

**Question:1**

Write one example for the following.

1. A surface that would gives a diffused reflection .....
2. A surface (other than silvered glass) that could act as a mirror .....
3. A mirror that always makes things look smaller .....
4. An object/surface that can split white light into its constituent colours .....
5. A device that can be used to show that the different colours of the spectrum combine to give white light .....

**Solution:**

1. A rough surface such as white paper would produce a diffused reflection.
2. A highly polished metal surface such as a steel plate acts like a mirror.
3. Convex mirrors make things look smaller.
4. A glass prism can split the white light into its constituent colours.
5. Newton's Disc is a device which can be used to show that different colours of the spectrum combine to give white light.

**Question:2**

Write one/two word(s) for the following.

1. Light bouncing off a surface .....
2. Reflection from a rough surface .....
3. Reflection from a smooth surface .....
4. An image that is erect .....
5. An image that cannot be formed on a screen .....

**Solution:**

1. Reflection
2. Irregular or Diffused Reflection
3. Regular Reflection
4. An upright image; Image formed by a plane mirror is an erect image
5. Virtual Image

**Question:3**

A real image can be obtained with

- (a) a plane mirror
- (b) with a concave mirror
- (c) a or b

(d) with a convex mirror

**Solution:**

(b) With a concave mirror

A concave mirror produces a real image of an object while plane and convex mirrors produce only virtual images.

**Question:4**

A magnifying glass is a

(a) concave mirror

(b) convex mirror

(c) concave lens

(d) convex lens

**Solution:**

(d) Convex lens

A magnifying glass is a convex lens.

**Question:5**

An image of the same size is obtained if the object is placed in front of a convex lens

(a) at infinity

(b) at the focus

(c) at twice the focal length

(d) between focus and the lens

**Solution:**

(c) At twice the focal length

An image of the same size is obtained if the object is placed in front of a convex lens at twice the focal length.

**Question:6**

Parallel rays of light, falling on a concave lens, appear to diverge from a point

(a) at infinity

(b) at twice focal length

(c) at the focus

(d) between focus and the lens

**Solution:**

(c) At the focus

Parallel rays of light falling on a concave lens appear to diverge from the principal focus.

**Question:7**

Newton's disc appears white when it is

- (a) kept in the dark
- (b) seen in sunlight
- (c) rotated
- (d) shaken very fast

**Solution:**

(c) Rotated.

Newton's disc is a coloured disc which appears white when rotated very fast.

**Question:8**

Fill in the blanks with the correct words.

1. We get diffused reflection from a ..... (rough/smooth) surface.
2. A smooth polished surface that can return the rays of light incident on it to form a clear image is called a ..... (lens/mirror).
3. Convex and concave mirrors can both form ..... (real/virtual) images.
4. A lens is made of a ..... (translucent/transparent) material.
5. .... (White/Blue) light consists of many colours.

**Solution:**

1. Rough Surface
2. Mirror
3. Virtual images
4. Transparent
5. White

**Question:9**

Give the differences between real and virtual images with examples.

**Solution:**

Differences between real and virtual images:

Sl.No	Real Images	Virtual Images
1.	An image of an object that can be formed on a screen is a real image	An image of an object that cannot be formed on a screen is a virtual image
2.	Real images are usually inverted and can be touched.	Virtual images are always erect and cannot be touched.
3.	Ex: A concave mirror such a highly polished steel spoon produces a real and inverted image of an object depending on the position of the object from the mirror	Ex: A plane mirror such as a mirror on your dressing table forms a virtual and erect image of an object

**Question:10**

Give two common uses of curved mirrors.

**Solution:**

Curved mirrors are reflecting surfaces which form images of the objects when placed in front of them. Curved mirrors are of two types; concave mirrors which are bulged inwards and convex mirrors are bulged outwards.

Uses:

- a. Convex mirrors make objects appear smaller than they usually are so as to give a wide view of the surroundings. This makes it useful in big shops and supermarkets to spot the shoplifters.
- b. Concave mirrors make objects appear larger when placed very close to the mirror. Therefore they are commonly used as shaving mirrors or dentist mirrors.

**Question:11**

Where would we commonly find lenses?

**Solution:**

A lens is an optical device made of glass or any other transparent material. The curved surfaces of the lenses either converge or diverge the light rays falling on it and form an image of the object. Most common lenses are concave and convex lenses and they are found in spectacles, cameras, binoculars, telescopes and magnifying glasses.

**Question:12**

How could we split white light into its constituent colours?

**Solution:**

A glass prism can be used to show the splitting of white light into its constituent colours. A prism is an optical device with two refracting surfaces. When white light such as sunlight passes through a prism, it splits the light into a band of colours called spectrum. This spectrum can be seen on a screen placed in front of the prism. The spectrum consists of colours which are visible to the human eye namely violet, indigo, blue, green, yellow, orange and red (VIBGYOR).

**Question:13**

If we want a clear image of an object, what kind of surface should we use?

**Solution:**

In order to obtain a clear image of an object, the surface on which the light falls should be smooth or regular. A smooth or regular surface such as a mirror reflects the light only in one direction. As a result, a mirror produces a clear image of an object.

**Question:14**

What kind of image does a plane mirror produce?

**Solution:**

A plane mirror acts like a reflecting surface and produces an erect and virtual image of an object.

**Question:15**

Which lens always produces a diminished image?

**Solution:**

A concave lens always produces a diminished, virtual and erect image of an object, irrespective of the position of the object from the lens.

**Question:16**

Give the nature of the image formed by a convex lens when the object is between  $F$  and  $2F$  (where  $F$  is the focal length of the lens).

**Solution:**

When the position of the object is between  $F$  and  $2F$  (where  $F$  is the focal length of the lens), the nature of the image formed by a convex lens is real, inverted and magnified.

**Question:17**

Where should we place an object in front of a convex lens so that the image is formed at infinity?

**Solution:**

When the position of the object is at the focal length of the lens ( $F$ ), the position of the image formed by a convex lens is at infinity.

**Question:18**

Give reasons for the following:

- (a) We cannot see a source of light through a bent tube.
- (b) Convex mirrors are used in a car wing mirrors.
- (c) A concave mirror is used as a dentist's mirror.

**Solution:**

(a): We cannot see a source of light through a bent tube because a bent tube is not a uniform medium. In order to see the source of light, the tube should be a straight uniform medium because light travels in straight lines. A tube which is bent obstructs the path of light from reaching the eye.

(b): Convex mirror is a curved object which bulges outwards to form a reflecting surface. The images formed in a convex mirror are therefore very small giving a wider range of view of the surroundings. Therefore a convex mirror finds its use in a car wing mirror as it helps in giving a wide view behind the car.

(c): Concave mirror is a reflecting surface which curves inwards. The image of any object appears larger when kept very close to the concave mirror. Therefore it is used as a dentist's mirror to examine inside the mouth.