

b- If a dust particle or an insect gets into our eye, we should never rub the eye, instead wash the eye with cold water.

c- Do not look at the sun directly as too much of light i.e. bright light may injure the retina.

d- Read from a normal distance of vision.

e- Never read or study in dim light or low light as it causes headaches.

Question 70.
What should we do if something like a dust particle or an insect gets into our eye?
Answer:

If something like a dust particle or an insect gets into our eye, we should never rub the eye, instead wash the eye with cold water. If washing with cold water does not help, we should consult a doctor immediately.

Question 71.
Name any five food items (including two fruits) which are rich in vitamin A.
Answer:
5 food items rich in vitamin A are- fish, sweet potatoes, carrots, banana, pink grapefruit, apricots.

Question 72.
Explain why, too little or too much light, both are bad for eyes.
Answer:
In the presence of little light the iris has to dilate pupil to facilitate entry of more and more light to view things, which leads to strain on the eyes and causes headaches.
In case of too much light, the retina may get injured and damaged thus impairing vision.

Question 73.
Explain why, an owl can see well in the night (but not during the day) whereas an eagle can see well during day (but not at night).
Answer:
An owl can see well in the night but not during the day because owl is a night bird and night birds have fewer cones and more rods in the retina. Since rods function in less amount of light so an owl can see well in the night. To see well during the day, cones are required which are not present in adequate amount in an owl's retina.

An eagle can see well during the day but not during the night because eagle has more cones and lesser rods in the retina. Cones function in good amount of light so an eagle can see well during the day. To see well during the night, rods are required which are not present in adequate amount in a n eagle's retina.

Question 74 A.
What is 'blind spot' in the eye?
Answer:
Blind spot is the point in human eye where the image is not visible. This is because there are no photoreceptors, i.e., rods and cones present in the optical disk.

Question 74 B.
What is night blindness? What causes night blindness?
Answer:
Night blindness is the inability to see properly at night or in poor light. In scientific terms, it is called as "nyctalopia".
The following factors cause night blindness:

1. The deficiency of Vitamin A (retinol) in the diet of a person for a considerable time can lead to the disease called night blindness.
2. The disorder in which the rod cells in the retina gradually lose their ability to respond to the light.
3. It can also happen due to cataract, or clouding of the eye's lens.
4. Usher syndrome can also cause night blindness, which is a genetic condition that affects both hearing and vision.
5. Nearsightedness or blurred vision can also cause night blindness.

Question 75.
What is lateral inversion? Explain with the help of an example.
Answer:
The effect produced by a plane mirror in reversing the images from left to right and right to left while forming images is lateral inversion.
Example:
The images are reversed by the plane mirror.

Long Answer Type Questions

Question 76 A.
What is meant by a luminous object? Name two luminous objects.
Answer:
Objects that have their own light i.e., objects that emit light of their own are known as luminous objects. 2 luminous objects are- stars and sun.

The sun and the stars have their own light. A light bulb is also luminous.

Question 76 B.
What is meant by a non-luminous object? Name two non-luminous objects.
Answer:
Non- luminous objects are those that are themselves not capable of producing their own light but can reflect light from another source. 2 non luminous objects are- wood, plastics etc.

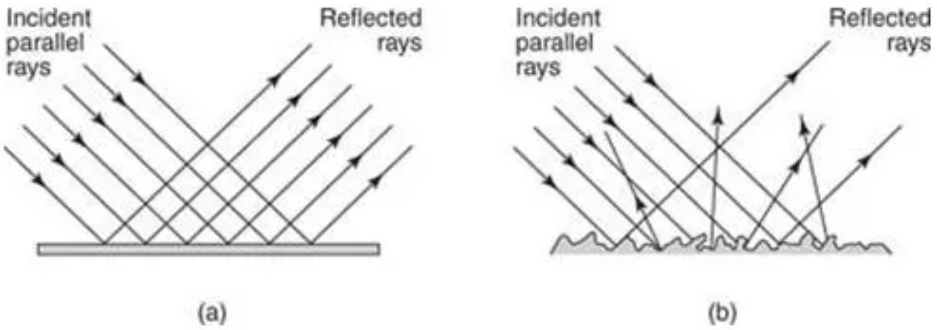
Moon also is incapable of producing its own light and it reflects sunlight and hence is non-luminous.

