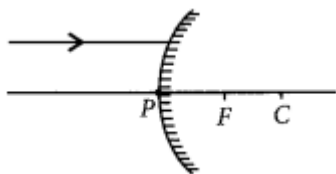




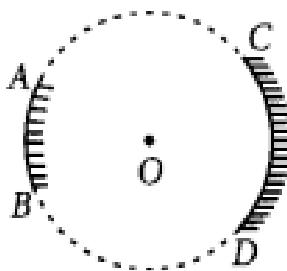
## NEUTRON CLASSES

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1. The laws of reflection hold true for
  - (a) plane mirrors only
  - (b) concave mirrors only
  - (c) convex mirrors only
  - (d) all reflecting surface
2. State the two laws of reflection of light.
3. List four characteristics of the images formed by plane mirrors.
4. When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is
  - (a) real
  - (b) inverted
  - (c) virtual and inverted
  - (d) virtual and erect
5. What is the magnification of the images formed by plane mirrors and why?
6. Draw a labelled ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a convex mirror. Mark the angle of incidence and angle of reflection on it.
7. If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it? Draw a labelled ray diagram to support your answer.
8. An object is placed at a distance of 30 cm in front of a convex mirror of focal length 15 cm. Write four characteristics of the image formed by the mirror.
9. An object is placed at a distance of 12 cm in front of a concave mirror of radius of curvature 30 cm. List four characteristics of the image formed by the mirror.
10. A ray of light is incident on a convex mirror as shown. Redraw the diagram and complete the path of this ray after reflection from the mirror. Mark angle of incidence and angle of reflection on it. (Delhi 2016)



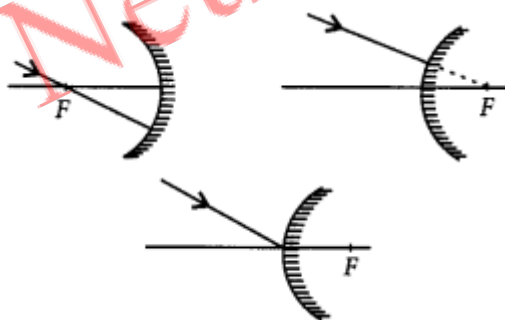
11. Name the type of mirrors used in the design of solar furnaces. Explain how high temperature is achieved by this device.
12. "The magnification produced by a spherical mirror is -3". List four informations you obtain from this statement about the mirror/ image.
13. AB and CD, two spherical mirrors, from parts of a hollow spherical ball with its centre at O as shown in the diagram. If arc  $AB = \frac{1}{2}$  arc CD, what is the ratio of their focal lengths? State which of the two mirrors will always form virtual image of an object placed in front of it and why?

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14. List two properties of the images formed by convex mirrors. Draw ray diagram in support of your answer.
15. The linear magnification produced by a spherical mirror is  $+3$ . Analyse this value and state the (i) type of mirror and (ii) position of the object with respect to the pole of the mirror. Draw a ray diagram to show the formation of image in this case.
16. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed towards the principal focus of a convex mirror. Mark on it the angle of incidence and the angle of reflection.
17. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray which is directed parallel to the principal axis of a convex mirror, Mark on it the angle of incidence and the angle of reflection.
18. Draw a ray diagram to show the path of the reflected ray corresponding to an incident ray of light parallel to the principal axis of a concave mirror. Mark the angle of incidence and angle of reflection on it.
19. List two possible ways in which a concave mirror can produce a magnified image of an object placed in front of it. State the difference if any between these two images.
20. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should the position of the object be relative to the mirror? Draw ray diagram to justify your answer.
21. The linear magnification produced by a spherical mirror is  $+1/3$ . Analysing this value state the (i) type of mirror and (ii) position of the object with respect to the pole of the mirror. Draw any diagram to justify your answer.
22. The linear magnification produced by a spherical mirror is  $-1$ . Analysing this value state the (i) type of mirror and (ii) position of the object with respect to the pole of the mirror. Draw any diagram to justify your answer.
23. The linear magnification produced by a spherical mirror is  $-1/5$ . Analysing this value state the (i) type of spherical mirror and (ii) the position of the object with respect to the pole of the mirror. Draw ray diagram to justify your answer.
24. Draw ray diagrams for the following cases when a ray of light:  
(i) passing through centre of curvature of a concave mirror is incident on it.

