PHYSICS

BOOKS - ICSE

REFLECTION OF LIGHT

Examples

1. In a dark room, a parallel beam of light falls on a plane mirror and another parallel beam of light falls on a white wall. The light reflected

by the mirror can be seen only in a certain direction, but the reflected light from the wall can be seen from anywhere. Give reason.

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2. Complete the diagram in fig. to form the image A'B' of the object AB by the plane mirror MM_1. State in workds how have you completed the diagram. Measure the perpendicular distance of the points A and B of the object from the mirror and also the

perpendicular distance of the points A' and B' of the image from the mirror and state how they are related.

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3. An object is at a distance 25 cm in front of a plane mirror. The mirror is shifted 5 cm away from the object. Find: (i) the new distance between theobject ad its image, and (ii) the

distance between the two positions of the image.

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4. Complete the ray diagram shown in fig to show the formation of image for parallel rays incident on a concave mirro. State position, nature and size of the image formed.

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5. Complete the ray diagram shown in fig to show the formation of image for prallel rays incident on a convex mirror. State position, nature and size of the image formed.

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6. In case of a convex mirror, if object is moved away from the mirror, how do the position, size and nature of image change?

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7. An object is brought from a far distance towards a concave mirror. How do the nature, position and size of image change?

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8. You are given a concave mirror of focal length 10 cm, a point source of light nad a screen placed at distance 30 cm in front of mirror. How can you obtain a bright patch of

light on screen, of size equal to that of the aperture of mirror? Draw diagram to explain your answer.

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9. What is the focal length of a concave mirror of radius of curvature 16.0 cm?

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10. A concave mirror is a part of hollow sphere of radius 40 cm. What will be the focal length of concave mirror?

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11. Focal length of a convex mirror is 10 cm

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12. For an object placed at a distance 20 cm from a concave mirror, the image is formed at the same position. What is the focal length of the mirror?

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13. The image image of an object placed at a distance of 30 cm on the principal axis of a concave mirror from its pole is formed on the

object itself. Find (a) the focal length and (b) linear magnification of mirror:

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14. An object is placed at a distance of 48 cm in front of a concave mirror of focal length 24 cm.

a. Find the position of image.

b. What will be the nature of image?

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15. An object is placed at a distance of 15 cm in form of a convex mirror of radius of curvature 10 cm. a.where will the image form? B. Find the magnification m. c. What will be the nature of image real or virtual?

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16. When an object is placed at a distance of 40 cm from a concave mirror, the size of image is one fourth that of the object. A. Calculate

the distance of image from the mirror b. What will be the focal length of the mirror?

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17. At what distance in front of a concave mirror of focal length 10 cm, an object be placed so that its real image of size five times that of the object is obtained?

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18. At what distance in front of a concave mirrorof focal length 10 cm, an object be placed so that its virtual image of size five times that of the object is obtained?

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19. A convex mirror forms the image of an object placed at a distance 40 cm in front of mirror, at distance 10 cm Find the focal length of mirror.

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20. The focal length of a convex mirror is 40 cm. A point source of light is kept at distance 40 cm from the mirror. Find the distance of image from the mirror.

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21. A convex mirror forms as erect image of an object of size one third the size of object. If

radius of curvature of convex mirror is 36 cm, find the position of object.

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Exercise 7 A

1. What do you mean by the term reflection of light ?

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2. State which surface of a plane mirror reflects most of the light incident on it: the front smooth surface or the back silvered surface.

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3. Explain the following terms:

plane mirror

Draw diagram/diagrams to show them.

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4. Explain the following terms:

incident ray

Draw diagram/diagrams to show them.

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5. Explain the following terms:

reflected ray

Draw diagram/diagrams to show them.

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6. Explain the following terms:

angle of incidence and

Draw diagram/diagrams to show them.

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7. Explain the following terms:

angle of reflection.

Draw diagram/diagrams to show them.

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8. With the help of diagrams, explain the difference between regular and irregular reflection.

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9. Differentiate between the reflection of light from a plane mirror and that from a plane sheet of paper.

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10. State the two laws of reflection of light.

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11. State the laws of reflection and describe an experiment to verify them.