Question 77 A.
What is the difference between regular reflection and diffuse reflection of light? Name one object which can produce regular reflection of light and another which produces diffuse reflection of light.
Answer:

REGULAR REFLECTION OF LIGHT	DIFFUSED REFLECTION OF LIGHT
1. Regular reflection occurs from a polished or even surface.	**1.** Diffused reflection occurs from any uneven surface.
2. The reflected rays are parallel always.	**2.** The reflected rays are not parallel ever.
3. A plane mirror produces regular reflection of light.	**3.** A wall or piece of paper produces diffused reflection of light.

Question 77 B.
Draw diagrams to show regular reflection of light and diffuse reflection of light.

Answer:



Question 77 C.
Which of the following will cause regular reflection of light and which diffuse reflection of light?
(a) Polished wooden table
(b) Chalk powder
(c) Cardboard
(d) Mirror
(e) Paper
(f) Marble floor with water spread over it.
Answer:
a- polished wooden table- regular reflection since the surface is polished (plane)

b-chalk powder-diffused reflection will occur because the surface of chalk powder is uneven

c- cardboard- diffused reflection of light since cardboard has an uneven surface

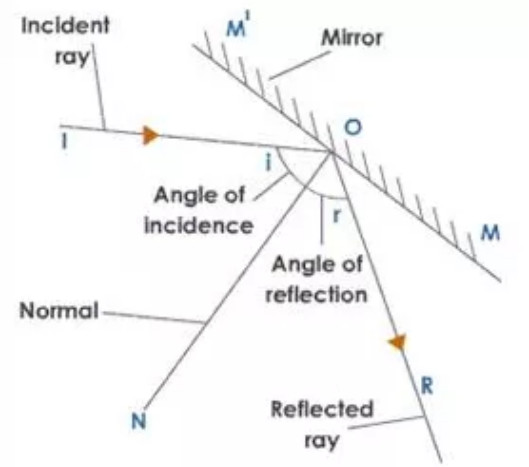
d- mirror- regular reflection since the surface of a mirror is plane

e- paper- diffused reflection since the surface of paper is uneven

f- marble floor with water spread over it- regular reflection as the floor with water will behave as a plane surface

Question 78 A.
Draw a diagram to show the reflection of light from a plane mirror. Label the following on the diagram:
(a) Plane mirror
(b) Incident ray
(c) Reflected ray
(d) Point of incidence
(g) Angle of reflection
(e) Normal
(f) Angle of incidence

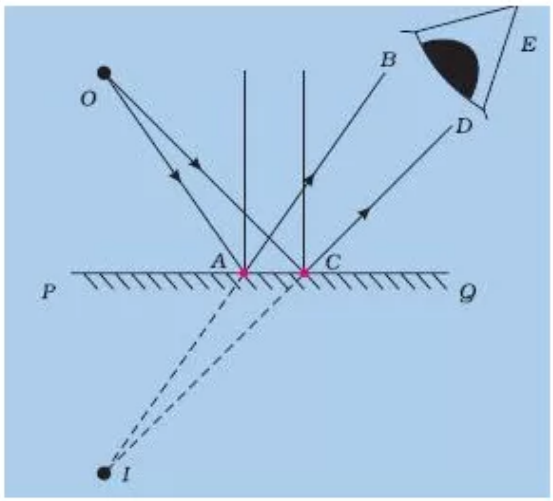
Answer:



Question 78 B.
State the laws of reflection of light.
Answer:
The laws of reflection of light are

1. The incident ray, the normal ray and the reflected ray all lie in the same plane, and
2. The angle of incidence is always equal to angle of reflection.

Question 79 A.
Draw a labelled diagram showing how a plane mirror forms an image of a point object placed in front of it.
Answer:

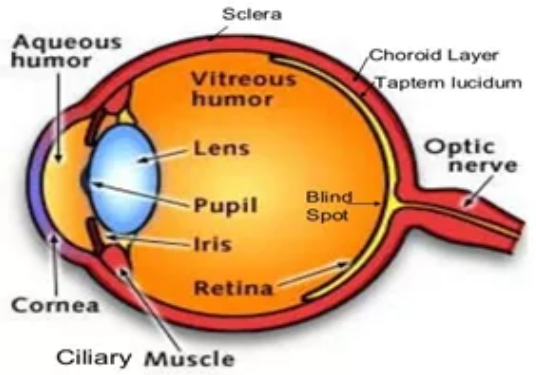


Question 79 B.
State the characteristics of the image formed in a plane mirror.
Answer:
Characteristics of the image formed by a plane mirror are-

1. The images formed by a plane mirror are virtual and erect
2. Image formed is of the same size as the object.
3. Image is laterally inverted.
4. Image is far behind the mirror as the object is in front of the mirror.