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- (ii) Parallel to principal axis is incident on convex mirror.  
(iii) is passing through focus of a concave mirror incident on it.
25. A concave mirror is used for image formation for different positions of an object. What inferences can be drawn about the following when an object is placed at a distance of 10 cm from the pole of a concave mirror of focal length 15 cm?
- Position of the image
  - Size of the image
  - Nature of the image
- Draw a labelled ray diagram to justify your inferences.
26. A concave mirror has a focal length of 20 cm. At what distance from the mirror should a 4 cm tall object be placed so that it forms an image at a distance of 30 cm from the mirror? Also calculate the size of the image formed.
27. The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed in front of the mirror at a distance of 60 cm from its pole. What is the nature of the mirror? Find its focal length. If the height of the flame is 2.4 cm, find the height of its image. State whether the image formed is erect or inverted.
28. An object 4 cm in height, is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object. Calculate the height of the image.
29. Draw the following diagram in which a ray of light is incident on a concave/convex mirror, on your answer sheet. Show the path of this ray, after reflection, in each case.



30. The image of an object formed by a mirror is real, inverted and is of magnification -1. If the image is at a distance of 40 cm from the mirror, where is the object placed? Where would the image be if the object is moved 20 cm towards the mirror? State reason and also draw ray diagram for the new position of the object to justify your answer.
31. The image formed by a spherical mirror is real, inverted and its magnification is -2. If the image is at a distance of 30 cm from the mirror, where is the object placed? Find the focal length of the mirror. List two characteristics of the image formed if the object is moved 10 cm towards the mirror.

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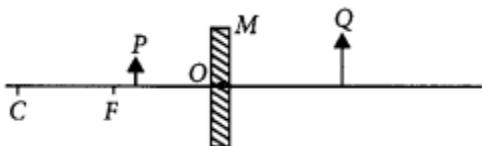
32. If the image formed by mirror for all positions of the object placed in front of it is always virtual and diminished, state the type of the mirror. Draw a ray diagram in support of your answer. Where are such mirrors commonly used and why?
33. To construct a ray diagram we use two rays of light which are so chosen that it is easy to determine their directions after reflection from the mirror. Choose these two rays and state the path of these rays after reflection from a concave mirror. Use these two rays to find the nature and position of the image of an object placed at a distance of 15 cm from a concave mirror of focal length 10 cm.
34. Draw a ray diagram to show the path of the reflected ray in each of the following cases. A ray of light incident on a convex mirror :
- strikes at its pole making an angle  $0$  from the principal axis.
  - is directed towards its principle focus.
  - is parallel to its principal axis.
35. A spherical mirror produces an image of magnification  $-1$  on a screen placed at a distance of 50 cm from the mirror.
- Write the type of mirror.
  - Find the distance of the image from the object.
  - What is the focal length of the mirror?
  - Draw the ray diagram to show the image formation in this case.
36. A spherical mirror produces an image of magnification  $-1$  on a screen placed at a distance of 40 cm from the mirror.
- Write type of mirror.
  - What is the nature of the image formed?
  - How far is the object located from the mirror?
  - Draw the ray diagram to show the image formation in this case.
37. A spherical mirror produces an image of magnification  $-1.0$  on a screen placed at a distance of 30 cm from the pole of the mirror.
- Write the type of mirror in this case.
  - What is the focal length of the mirror?
  - What is the nature of the images formed?
  - Draw the ray diagram to show the image formation in this case.
38. A student wants to project the image of a candle flame on a screen 48 cm in front of a mirror by keeping the flame at a distance of 12 cm from its pole.
- Suggest the type of mirror he should use.
  - Find the linear magnification of the image produced.
  - How far is the image from its object?
  - Draw ray diagram to show the image formation in this case.

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39. A student wants to obtain an erect image of an object using a concave mirror of 12 cm focal length. What should be the range of distance of the candle flame from the mirror? State the nature and size of the image he is likely to observe. Draw a ray diagram to show the image formation in this case.
40. A student wants to obtain an erect image of a candle flame using a concave mirror of focal length 15 cm. What should be the range of distance of the candle flame from the mirror?  
State the nature and size of the image he is likely to observe. Draw a ray diagram to show the image formation in this case.
41. A student has a concave mirror of 20 cm focal length and he wants to see an erect image of his face in the mirror. What should be the range of distance of the mirror from his face? State the nature and size of the image he is likely to observe. Draw a ray diagram to justify your answer.
42. Mention the types of mirrors used as (i) rear view mirrors, (ii) shaving mirrors. List two reasons to justify your answer in each case.
43. Calculate the magnification of the image of an object placed perpendicular to the principal axis of a concave mirror of focal length 15 cm. The object is at a distance of 20 cm from the mirror.
44. To construct ray diagram we use two light rays which are so chosen that it is easy to know their directions after reflection from the mirror. List these two rays and state the path of these rays after reflection. Use these rays to locate the image of an object placed between centre of curvature and focus of a concave mirror.
45. State the types of mirrors used for (i) headlights and (ii) rear view mirrors, in motorcycles. Give reason to justify your answer in each case.
46. An object is placed between infinity and the pole of a convex mirror. Draw a ray diagram and also state the position, the relative size and the nature of the image formed.
47. With the help of a ray diagram explain why a convex mirror is preferred for rear view mirrors in the motor cars.
48. An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.  
(i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?  
(ii) Find the size of the image.  
(iii) Draw a ray diagram to show the formation of image in this case.
49. A concave mirror of focal length 10 cm can produce a magnified real as well as virtual image of an object placed in front of it. Draw ray diagrams to justify this statement.