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12. a light ray is incident normally on a plane mirror.

a. What is its angle of incidence?

b. What is the direction of reflected ray? Show it on a diagram.

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13. Draw a diagram to show the reflection of a ray of light by a plane mirror. In the diagram, label the incident ray, the reflected ray, the normal, the angle of incidence and the angle of reflection.

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14. Fig shows an incident ray AO and the normal ON on a plane mirror. The angle which the incident ray AO makes with the mirror is 30°. A. Find the angle of incidence. B. Draw the reflected ray and then find the angle between the incident and reflected rays.

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15. The diagram below in fig shows an object XY in front of a plane mirror MM_1. Draw on

the diagram, path of two rays from each point X and Y of the object to show the formation of its image.

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16. Write three characteristics of the image formed by a plane mirror?

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17. How is the position of image related to the position of the object for concave mirror of focal length f?

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18. Differentiate between a real and a virtual image.

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19. What is meant by lateral inversion of an image in a plane mirror? Explain it with the help of a ray diagram.

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20. Why is difficult to read the image of the text of a page formed due to reflection by a plane mirror?

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21. According to the law of reflection:

A. $i/r =$ constant

B. $\sin I/\sin r =$ constant

C. $i + r =$ constant

D. $i = r$

Answer: A::D

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22. The image formed by a plane mirror is

A. erect and diminished

B. erect and enlarged

C. inverted and of same size

D. erect and of same size

Answer: A::D

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23. The image formed by a plane mirror is

A. real

B. virtual

C. virtual with lateral inversion

D. real with lateral inversion

Answer: C

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24. A ray is incident on a plane mirro. Its reflected ray is perpendicular to the incident ray. Find the angle of incidence.

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25. A man standing in front of a plane mirror finds his image at a distance 6 metre from himself. What is the distance of man from the mirror?

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26. An insect is sitting in front of a plane mirror at a distance 1 m from it.

a. Where is the image of the insect formed?

b.What is the distance between the insect and its image?

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27. An object is kept at 6 0cm in front of a plane mirror. If the mirror is now moved 25 cm away from the object, how does the image shift from its previous position?

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28. An optician while testing the eyes of a patient keeps a charge of letters 3 m behind the patient and asks him to see the letters on the image of chart formed in plane mirror kept at distance 2 m in front of him. At what distance is the chart seen by the patient?

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Exercise 7 B

1. When the two plane mirror are parallel to each other, then the number of images of an object placed between them is

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2. Two plane mirrors are placed making an angle θ° in between them. For an object placed in between the mirrors, if angle is gradually increased from 0° to 180°, how will

the number of images change: increase, decrease or remain unchanged?

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3. How many images are formed for a point object kept in between the two plane mirrors at right angles to each other? Show them by drawing a ray diagram.

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4. Two plane mirrors are arranged parallel and facing each other at some separation. How many images are formed for a point object kept in between them? Show the formation of images with the help of a ray diagram.

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5. State two uses of a plane mirror.

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6. Two mirrors are kept at 60° to each other and a body is placed at the middle. The total number of images formed are

A. 3

B. 6

C. 5

D. infinite

Answer: C

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7. In a barber's shop, two plane mirrors are placed

A. perpendicular to each other

B. parallel to each other

C. at an angle of 60° between them

D. at an angle of 45° between them

Answer: B

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8. State the number of images of an object placed between the two plane mirrors, formed in each case when the mirrors are inclined to each other at a. 90°, and b 60°

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9. An object is placed (i) asymmetrically (ii) symmetrically, between two plane mirrors inclined at an angle of 50°. Find the number of images formed.

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Exercise 7 C

1. What is a spherical mirror?

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2. Name the two kinds of spherical mirrors and distinguish between them.

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3. Define the terms pole, principal axis and centre of curvature with reference to a spherical mirror.

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4. Draw suitable diagrams to illustrate the action of (i) concave mirror, and (ii) convex mirror, on a beam of light incident parallel to the principal axis.

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5. Name the spherical mirror which (i) diverges (ii) converges the beam of light incident on it. Justify your answer by drawing a ray diagram in each case.

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6. Define the terms focus and focal length of a concave mirror. Draw diagram to illustrate your answer.

