CBSE NCERT Solutions for Class 7 Science Chapter 15

Back of Chapter Questions

1. Fill in the blanks in the following.

(A) An image that cannot be obtained on a screen is called _____.

(B) An image formed by a convex _____ is always virtual and smaller in size.

(C) An image formed by a _____ mirror is always of the same size as that of the object.

(D) An image which can be obtained on a screen is called a _____ image.

(E) An image formed by a concave _____ cannot be obtained on a screen.

Solution:

(A) An image that cannot be obtained on a screen is called **virtual image**.

Virtual images cannot be obtained on a screen, whereas real images can be obtained on a screen.

(B) An image formed by a convex **mirror** is always virtual and smaller in size.

The image formed by a convex mirror is erect, virtual and smaller in size than the object.

(C) An image formed by a **plane** mirror is always of the same size as that of the object.

The plane mirror forms images that are the same size as the object.

(D) An image which can be obtained on a screen is called a **real** image.

Real images can be obtained on the screen, whereas virtual images cannot be obtained on the screen.

(E) An image formed by a concave **lens** cannot be obtained on a screen.

Concave lenses form virtual images.

2. Mark 'T' if the statement is true and 'F' if it is false.

(A) We can obtain an enlarged and erect image by a convex mirror. (T/F)

(B) A concave lens always forms a virtual image. (T/F)

(C) We obtain a real, enlarged and inverted image by a concave mirror. (T/F)

(D) A real image cannot be obtained on a screen. (T/F)

(E) A concave mirror always forms a real image. (T/F)

Solution:

(A) False

Convex mirror forms images that are virtual, erect and smaller in size than the object.

(B) True

A concave lens forms images that are virtual, erect and smaller in size than the object.

(C) True

A concave mirror can form images that are real or virtual, enlarged or diminished and real or inverted depending on the object distance from the mirror.

(D) False

Real images can be obtained on the screen, whereas virtual images cannot be obtained on the screen.

(E) False

A concave mirror can form images that are real or virtual, enlarged or diminished and real or inverted depending on the object distance from the mirror.

3. Match the items given in Column I with one or more items of Column II.

Column I	Column II
(A) A plane mirror	(i) Used as a magnifying glass.
(B) A convex mirror	(ii) Can form image of objects spread over a large area.

(C) A convex lens	(iii)	Used by dentists to see enlarged image of teeth.
(D) A concave mirror	(iv)	The image is always inverted and magnified.
(E) A concave lens	(v)	The image is erect and of the same size as the object.
	(vi)	The image is erect and smaller in size than the object

Solution:

Column I	Column II
(A) A plane mirror	(v) The image is erect and of the same size as the object.
(B) A convex mirror	(ii) Can form image of objects spread over a large area. (vi) The image is erect and smaller in size than the object
(C) A convex lens	(i) Used as a magnifying glass.
(D) A concave mirror	(iii) Used by dentists to see enlarged image of teeth.
(E) A concave lens	(vi) The image is erect and smaller in size than the object

4. State the characteristics of the image formed by a plane mirror.

Solution:

The characteristics of an image formed by a plane mirror are:

i. The image height and object height are the same.

ii. The image is erect.

iii. The image is virtual.

iv. The distance between the object and the mirror is the same as the distance between the image and the mirror.

v. The image is laterally inverted.

vi. The image is formed at the back of the mirror.

5. Find out the letters of English alphabet or any other language known to you in which the image formed in a plane mirror appears exactly like the letter itself. Discuss your findings.

Solution:

The alphabets that will have the image appear the same as the alphabet when kept in front of a plane mirror are A, H, I, M, O, T, U, V, W, X, Y. These letters are vertically symmetric. That means if we cut the letters in half, both the halves will look similar. There won't be any change even if the letter is interchanged sidewise.

6. What is a virtual image? Give one situation where a virtual image is formed.

Solution:

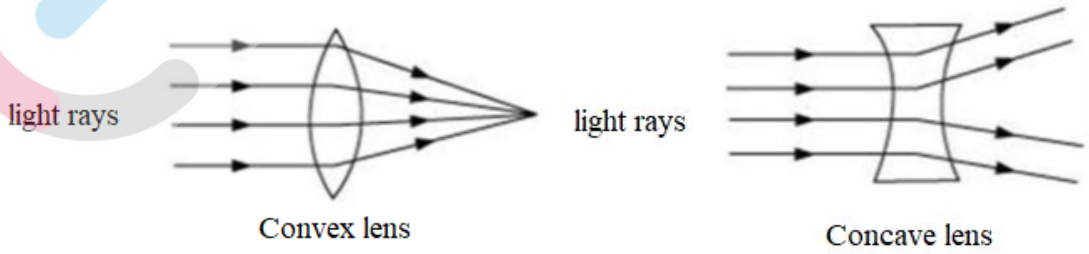
A virtual image is an image that cannot be obtained on a screen. The image formed by a plane mirror is a virtual image. The image cannot be obtained on a screen placed in front of or behind the mirror.

7. State two differences between a convex and a concave lens.

Solution:

i. A convex lens is thicker in the middle, whereas the concave lens is thinner in the middle.

ii. A convex lens converges the rays falling on it whereas the concave lens diverges the rays falling on it.



8. Give one use each of a concave and a convex mirror.

Solution:

Concave mirrors form an enlarged image of the object. Thus, they are used by dentists to see an enlarged image of the teeth.

Convex mirrors form images that are diminished and erect. Thus, they are used as a side view mirror for vehicles as they enable the driver to see over a large area behind the vehicle.

9. Which type of mirror can form a real image?

Solution:

A concave mirror can form a real image. The image formed by a concave mirror is real or virtual, enlarged or diminished and real or inverted depending on the object distance from the mirror.

10. Which type of lens forms always a virtual image?

Solution:

A concave lens always forms a virtual image. A convex lens forms a real image or virtual image depending on the position of the object.

11. A virtual image larger than the object can be produced by a

(A) Concave lens

(B) Concave mirror

(C) Convex mirror

(D) Plane mirror

Solution: (B)

A concave mirror can form a virtual image larger than the object when placed near to it. Concave lens and convex mirror produce a virtual image but diminished in size. The plane mirror produces a virtual image that is the same height as that of the object.

12. David is observing his image in a plane mirror. The distance between the mirror and his image is 4 m. If he moves 1 m towards the mirror, then the distance between David and his image will be

(A) 3 m

(B) 5 m

(C) 6 m

(D) 8 m

Solution: (C)

When the distance between David and the mirror is 4 m, the distance between the mirror and the image is also 4 m.

The distance between David and the image is $4\text{ m} + 4\text{ m} = 8\text{ m}$.

When David moves 1 m towards the mirror, the distance between David and the mirror will become 3 m. When David moves 1 m towards the mirror, the image also moves 1 m closer to the mirror. Thus, the distance between the mirror and the image is 3 m.

Thus, the distance between David and his image will be $3\text{ m} + 3\text{ m} = 6\text{ m}$.

13. The rearview mirror of a car is a plane mirror. A driver is reversing his car at a speed of 2 m/s. The driver sees in his rearview mirror the image of a truck parked behind his car. The speed at which the image of the truck appears to approach the driver will be

(A) 1 m/s

(B) 2 m/s

(C) 4 m/s

(D) 8 m/s

Solution: (B)

When a plane mirror moves 1 m towards the object, the distance between the object and the mirror decreases by 2 m. Hence, the image of the truck will appear to approach the driver with twice the speed the driver is reversing the car.
The speed at which the image of the truck appears to approach the driver $= 2(2\text{ m/s}) = 4\text{ m/s}$.

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