1. Give reasons for the following.
    1. It is difficult to place a test-tube over an erect pencil looking at it through a glass slab.
    2. Light bends towards the normal when it travels from air to water.
    3. The dispersion of light occurs when it is passed through a prism

    Answer

    1. When a ray of light travels from one medium to another, it changes its path. So the correct position of the pencil is not seen through a glass slab. So it is difficult to place a test tube over an erect pencil while looking at it though a glass slab.
    2. Since air is less dense than water, so light bends towards the normal when it travels from air to water.
    3. The dispersion of light occurs when it passes through a prism because the different colours are refracted through different angles by a prism.
2. Define these terms.
    1. Spectrum.
    2. Dispersion of light.
    3. Optical centre.
    4. Principal axis.
    5. Focal length.

    Answer

    1. Spectrum: A band of seven colours formed by the dispersion of white light by a prism is called spectrum.
    2. Dispersion of light: The phenomenon due to which white light splits into seven colours, when passed through an equilateral prism, is called dispersion of light.
    3. Optical Centre: A point within the lens, where a line drawn through the diameter of lens meets principal axis, is called optical centre.
    4. Principals axis: An imaginary line joining the centres of curvature of the two spheres, of which lens is a part is called principal axis.
    5. Focal length: The distance between principal focus and optical centre is called focal length

3. Differentiate between the following.
    1. Reflection of light and refraction of light.
    2. Light travelling in air and light travelling in water.
    3. Angle of incidence and angle of refraction.
    4. Incident ray and refracted ray.

Answer.

1. The phenomenon due to which a ray of light, travelling from one optical medium to another optical medium, bounces off from its surface is called reflection of light.
   The phenomenon due to which a ray of light deviates from its path, at the surface of separation of two media, when the ray of light is travelling from one optical medium to another optical medium, is called refraction of light.
2. Light travels at a lower speed in water than in air
3. The angle which an incident ray makes with the normal, at the point of incidence, is known as angle of incidence.
   The angle which a refracted ray makes with the normal, at the point of incidence, is known as angle of refraction.
4. A ray which strikes the surface of separation of two optical media is known as incident ray while a ray which travels in the second optical medium, is known as refracted ray.

4. State the laws of refraction.

Answer.

There are two laws of refraction:

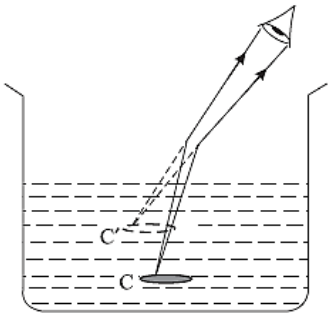
(i) The incident ray, the refracted ray and the normal lie in the same plane at the point of incidence.

(ii) If a circle is drawn at the point of incidence with any radius, cutting the incident ray and the refracted ray and if the perpendiculars are drawn from those points to the normal, then the ratio of perpendicular in air to the perpendicular in denser medium is a constant quantity and is commonly called refractive index of the denser medium.

5. Explain why a coin placed at the bottom of a beaker containing water appears raised?

Answer.

A coin placed at the bottom of a beaker containing water appears raised because the rays of light from the coin 'C' while travelling from water to air bend away from the normal at the water air surface. These refracted rays reach the eye of the observer who sees the coin raised to C′ instead of C.



6. Draw a neat and labelled diagram for the passage of ray of light through an equilateral glass prism, showing clearly

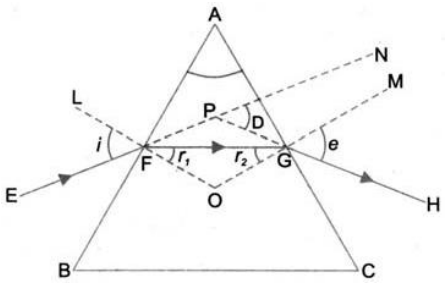
(a) angle of incidence

(b) angle of emergence

(c) angle of deviation

(d) angle of prism.

Answer.