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7. Explain the meaning of the terms focus and focal length in case of a convex mirror, with the help of , suitable ray diagram.

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8. State the direction of incident ray which after reflection from a spherical mirror retraces its path. Give a reason to your answer.

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9. (i) Name the mirrors shown in fig a. and b.

(ii) In each case a. and b, draw the reflected rays for the given incident rays and mark focus by the symbol f.

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10. Complete the following diagrams in fig by drawing the reflected rays for the incident rays 1 and 2.

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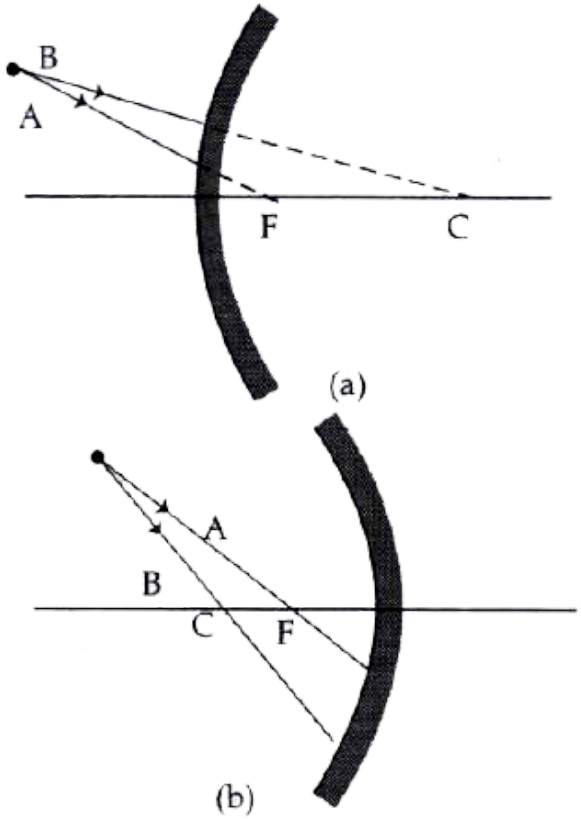
11. Complete the following diagrams in Fig. by drawing the reflected ray for the incident rays A and B.



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12. State the two convenient rays that are chosen to construct the image by a spherical mirror for a given object? Explain your answer with the help of suitable ray diagrams.

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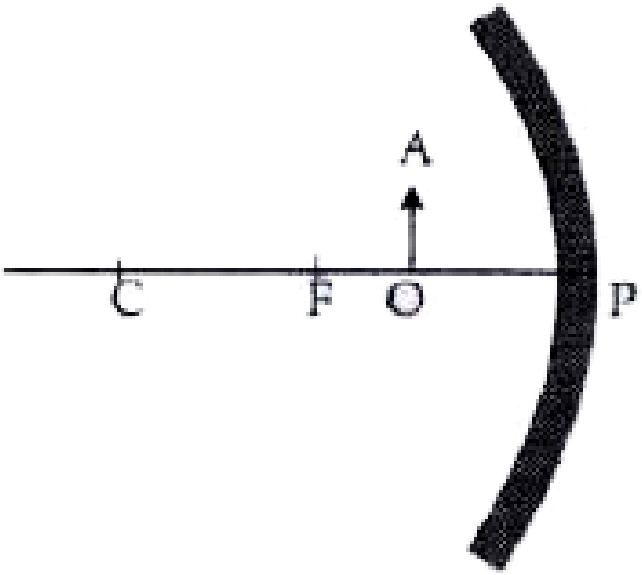
13. Draw a ray diagram to show the formation of image by a concave mirror for an object

placed between its pole and focus. State three characteristics of the image.



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14. Draw a ray diagram to show the formation of image by a concave mirror for an object

beyond its centre of curvature. State three characteristics of the image.

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15. Draw the image formed by a convex mirror when the object is kept in front of the mirror and write the characteristics of the image.

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16. Name the mirror which always produces an erect and virtual image. How is the size of image related to the size of object?

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17. (a) For what position of object, the image formed by a concave mirror is magnified and erect?

(b) State whether the image in part (a) is real or virtual?

