

OBJECTIVE TYPE QUESTIONS & ANSWERS

Q.2 Give short Answers.

1. What is light?

Answer

Light is a form of energy, which enables us to see various objects and their colours. It is a kind of radiation to which our eyes are sensitive.

2. What 1st the nature of light?

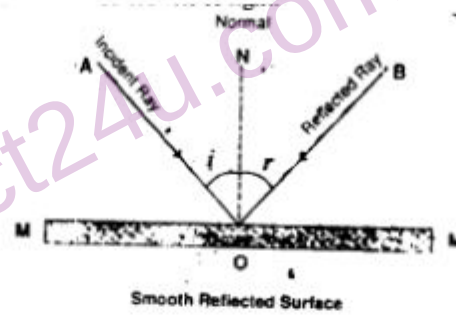
Answer

The light possesses dual nature. It means that, in some crises it behaves as particle, but in some cases as wave.

3. What is reflection of light?

Answer

When a beam of light travelling in a straight line in homogenous medium falls on the boundary of another medium, then a part of it bounces back from there, this bouncing back of the light is called the reflection of light.



4. On what factors the amount of light reflected from the surface of another medium depends?

Answer

The amount of light reflected from the surface of another medium depends upon:

- Nature of the medium
- Smoothness of the medium

5. State laws of reflection.

Answer

There are two laws of reflection:

- Angle of incidence is equal to the angle of reflection i.e. $\angle i = \angle r$.
- The incident ray, the normal at the point of incidence and reflected ray all lie in the same plane.

6. Differentiate between real and virtual image?

Answer

	Real image	Virtual image
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• Recall image is formed in front of the mirror when rays of light coming from a point on object converge after reflection from the mirror.	• Virtual image is formed behind the mirror when ray of light coming from a point on subject diverge after reflection from a mirror.
• It can be observed on the screen.	• It cannot be observed on the screen.
• It is always inverted.	• It is always erect.

7. What are spherical mirrors?

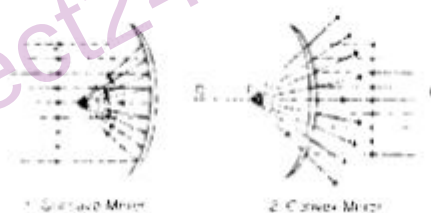
Answer

A part of spherical reflecting surface is called spherical mirror.

8. Distinguish between concave and convex mirror.

Answer

- If the inner surface of the spherical mirror is reflecting, then it is called a concave mirror.
- If the outer surface of a spherical mirror is reflecting, then it is called a convex mirror.



9. Explain how a convex lens is used a magnifier.

Answer

A convex lens of short focal length can be used as magnifier when object is placed very close to it when the object is in between the lens and its focus. The image is then formed is virtual, erect and magnified.

10. Differentiate between center of curvature and radius of curvature of a mirror.

Answer

The center of the hollow sphere of which mirror is a part is called its center of the curvature.

The radius of the hollow sphere which is mirror is a part called its radius of the curvature.

11. Define pole and aperture.

Answer

Pole

The central point of a mirror is called its pole

Aperture

The diameter of a circular outline of a spherical edge or boundary of a spherical mirror is called aperture.

12. Define principal focus in terms of:

i) Concave mirror 2) Convex mirror

Answer

- The point where rays of light parallel to the principal axis converge after reflection from concave mirror is called its principal focus.

- The point from where rays of light seem to come after reflection if they are parallel to the principal axis initially is called its principal focus.

13. What is focal length of a mirror?

Answer

The distance between principal focus and pole of the mirror is called its focal length.

- Focal length of concave mirror is positive.
- Focal length of convex mirror is negative.

Focal length of a mirror is equal to the half of its radius of curvature.

$$f = \frac{1}{2} R$$

14. What is principal axis?

Answer

The line joining the pole of the mirror and center of curvature is called principal axis of the mirror.

15. Write the characteristics of image formed by a convex mirror.

Answer

- The image formed by convex mirror is always virtual.
- Distance of virtual image is taken as negative
- In this case, the values of f and q are taken as negative.

16. What is linear magnification?

Answer

The ratio of the height of the image to that of the object is called as linear magnification.

