



REFRACTION OF LIGHT

Question 1: Which of the following events is not related to refraction of light?

- (a) The bottom of water
- (b) Appearance of sun before sun rising and after sunset
- (c) Formation of image by mirror
- (d) Twinkling of stars

Answer: (c) Formation of image by mirror

Question 2. Which is not a part of a human eye?

- (a) Retina
- (b) Cornea
- (c) Pupil
- (d) Mid plane

Answer: (d) Mid plane

Question 3: When a ray of light enters into a rarer medium from denser medium. Then it bends:

- (a) Away from normal
- (b) Towards normal

Question 4
Define light.

Answer:

Light is defined as a form of energy that stimulates sight and makes things visible.

Question 5

What is reflection?

Answer:

The bouncing back of light into the same medium after it falls on a surface is called reflection.

Question 6

What is a mirror?

Answer:

A piece of glass with a shiny metal-covered at back, that reflects light, producing an image of the object in front of it is known as mirror.

Question 7.

State the two laws of reflection.

Answer:

The two laws of reflection are:

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

Question 8.

How do we see various objects?

Answer:

We see various objects due to reflection. As we know all surface reflect light, when light falls on any object, it reflects the light. The reflected light reaches our eyes and we are able to see the object.

Question 9.

What do you mean by reflected ray?

Answer:

The ray of light which is returned back into the same medium after the incident ray strikes the surface ' is called reflected ray.

Question 10.

What is irregular reflection?

Answer:

Irregular reflection is defined as the reflection of light from an uneven surface. In irregular reflection, the reflected beam is not parallel.

Fill in the blanks with suitable words:

Question 11 _____ of eye control the amount of light enter into the eye.

Answer: Iris

Question 12 : The image formation by the _____ lens is always erect, virtual and small.

Answer: concave

Question 13: Light ray enters into water medium from air bends _____ the normal.

Answer: towards

Match column A with B:

Column A	Column B
Q7: Liquid filled in between lens and cornea	(a) Vitreous humour
Q8: Transparent liquid filled in between lens and retina	(b) Iris
Q9: Muscular structure of dark colour behind the cornea	(c) Retina
Q10: The portion of eye on which image is formed	(d) Eye fluid

Answers:

Column A	Column B
A7: Liquid filled in between lens and cornea	(a) Eye fluid
A8: Transparent liquid filled in between lens and retina	(b) Vitreous Humour
A9: Muscular structure of dark colour behind the cornea	(c) Iris
A10: The portion of eye on which image is formed	(d) Retina

Question 14: What is refraction? What is the cause of refraction?

Answer: When a ray of light enters from one medium to another, then it deviates from its actual path. This phenomenon is called refraction of light.

Cause of Refraction: The speed of light in denser medium i.e, glass is less in comparison to rarer medium i.e, air. This implies that when light enters in a denser medium from a rarer medium, it's speed slows down. On the contrary, when light enters from a denser medium to a rarer medium, it's speed accelerates. Hence, refraction of light is a phenomenon which happens due to the difference in speed while travelling from one medium to another.

Question 15: Write the main difference between convex and concave lens.

Answer: Convex lens: A lens which is thicker in the middle part and thinner at the edges is known as Convex lens. A convex lens converts all the parallel beams of light into a single point. The parallel rays which enter through the convex lens meet at a single point and for this reason are also called Converging lens. The incident rays which are parallel to the principal axis get focused on it at a point after refracting from the convex lens, that is known as the focal point of the convex lens.

Concave lens: A lens which is thinner in the middle part and thicker at the edges is known as Concave lens. This lens diverges the light rays coming parallel to the principal axis. For this reason, it is called Concave or Diverging lens. When the light beam enters through the lens, it deviates from their path and these lenses refract the light rays. The incident rays which are parallel to the principal axis appear to diverge from a point on the principal axis after entering through the concave lens. This point is known as the focal point of a concave lens.

Question 16: What do you mean by dispersion? Write the sequence of colours in rainbow.

Answer: The phenomenon at which white light enters through a prism and gets split into seven different colours such as violet, indigo, blue, green, yellow, orange and red. This is known as Dispersion of light. This occurs when the sun rays pass through a glass prism and forms an array of seven different colours. When we see the strips of seven colours on the wall, it is known as "**Spectrum of light**".

Question 17: The two classmates of Meena are Raghav and Megha

Raghav is not able to see distant objects and Megha is not able to see near objects. What are eye's defects they have? To remove these defects, which type of lens should they use in their spectacles?

Answer: Raghav is suffering from nearsightedness or myopia. It can be corrected by using the concave lens spectacles. Whereas, Megha is suffering from farsightedness or hypermetropia. It can be corrected by using the convex lens spectacles.

Question 18: Name the optical instruments which use lens. Describe it in brief.

Answer: Given below are some of the optical instruments which use lens:

1. Correction of defects of vision through lenses: In spectacles, both types of lens are being used extensively for correction of defects in vision. For instance, those who have a blurry distant vision usually tend to suffer from nearsightedness. Such people need to use concave lenses in their spectacles. On the other hand, those people who have a problem with viewing nearby objects, are known to suffer from the farsightedness defect. Such people should use the convex lens in their spectacles.

2. Simple microscope: In shops, a clock repairman uses the convex lens to see the tiny parts of the clock. This single convex lens is known as a simple microscope. In this type of microscope, the low focal length lens is being used. This helps in magnifying the small things into an enlarged form.

