

## Class 7<sup>th</sup> Living science solution 2017-18 Chapter 16. LIGHT

### P. 178 Oral Questions For Formative Assessment

1. No    2. virtual image    3. all but E    4.  $90^\circ$  - the angle between the mirror and the incident ray

### Page 182 Oral Questions For Formative Assessment

1. outwards
2. the rays meet (converge) at a point called the Principal Focus (F) after reflection.
3. they diverge after reflection
4. No, the image is real for all other positions except when the object is between F and P in case of concave mirror.
5. concave mirror
6. Convex because it forms smaller images and hence can be used to view a much larger area.

### P 185 Oral Questions For Formative Assessment

1. yes
2. they will diverge
3. they converge at a single point called the Principal Focus
4. This point lies at the centre of the lens and is called the optical centre of the lens.
5. convex
6. No, there are seven colours but they appear as one, that is, white as our eyes can not distinguish them separately.

### P 186 For Formative and Summative Assessment

A. 1.d. 2. d 3. c 4. b 5.b. 6. b 7. d 8. c 9. a 10. c

B. 1. false 2. false 3. behind 4. focus 5. concave 6. true 7. concave  
8. converges 9. a thick lens 10. at 2F 11. false 12. prism

C. 1. The angle formed by the ray of light or incident ray and the normal drawn at the point of incidence to the mirror surface is called the angle of incidence of that ray of light.

2. The angle of incidence is equal to the angle of reflection.
3. The image which can be formed on a screen is called a real image.
4. In the image formed by a plane mirror, there is an interchange of left and right. This is called lateral inversion.
5. Because a convex mirror forms smaller images of objects, it can be used to view a much larger area than would be possible with a plane mirror.
6. A convex lens bends all parallel rays passing through it inwards to meet or converge at a point called the focus. Thus, it is said to have a real focus. A concave lens makes spread all parallel rays away or diverge and it appears as if they were coming from a point called the focus. Thus, it is said to have a virtual focus.
7. The pattern formed by the seven colours of ordinary white light is called a spectrum.
8. The convex lens forms a virtual image when the object is between O and F. Bigger than the object.

D. 1. see diagram

2. The characteristics of the image formed by a plane mirror are: .

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- (i) It is virtual
- (ii) It is erect
- (iii) It is of the same size as the object
- (iv) It appears to be as much behind the mirror as the object is in front of it
- (v) It is laterally inverted

3. Three uses of concave mirrors are:

- (i) Used in torches and car headlights to reflect the light to form a powerful beam of light
- (ii) Used in the astronomical telescope to form an image of the star or planet
- (iii) Used by dentists to magnify the image of teeth

4. A real image can be taken on screen whereas a virtual image cannot be taken on screen. In case of convex lens real images are always formed (except in magnifying glass) whereas in case of concave lens virtual images are always formed.

5. a. Position of the object between  $O$  and  $F$ :

Position of the image — behind the mirror

Nature of the image — virtual, magnified and erect

b. Position of the object between  $F$  and  $C$ :

Position of the image — beyond  $C$

Nature of the image — real, magnified and inverted

c. Position of the object beyond  $C$ : Position of the image — between  $F$  and  $C$

Nature of the image — real, diminished and inverted

6. a. Position of the object between  $O$  and  $F$ :

Position of the image — on same side as object

Nature of the image — virtual, erect, magnified

b. Position of the object between  $F$  and  $2F$ :

Position of the image — beyond  $2F$

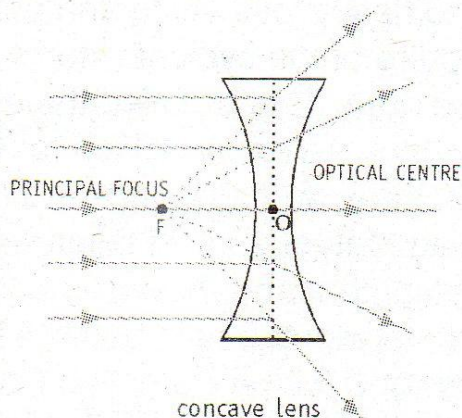
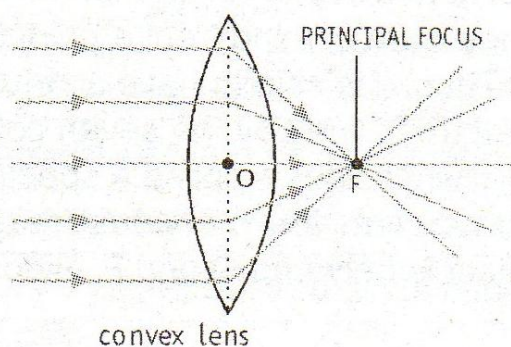
Nature of the image — real, inverted, magnified

c. Position of the object beyond  $2F$ :

Position of the image — between  $F$  &  $2F$

Nature of the image — real, inverted, diminished

7.



Principal focus: The point 'F' in the figure for convex lens is actually the real image of the sun formed on a screen. This point is called the principal focus of the lens.

In the case of a concave lens, a virtual image will be formed at the point F which is the principal focus of the lens.

Focal length: The distance between the optical centre O and the focus F of a lens is called the focal length (OF).

8. Newton showed that a prism can produce a spectrum. He allowed a thin beam of light to fall on a prism in a dark room. After passing through the prism, the beam splits into its different colours. A spectrum was seen on a screen kept behind the prism.

HOTS Questions

1. No difference. The size of the image of any object formed on a plane mirror does not depend on the size of the mirror.

2. Four identical mirror image letters H, I, O, X

3. Rear view mirrors are convex to have a useful field of view. They form a smaller image of the object behind them. Since smaller objects appear farther away, the objects seen in the mirror look further away than they really are. If the driver does not realise this, he might turn or change lanes thinking that the car behind is further away than it actually is. This can result in an accident. The warning is there to remind the driver of this potential problem.

4. A concave mirror converges parallel rays of light after reflection so that they actually meet at the focus and form a real image. Therefore the focus is real. A convex mirror diverges parallel rays of light after reflection so that they appear to come from the focus. Therefore the focus is virtual.

By the same logic a convex lens has a real focus (as it converges parallel rays), and a concave lens a virtual focus (as it diverges parallel rays).

5. Glass lens will have a greater focal length because it bends light less than diamond. 6. In plane mirror, all normals at the surface are parallel to each other.

7. Infinite number of images, as the image formed by one mirror becomes the object for the other mirror and so on.