Magnification = image height/ object height

17. Write some uses of concave mirrors.

Answer

- Concave mirrors are used as shaving mirrors.
- Concave mirrors are used as magnifiers
- Concave mirror are used to throw light on the slides of microscope to view it more clearly.
- These mirrors are used in searchlights and head lights.
- These mirrors are also used fry doctors in their instruments for the examination of eye, nose, ears and throat.
- Some developed countries use giant concave mirrors in their huge telescopes.
- They are used in some optical instruments as an alternate to lens.

18. Find the power of 0.5 m of focal length?

Answer

Power of lens = $1/\text{focal length}$

$$P = 1/f$$

$$P = 1/0.5 = 2D$$

19. What sign connections of mirror formula are used?

Answer

The relation for the mirror formula

$$1/f = 1/p + 1/q$$

The following rules, known as sign of convention are used for this purpose.

- The distance of real objects and real images from the mirror are positive.
- The distance of virtual images from mirror are negative.
- Focal length of concave mirror is positive.
- Focal length of convex mirror is negative.

20. What is meant by refraction of light?

Answer

The bending of light when it enters from one medium to another is called refraction of light.



21. State the laws of refraction.

Answer

There are two laws of refraction of light.

- The incident ray, the refracted ray and the normal at the point of incidence all are in the same plane.

- The ratio of the sine of the angle of incidence to the sine of angle of refraction is constant for a given pair of media.

22. State Snell's law

Answer

The ratio of the sine of the angle of incidence to the sine of angle of refraction is constant for a given pair of media. This is known as Snell's law and can be expressed as:

$$n = \sin i / \sin r$$

23. Define refractive index. Give its unit.

Answer

The ratio of the sine of the angle of incidence to the sine 'of angle 'of refraction is constant for a given pair of media. This is known as Snell's law and can be expressed as:

$$n = \sin i / \sin r$$

Where n is a constant called the refractive index.

Since refractive index is a ratio, so it has no unit.

24. On what factors refractive index of the medium depends?

Answer

Refractive index is independent of the angle of incidence but depends upon the nature of the medium.

25. What is the relation between real and apparent depth?

Answer

The distance of object from the surface of water is real depth.

The distance of image from the surface of water is called apparent depth is

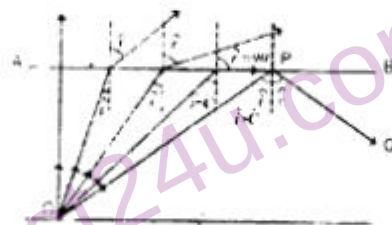
$$n = \text{Real depth} / \text{Apparent depth}$$

where n is the refractive index

26. What is meant by total internal reflection?

Answer

When a ray of light from denser medium enters a rare medium in such a way that the angle of incidence is greater than the critical angle, then the ray is reflected totally inside and does not emerge out from the denser medium. This phenomenon is called total internal reflection.



27. What conditions are necessary for total internal reflection?

Answer

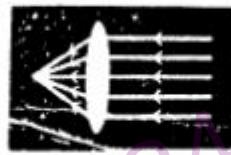
The following two conditions are necessary for total internal reflection:

- The ray of light should travel from a denser to a rare medium.
- The angle of incidence should be greater than the critical angle.

28. Differentiate between convex and concave lens.

Answer

- The lens which is thicker in the middle and thinner at the edges, is called a convex lens.
- The lens which is thinner in the middle and thicker at the edges, is called a concave lens.



i. Convex lens



ii. Concave lens

29. Can power of lens be negative?

Answer

Yes, the power of the lens can be positive as well as negative

- It is positive for convex lens or converging lens.
- It is negative for the concave lens or diverging lens

30. What is critical angle?

Answer

When light enters from a denser medium to a rare medium then the angle of incidence whose angle of refraction becomes 90° , is called critical angle.

31. Find the relation for the relation for the critical angle?

Answer

Let the refractive index of glass to air is n , as the light is entering from glass to air in this case. According to Snell's law,

$$\frac{1}{n} = \frac{\sin \angle i}{\sin \angle r}$$

$$n = \frac{\sin \angle i}{\sin \angle r}$$

in this case, $\angle r = 90^\circ$ and $\angle i = \angle C$, then we get

$$n = \frac{\sin 90^\circ}{\sin C}$$

$$n = \frac{1}{\sin C} \quad \text{or} \quad \sin C = \frac{1}{n}$$

32. On what factors does critical angle depend?

Answer

Critical angle depends upon the following two factors.