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18. (a) For what position of object, the image formed by a concave mirror is magnified and erect?

(b) State whether the image in part (a) is real or virtual?

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19. State the position of object for which the image formed by a concave mirror is of same

size.

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20. Write two more characteristics of the image.

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21. What is a real image?

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22. What type of mirror can be used to obtain a real image of an object?

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23. Does the mirror mentioned in part b. form real image for all locations of the object?

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24. Write the position and nature of the image formed in a concave mirror if the object is kept (a) at infinity (b) at F (c) between F and C (d) at (e) beyond C (f) between F and P.

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25. Name the kind of mirror used to obtain:

a. a real and enlarged image

b. a virtual and enlarged image

c. a virtual and diminished image

d. a real and diminished image

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26. How is the focal length of a spherical mirror related to its radius of curvature?

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27. Write the spherical mirror's formula and explain the meaning of each symbol used in it.

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28. What is meant by magnification ? Write its expression. What is its sign for the a. real b. virtual, image?

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29. What may be the maximum distance of the image in a convex mirror can be obtained? What will be the location of object then?

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30. Upto what maximum distance from a concave mirror, the image can be obtained ? What will be the location of object for it?

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31. You are provided with (a) a plane mirror, (b) a convex mirror and (c) a concave mirror.

How will you distinguish between them, without touching them?

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32. State two uses of a concave mirror.

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33. State the kind of mirror used

a. by a dentist, b. as a search light reflector.

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34. (a) When a concave mirror is used as a shaving mirror, where is the person.s face in relation to the focus of mirror?

(b) State three characteristics of the image seen in part (a).

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35. State three characteristics of the image seen in part a.

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36. A mirror which is always used as a rear view mirror for vehicles is :

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37. Why does a driver use a convex mirror instead of a plane mirror as arear view mirror? Illustrate your answer with the help of a ray diagram.

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38. For an incident ray directed towards centreof curvature of a spherical mirror, the reflected ray:

A. retraces its path

B. passes through the focus

C. passes through the pole

D. becomes parallel to the principal axis

Answer: A

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39. The image formed by a convex mirror is

A. erect and diminished

B. erect and enlarged

C. inverted and diminished

D. inverted and enlarged.

Answer: A

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40. Name the kind of spherical mirror used to obtain : A real and enlarged image

A. convex mirror

B. plane mirror

C. concave mirror

D. either convex or plane mirror

Answer: C

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41. The radius of curvature of a convex mirror is 40 cm. Find its focal length.

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42. The focal length of a concave mirror is 10 cm. Find its radius of curvature.

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43. An object of height 2 cm is placed at a distance 20cm in front of a concave mirror of

focal length 12 cm. Find the position, size and nature of the image

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44. An object is placed at 4 cm distance in front of a concave mirror of radius of curvature 24 cm. Find the position of image. Is the image magnified?

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45. At what distance from a concave mirror of focal length 25 cm should an object be placed so that the size of image is equal to the size of the object.

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46. An object 5 cm high is placed at a distance 60 cm in fornt of a concave mirror of focal length 10 cm. Find (i) the position and (ii) size, of the image.

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47. A point light source is kept in front of a convex mirror at a distance of 40 cm. The focal length of the mirror is 40 cm. Find the position of image.

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48. When an object of height 1 cm its kept at a distance 4 cm from a concave mirror, its erect image of height 1.5 cm is formed at a distance

6 cm behind the mirror. Find the focal length of mirror.

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49. An object of length 4 cm is placed in front of a concave mirror at distance 30 cm. The focal length of mirror is 15 cm. a. Where will the image form? B. What will be the length of image?

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50. A concave mirror forms a real image of an object placed in front of it at a distance 30 cm, of size three times the size of object. Find a. the focal length of mirror b. position of image.

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51. A concave mirror forms a virtual imageof size twice that of the object placed at a distance 5 cm from it. Find: a. the focal length of the mirror b. position of image.

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52. The image formed by a convex mirroris of size one third the size of object. How are u and v related?

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53. The erect image formed by a concave mirror is of size double the size of object. How are u and v related?

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54. The magnification for a mirror is -3. How are u and v related?

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