Question 80 A.
Draw a labelled diagram of the human eye. Label the following parts on this diagram: Cornea, Iris, Pupil,

Ciliary muscles, Eye-lens, Retina, Optic nerve, Blind spot.
Answer:



Question 80 B.
What are the functions of the following parts of the eye?
(a) Iris
(b) Eye-lens
(c) Ciliary muscles
(d) Retina
(e) Optic nerve
Answer:
Functions of parts-
IRIS- The muscles of the iris dilate and constrict the pupil and thus increases and reduces the amount of light reaching the retina.

EYE-LENS- Lens focuses the light rays passing through it onto the retina and thus creates a clear image of the objects in sight.

CILIARY MUSCLES- The ciliary muscle fibers affect the zonular fibers in eye and thus change the lens shape and thus changes the converging power.

RETINA- Retina receives the light focused by the lens, the photoreceptors In the retina (rods and cones) convert this light into signals and the signals are then passed onto the brain for viewing.

OPTIC NERVE- The optic nerve transmits signals from photoreceptors in the retina to the brain through electric impulses.

Multiple Choice Questions (MCQs)

Question 81.
The angle of reflection is equal to the angle of incidence:
A. always
B. sometimes
C. under special conditions
D. never
Answer:
A. always
According to laws of reflection, angle of reflection is always equal to the angle of incidence. The law of reflection also states that the incident ray, reflected ray and the normal to a surface, all lie in the same plane.

Question 82.
The image formed by a plane mirror is:
A. virtual, behind the mirror and enlarged.
B. virtual, behind the mirror and of the same size as the object.
C. real, at the surface of the mirror and enlarged.
D. real, behind the mirror and of the same size as the object.
Answer:
B. virtual, behind the mirror and of the same size as the object.
The images formed by a plane mirror are virtual, opposite in direction and are of the same size as the object.

Question 83.
The least distance of distinct vision for a young adult with normal vision is about:
A. 25 m
B. 2.5 cm
C. 25 cm
D. 2.5 m
Answer:
C. 25 cm
The least distance of distinct vision means the minimum distance for an object to be viewed clearly. This minimum distance for a young adult with normal vision is 25cm.

Question 84.
The angle between an incident ray and the plane mirror is 30°. The total angle between the incident ray and the reflected ray will be:
A. 30°
B. 60°
C. 90°
D. 120°
Answer:
A. 30°
The angle between the incident ray and the mirror is 30 degrees.
Angle of incidence = angle of reflection.
90 degrees is going directly into the mirror.
So, 90 – 30 = 60 degrees.
The total angle between the incident ray and the reflected ray will be 120 degree.

Question 85.
The image of an object formed by a plane mirror is:
A. virtual
B. real
C. diminished
D. upside-down
Answer:
A. virtual
The image of an object formed by a plane mirror is virtual always suggesting that the light rays do not actually come from the image.

Question 86.
Which of the following is a non-luminous object?
A. sun

B. star
C. moon
D. fire
Answer:
C. moon
Non- luminous objects are those that are themselves not capable of producing their own light but can reflect light from another source. Moon reflects sunlight and hence is non-luminous.

Question 87.
A device which works on the reflection of light from two plane mirrors arranged parallel to one another is:
A. electroscope
B. kaleiodoscope
C. periscope
D. stethoscope
Answer:
C. periscope
Periscopes are used to see objects that are not in direct line of sight.