3. Compound microscope: In this type of microscope, two convex lenses are fitted in a particular metal tube. The lens is located where the object is kept and is known as an objective lens. While the lens which is closer to the eye through which the object is seen is called the eye lens or eye-piece.

4. Telescope: A telescope is used to see very distant objects which are located at a very far distance. It contains two convex lenses like a compound microscope. They are also known as objective lenses and eye-piece lenses.

Question 19: Define light.

Answer: Light is an energy source which helps us to view objects through our eyes.

Question 20 : Explain Hypermetropia. How can it be corrected?

Answer: A vision condition in which nearby objects appear blurry, but distant objects can be seen very clearly is known as hypermetropia. This eye defect is also known as farsightedness. This defect can be corrected by wearing spectacles which are made up of convex lenses.

Question 21: A convex lens is also called a converging lens. Explain why.

Answer: When the parallel rays of light enter through a convex lens, they meet or converge at a single point which is known as Converging lens. The incident rays which are parallel to the principal axis get focused at a point on the principal axis after refracting from the convex lens. This point is known as (F) or the focal point of a convex lens.

Question 22 : Define lens. What are the different types of lens?

Answer: Lens is the transparent medium which is covered by the two different curved surfaces. Lens are mainly two types:

1. Convex Lens (Converging lens)
2. Concave Lens (Diverging lens)

Question 23: Explain a blind spot.

Answer: Blind spot refers to the small point where the optic nerve enters the eye that has no nerve endings within the retina. This area is insensitive to light.

Question 24: What is the cause of refraction?

Answer: The refraction of light is mainly caused due to the change in the speed of light when it moves from one medium to another with a deviation from the original path.

Question 25: What will happen when a ray of light goes from a denser medium to a rarer medium?

Answer: When a ray of light passes from a denser medium to a rarer medium, it will deviate from the normal. This is due to the fact that when a light beam travels from a denser to a rarer medium, its speed accelerates and it appears to bend away from the normal.

Question 26 : What kind of image is formed when an object is placed within the focal length of a convex lens?

Answer: An erect, virtual and magnified image is formed when we place an object within the focal length of a convex lens.

Question 27: Define retina. What kind of image forms on the retina?

Answer: Retina is a light tender transparent membrane which has various light sensitive neurons, which are connected to the brain. When these neurons send signals to the brain there is a formation of image on the retina. An inverted image is formed on the retina.

Question 28: Define focal length.

Answer: Focal length (f) refers to the distance between the optical centre (O) and the focal point (F) of a lens or curved mirror.

Question 29. : Give at least two uses of convex lens.

Answer: Given below are two simple uses of convex lens:

1. Convex lens are used in spectacles to correct the vision defect called farsightedness or hypermetropia.
2. Convex lens is being used as a magnifying glass which are often used by clock repairmen for repairing clocks.

Question 30: Explain the bending of pencil in water.

Answer: A pencil appears to be bent when it is immersed under water due to the refraction of light. The light rays coming from the dipped portion of pencil refracts or moves away from the normal to the surface of water due to refraction.

Question 31 Define optical centre.

Answer: Optical centre (O) of the lens is a point on the principal axis inside the lens through which a ray of light passes through without any deviation.

Question 32 : Explain Myopia. How can it be corrected?

Answer: A vision condition in which distant objects appear blurry, but nearby objects can be seen very clearly is known as myopia. This eye defect is also known as nearsightedness. This defect can be corrected by wearing spectacles which are made up of concave lenses.

Question 33: What will happen when a ray of light goes from a rarer medium to a denser medium?

Answer: When a ray of light passes from a rarer medium to a denser medium, it will bend towards the normal. This is due to the fact that when a light beam travels from a rarer into a denser medium, its speed slows down and it appears to bend towards the normal.

Question 33 : What is a concave lens? Why is it also called a diverging lens?

Answer: A lens which is thinner in the middle part and thicker at the edges is known as Concave lens. When the parallel rays of light pass through a concave lens to the principal axis, it deviates from its focal point and refracts the light rays. Due to this reason, it is called Concave or Diverging lens.

Question34: Define principal axis.

Answer: The line which passes through the centres of curvature and the optical centre of the faces of a curved lens or mirror is known as the Principal Axis.

Question 35: Explain the twinkling of stars at night.

Answer: The layers of atmosphere comprise different densities as they have different refraction coefficients. The light coming from stars constantly scatters after entering through these different atmospheric layers. Due to this reason, the stars seem to twinkle at night.

Question 36: What is focal point?

Answer: The focal point of convex and concave lens are mentioned below:

1. The incident rays of light parallel to the principal axis converge at a point on the principal axis after it refracts from the convex lens. This point is known as the Focal point (F) of a convex lens.
2. The incident rays of light parallel to the principal axis appear to diverge from a point on the principal axis after entering the concave lens. This point is known as the Focal point (F) of a concave lens.

Question 37: What do you mean by refractive index? What is it used for?

Answer: The refractive index is the ratio of the velocity of light in vacuum to the speed of light in a specified medium. It is mostly applied for identifying a particular substance, checking its purity or computing its concentration.

Question 38: How is a rainbow formed?

Answer: When sunlight passes through raindrops, there is refraction and a total internal reflection of light takes place, which results in the formation of a rainbow.