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50. An object is placed perpendicular to the principal axis of a convex mirror of focal length 10 cm. The distance of the object from the pole of the mirror is 10 cm. Find the position of the image formed.
51. A security mirror used in a big showroom has radius of curvature 5 m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image formed in the security mirror.
52. Neha visited a dentist in his clinic. She observed that the dentist was holding an instrument fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by dentist.
53. To construct a ray diagram we use two rays which are so chosen that it is easy to know their directions after reflection from the mirror. Use these two rays and draw ray diagram to locate the image of an object placed between pole and focus of a concave mirror.
54. A concave mirror produces three times magnified image on a screen. If the objects placed 20 cm in front of the mirror, how far is the screen from the object?
55. If the image formed by a mirror for all positions of the object placed in front of it is always diminished, erect and virtual, state the type of the mirror and also draw a ray diagram to justify your answer. Write one use such mirrors are put to and why?
56. Define the radius of curvature of spherical mirrors. Find the nature and focal length of a spherical mirror whose radius of curvature is +24 cm.
57. Define the following terms in the context of spherical mirrors:
- Pole
  - Centre of curvature
  - Principal axis
  - Principal focus
58. Draw ray diagrams to show the principal focus of a
- Concave mirror
  - Convex mirror
- (c) Consider the following diagram in which M is a mirror and P is an object and Q is its magnified image formed by the mirror.



59. It is desired to obtain an erect image of an object, using concave mirror of focal length of 12 cm.
- What should be the range of distance of a , object placed in front of the mirror?
  - Will the image be smaller or larger than the object? Draw ray diagram to show the formation of image in this case.

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(+91-9717183928; +91-9643852903)



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- (iii) Where will the image of this object be, if it is placed 24 cm in front of the mirror? Draw ray diagram for this situation also to justify your answer. Show the positions of pole, principal focus and the centre of curvature in the above ray diagrams.
60. Suppose you have three concave mirrors A, B and C of focal lengths 10 cm, 15 cm and 20 cm. For each concave mirror you perform the experiment of image formation for three values of object distances of 10 cm, 20 cm and 30 cm. By giving reason, answer the following:
- For the three object distances, identify the mirror/mirrors which will form an image of magnification  $-1$ .
  - Out of the three mirrors, identify the mirror which would be preferred to be used for shaving purposes/make up.
  - For the mirror B draw ray diagram for image formation for object distances 10 cm and 20 cm.
61. A student has focused the image of a candle flame on a white screen using a concave mirror. The situation is a given below:
- Length of the flame = 1.5 cm  
Focal length of the mirror = 12 cm  
Distance of flame from the mirror = 18 cm  
If the flame is perpendicular to the principal axis of the mirror, then calculate the following:
- Distance of the image from the mirror
  - Length of the image
- If the distance between the mirror and the flame is reduced to 10 cm, then what would be observed on the screen? Draw ray diagram to justify your answer from this situation.
62. A student wants to project the image of a candle flame on the walls of school laboratory by using a mirror.
- Which type of mirror should he use and why?
  - At what distance in terms of focal length 'f' of the mirror should he place the candle flame so as to get the magnified image on the wall?
  - Draw a ray diagram to show the formation of image in this case.
  - Can he use this mirror to project a diminished image of the candle flame on the same wall? State 'how' if your answer is 'yes' and 'why not' if your answer is 'no'
63. List the sign conventions for reflection of light by spherical mirrors. Draw a diagram and apply these conventions in the determination of focal length of a spherical mirror which forms a three times magnified real image of an object placed 16 cm in front of it.

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64. List the new Cartesian sign convention for reflection of light by spherical mirrors. Draw a diagram and apply these conventions for calculating the focal length and nature of a spherical mirror which forms a  $\frac{1}{3}$  times magnified virtual image of an object placed 18 cm in front of it.

Neutron Classes