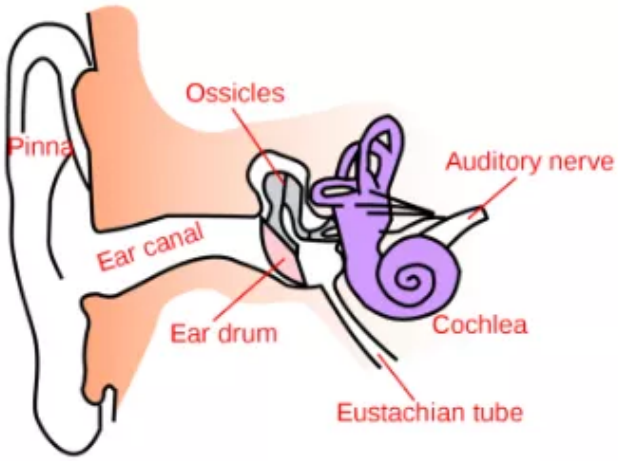
Question 88.
The number of images formed of an object placed between two plane mirrors inclined at right angles to each other is:
A. two
B. five
C. one
D. three
Answer:
D. three
The relationship between no. of images and angle of mirror is
Images = (360degrees/ angle between the mirrors) – 1
Images = (360 degree/90 degree) – 1
Images = 4 – 1
Images = 3

Question 89.
As the angle between two plane mirrors is decreased gradually, the number of images of an object placed between them:
A. increases gradually
B. decreases gradually
C. first increases then decreases
D. first decreases then increases
Answer:
A. increases gradually
If the angle between 2 plane mirrors is decreased, the number of images of an object placed in between will increase gradually.
The relationship between no. of images and angle of mirror is
Images = (360degrees/ angle between the mirrors) – 1

Question 90.
The deficiency of one of the following in the diet of a person for a considerable time can lead to a disease called night blindness. This one is:
A. vitamin B

B. vitamin D
C. vitamin A
D. vitamin C
Answer:
C. vitamin A
Vitamin A deficiencies occur from fat malabsorption, liver disorders and inadequate food intake.

Question 91.
Which of the following is not a part of the human eye?
A. retina
B. auditory nerve
C. optic nerve
D. ciliary muscle
Answer:
B. auditory nerve
Auditory nerve is not a part of the human eye, but a part of human ear. It transmits hearing information between the brain and cochlea.
See the diagram of human ear attached:



Question 92.
How does the eye change in order to focus on near or distant objects?
A. the lens moves in or out
B. the retina moves in or out
C. the lens becomes thicker or thinner
D. the pupil becomes larger or smaller
Answer:
C. the lens becomes thicker or thinner
The shape of the lens is changed by ciliary muscles so that the image forms at a sharp focus at the retina. The lens becomes thicker to focus at near objects and becomes thinner to focus at distant objects.

Question 93.
Which of the following changes occur when you walk out of bright sunshine into a poorly lit room?
A. the pupil becomes larger
B. the lens becomes thicker
C. the ciliary muscle relaxes
D. the pupil becomes smaller
Answer:
A. the pupil becomes larger

When a person walks out of bright sunshine into a poorly lit room, the pupil dilates and becomes larger to allow maximum light to enter the eye and thus helps in viewing things easily in a poorly lit room.

Question 94.
An incident ray makes an angle of 65° with the surface of a plane mirror. The angle of reflection in this case will be:
A. 65°
B. 45°
C. 25°
D. 35°
Answer:
D. 35°
Angle of incidence is always equal to angle of refection. Hence, angle of reflection will be 35°.

Question 95.
Which of the following produces diffuse reflection of light?
A. mirror on a dressing table
B. water surface of a pond
C. screen in a cinema hall
D. polished wooden table
Answer:
B. water surface of a pond
Others, the mirror, the screen and the polished wooden table will give regular reflection as they are even surfaces.

Question 96.
The human eye forms the image of an object at its:
A. cornea
B. iris
C. pupil
D. retina
Answer:
D. retina
The image of an object is formed at the retina of an eye which is the third and the innermost coat of an eye. Light rays are focused on the retina by cornea, lens and the pupil.

Question 97.
The change in converging power of an eye-lens is caused by the action of:
A. iris
B. ciliary muscles
C. optic nerve
D. retina
Answer:
B. ciliary muscles
The ciliary muscle fibers affect the zonular fibers in eye and thus change the lens shape and thus changes the converging power.

Question 98.
The size of the pupil of the eye is adjusted by:
A. cornea
B. ciliary muscles

C. optic nerve
D. iris
Answer:
D. iris
The muscles of the iris dilate and constrict the pupil and thus increases and reduces the amount of light entering the eye.