Here, ∠EFL is angle of incidence

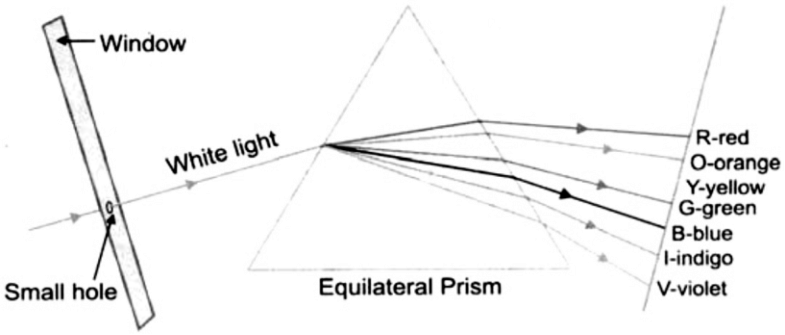
∠GFO is angle of refraction

∠MGH is angle of emergence

∠NPH is angle of deviation

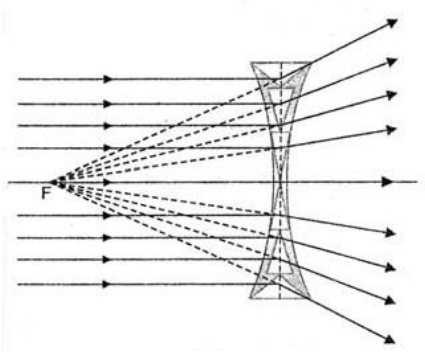
∠A is the angle of prism

7. Draw a neat diagram when a ray of white light passes through an equilateral glass prism.



8. By drawing a neat diagram show how a concave lens acts as a diverging lens

Answer.



9. State the characteristics of an image and draw a neat diagram when:

(a) Object is between F and 2F in case of convex lens.

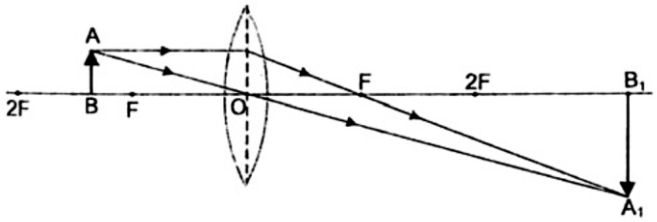
(b) Object is beyond 2F in case of concave lens.

Answer.

(a) When object is between F and 2F of a convex lens.

Image is

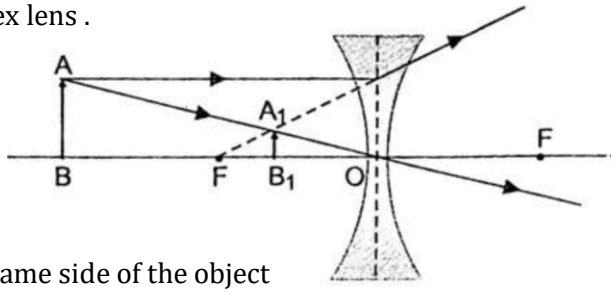
1. Real
2. Magnified
3. Inverted
4. Formed beyond 2F on the other side of lens



(b) When object is beyond 2F of a convex lens .

Image is

1. Virtual
2. Diminished
3. Erect
4. Formed between O and F on the same side of the object



10. (a) What is the short-sighted eye?

(b) State two causes of short-sightedness.

(c) Name the lens used for correcting short-sightedness.

Answer.

(a) When the eye of a person can see nearby objects clearly, but cannot see far off objects clearly, it is known as short-sighted eye.

(b) Short-sightedness is caused when

(i) The focal length of eye lens has shortened.

(ii) Eyeball gets elongated.

(c) Short-sightedness is corrected by using concave lens of appropriate focal length.

11. What is spectrum? Name the various colours in the spectrum of sunlight

Answer.

The band of seven colours obtained on the screen when light splits into seven colours (VIBGYOR), is called spectrum.

The various colours in the spectrum of sunlight are:

1. Violet 2. Indigo 3. Blue 4. Green

5. Yellow 6. Orange 7. Red.

12. What is a virtual image? What are its characteristics?

Answer.

When the rays of light diverging from a point, after reflection or refraction, appear to diverge from some other point, the image so formed is called virtual image.

Characteristics of virtual image:

(a) Virtual images are always erect.

(b) Virtual image cannot be taken on screen.

(c) Virtual image may be magnified or diminished or be of the same size as the object.

13. What is a real image? What are its characteristics.

Answer.

When the rays of light diverging from a point of reflection or refraction actually converge at some other point the image so formed is called real image.

Characteristics of real image:

(a) Real image is always inverted.

(b) Real image can be taken on screen.

(c) Real image may be magnified, diminished or be of the same size as the object.