- Nature of two media
- Wavelength of light

33. Define the term lens and diopter.

Answer

Lens

A transparent refracting medium bounded by two surfaces, one of which is at least curved is called a lens.

Diopter

The unit of the power of lens is called 'diopter'. Power of a lens is said to be one diopter when focal length of lens is one meter. It is expressed as

$$P = 1/f$$

Where f is the focal length

34. Under what conditions does a convex lens act as a diverging lens'?

Answer

A convex lens acts as diverging lens under the following conditions:

- If the object lies between the focus and the optical center of convex lens.
- If the medium outside the lens is denser.

35. For glass-air boundary, find the value of critical angle?

Answer

When ray of light enters from the denser to rare medium, then

Refractive index of glass to air medium i.e. $n=1.5$

The relation for critical angle is

$$\begin{aligned}\sin \hat{C} &= \frac{1}{n} = \frac{1}{1.5} = 0.66 \\ \hat{C} &= 41.8^\circ\end{aligned}$$

Thus for glass-air boundary, the value of critical angle is 41.8°

36. What is optical fibre?

Answer

An optical fibre is made of a highly transparent fine strand of glass or plastic coated with another type of glass whose refractive index is less than the inner tube. Usually the refractive index of inner tube is 1.52 and of outer coating is 1.48.

37. By what processes light propagates in an optical fibre should be totally confined within the fibre?

Answer

Light propagating in an optical fibre should be totally confined within the fibre.

This can be made possible by:

- Total internal reflection
- Continuous refraction

38. Give some uses of optical fibre.

Answer

- Optical fibres are used to carry telephonic signals and modern communication systems using laser beams.
- Optical fibres are very light in weight more flexible and much cheaper than copper cables.
- The information capacity of light is thousands times greater than that of electricity or radio waves.

39. What is prism and angle of prism?

Answer

- Prism is transparent body having three rectangles and two triangular surfaces.
- Triangular surface opposite to its base is known as angle of prism.

40. What is angle of deviation?

Answer

The angle through which convergent ray has been deviated is called angle of deviation.

41. On what factors the value of angle of deviation depend?

Answer

The value of angle of deviation depends upon the following factors

- Angle of prism
- The refractive index of the material of prism
- The angle of incidence

42. What is minimum an angle of deviation?

Answer

When the angle of incidence is continuously increased from a small value. The angle of deviation first decreases reaches a minimum value and then starts increasing the minimum value of the angle of deviation is known as minimum angle of deviation.

43. What is dispersion of light?

Answer

The phenomenon of splitting of white light into its colours is called dispersion of light.

44. On what factor the refraction of light through prism depends.

Answer

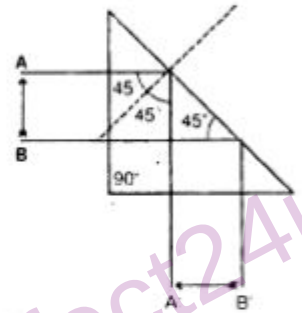
The refraction of light depends on the wavelength. Since the sunlight consists of different colours, the rays of different wavelengths are obtained.

Therefore, when light passes through a prism then the waves of different wavelengths deviate on different paths due to dispersion of light.

45. What is totally reflecting prism?

Answer

A totally reflecting prism is the one, which has one of its angles equal to 90° and each of the remaining two angles equal to 45° . In totally reflecting prism, the phenomenon of total internal reflection has been used.



46. Give some uses of totally reflecting prisms.

Answer

Totally reflecting prisms are used in:

- The periscope
- Binocular
- Projectors

47. What is endoscope?

Answer

Endoscope is an instrument, which is used for viewing and photographing internal organs of human body, by using light pipes.

48. Describe the types of endoscope.

Answer

Endoscope are of many types, which are based on the nature of work required.

- Gastro-scope is used to view stomach.
- Bronchoscope is used to view sore throat.
- Cystoscope is used to examine the working of liver.

49. What is rainbow?

Answer

An arc of spectral colors, which appears in the sky after the rainfall, is called rainbow.

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