Question 99.
The defect of vision in which the eye-lens of a person gets progressively cloudy resulting in blurred vision is called :
A. myopia
B. night blindness
C. cataract
D. hypermetropia
Answer:
C. cataract
Cataract is the clouding of the lens of human eye, that lies behind the iris and pupil. It leaves to a blurred vision or decrease in vision.

Question 100.
A person cannot see the distant objects clearly (though he can see the nearby objects clearly). He is suffering from the defect of vision called:
A. hypermetropia
B. myopia
C. night blindness
D. cataract
Answer:
B. myopia
Myopia is the defect of vision wherein a person cannot see the distant objects clearly as the light is unable to focus on the retina and thus distant objects appear to be blurred.

Questions Based on High Order Thinking Skills (HOTS)

Question 101.
A man stands 10 m in front of a large plane mirror. How far must he walk before he is 5 m away from his image?
Answer:
The object distance is equal to image distance in a plane mirror.
For the distance of man from his image to be 5m
The distance of man from mirror + distance of image from the mirror = 5m
Since object distance = image distance
Therefore, 2*distance of man from the mirror = 5m
Distance of man from the mirror = 5/2 = 2.5m
The man is 10m from the mirror at the starting, so he will have to walk 10 – 2.5 = 7.5m towards the mirror for being 5m away from his image.

Question 102.
A ray of light strikes a plane mirror XY at an angle of incidence of 65°, is reflected from this plane mirror and then strikes a second plane mirror YZ placed at right angles to the first mirror. What is the angle of reflection for the mirror YZ?
Answer:

The mirrors XY and YZ are at right angles, i.e., perpendicular. When a ray of light strikes the XY mirror with 65 degree angle, the incident angle will be 90 – 65 = 25 degree on the YZ mirror. Since angle of incidence = angle of reflection, the angle of reflection for YZ mirror will be 25 degrees.

Question 103.
The eye of a person exhibits a phenomenon X due to which it can see the image of an object for a short duration of Y even after the object has disappeared from his view. It is due to the phenomenon X that we are able to see moving Z on a television screen. What are X, Y and Z?
Answer:
The phenomenon X is persistence of vision. The property of this phenomenon is that the image formed on the retina of the eye persists for about 1/16th of a second, hence if 16 frames are shown on a screen in succession, they are viewed by the retina as an ongoing action.
Short duration of Y is 1/16 seconds.
Z is pictures. Due to the phenomenon of persistence of vision, we are able to see moving pictures on a television or a cinema screen.

Question 104.
Man A has a defect of vision due to which he cannot see the nearby objects clearly (though he can see the distant objects clearly). On the other hand, man B has a defect of vision due to which he cannot see the distant object clearly (though he can see the nearby objects clearly). The defect in man A can be corrected by using spectacles containing lenses C whereas the defect in man B can be corrected by using spectacles containing lenses D.
(a) Name the defect of vision in man (i) A, and (ii) B.
(b) What type of lenses are (i) C, and (ii) D?
Answer:
a) i-Man A suffers from hypermetropia wherein the image of a nearby object is formed behind the retina so the person has a blurred vision while looking at nearby objects.

ii- Man B suffers from myopia wherein Light from a distant object forms an image before it reaches the retina so the person can see the nearby objects clearly but not the distant objects.

b) C are Convex lens. these lenses are placed in front of a hyper-metropic eye which moves the image forward and focuses directly onto the retina which clears the vision of a nearby object.

D are concave lenses. These lenses are placed in front of a myopic eye which moves the image back to the retina and clarifies the image of a distant object.

Question 105.
A student makes a device P by using three long and narrow strips of plane mirrors inclined at 60° to one another which enables him to see beautiful patterns made by pieces of coloured glass bangles. On the other hand, another student makes a device Q by using two plane mirrors arranged parallel to each other which helps him to see a football match clearly even when some very tall persons are sitting in front of him in the ground. What are P and Q?
Answer:
Device P is a Kaleidoscope which consists of 3 plain mirror strips are arranged inside a tube (cylinder) with colored glass pieces at one end and a glass to view on the other.

The device Q is a Periscope. A periscope is a device that reflects the reflected ray again. It consists of a tube attached to a set of 2 mirrors. A periscope is used to see over, through or around any object. So, the student is able to see a football match clearly even when some very tall persons are sitting in front of him

in the ground because the periscope helps him in seeing over, through and around the tall persons sitting in front of him in the ground.