



PHYSICS

BOOKS - MBD NCERT SOLUTIONS

LIGHT: REFLECTION AND REFRACTION

Example

1. The radius of curvature of a spherical mirror is 20 cm. What is its focal length?



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2. Name a mirror that can give an erect and enlarged image of an object.



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3. Why is a convex mirror used as a rear-view mirror in vehicles? Explain.



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4. Find the focal length of a concave mirror whose radius of curvature is 32 cm.



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5. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located ?



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6. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal ?

Why ?



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7. What will be the speed of light in water if it is given that the refractive index of water is $\frac{4}{3}$ and the speed of light in air is 3×10^8 m/s?





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8. Find out, from Table 10.3, the medium having highest optical density. Also find the medium with lowest optical density.



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9. Refractive indices of kerosene, turpentine and water are 1.44, 1.47 and 1.33 respectively, in

which material does the light travel fastest and why?



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10. The refractive index of diamond is 2.42.

What is the meaning of this statement ?



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11. Define one diopetre of power of a lens.



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12. What is the unit of power of a lens ?

Define it .



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13. A convex lens forms a real and inverted image of a needle at a distance of 50cm from it. Where is the needle placed in front of the convex lens if the image is equal to size of the object ? Also, find the power of the lens.



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14. Find the power of a concave lens of focal length $2m$.



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15. Which one of the following materials cannot be used to make a lens ?

A. water

B. glass

C. clay

D.

Answer:



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16. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object?

- A. between principal focus and the centre of curvature
- B. at centre of curvature
- C. beyond centre of curvature
- D. between the pole of the mirror and its principal focus.

Answer:



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17. Where should an object be placed in front of a convex lens to get a real to get real image of the size of the object ?

A. at principal focus of the lens

B. at twice the focal length of lens.

C. at infinity

D. between optical centre of the lens and its principal focus.

Answer:





18. A spherical mirror and a thin spherical lens have each a focal length of -15cm . The mirror and lens are likely to be

- A. both are concave
- B. both are convex
- C. mirror is concave and lens is convex
- D. mirror is convex but lens is concave.

Answer:



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19. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be

A. plane only

B. concave only

C. convex only

D. either plane or convex

Answer:



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20. Which of the following lenses would you prefer to use while reading small letters found in a dictionary ?

- A. A convex lens of focal length 50 cm
- B. a concave lens of focal length 50 cm
- C. a convex lens of focal length 5 cm
- D. a concave lens of focal length 5 cm

Answer:



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21. We wish to obtain an erect image of an object, using a concave mirror of focal length 15 cm. What should be the range of distance of the object from the mirror? What is the nature of the image? Is the image larger or smaller than the object? Draw a ray diagram to show the image formation in this case.



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22. Name the type of mirror used in the following situations :

(a) Head lights of a car.

(b) Side rear view mirror of a vehicle.

(c) Solar furnace.

Support your answer with reason.



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23. Name the type of mirror used in the following situations :

(a) Head lights of a car.

(b) Side rear view mirror of a vehicle.

(c) Solar furnace.

Support your answer with reason.



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24. Name the type of mirror used in the following situations :

(a) Head lights of a car.

(b) Side rear view mirror of a vehicle.

(c) Solar furnace.

Support your answer with reason.



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25. One half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.



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26. 10 cm high object is placed at a distance of 25 cm from a converging lens of focal length

of 10 cm . Determine the position, size and type of the image.



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27. A convex lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object from the lens ? Draw the ray diagram.



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28. An object is placed at a distance of 10cm from a convex mirror of focal length 15cm . Find the position and nature of the image ?



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29. The magnification produced by a plane mirror is $m = +1$. What does this mean ?



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30. An object 5.0cm in length is placed at a distance of 20cm in front of a convex mirror of radius of curvature 30cm . Find the position of image, its nature and size.



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31. An object of size 7.0cm is placed at 27cm in front of a concave mirror of focal length 18cm . At what distance from the mirror, should a screen be placed, so that a sharp focussed

image can be obtained ? Find the size and nature of the image ?



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32. Find the focal length of a lens of power $-2.0D$. What type of lens is this ?



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33. A doctor has prescribed lens of power $+1.5D$. Find the focal length of the lens. Is the

prescribed lens diverging or converging ?



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34. The image of an object is formed at infinite distance from a concave mirror. The position of the object is _____.



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35. Describe with the help of a diagram, the nature, size and position of the image formed

when an object is placed beyond the centre of curvature of a concave mirror.



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36. What is meant by refraction of light ? State the laws of refraction. Show that emergent ray from a glass slab is parallel to incident ray.



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37. Draw the ray diagrams and find position, nature and size of image formed by a convex lens, when object is placed: between F and $2F$



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38. Describe with the help of a ray-diagram, the size, nature and position of the image formed by a convex lens when an object is placed beyond $2f$ in front of the lens.





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39. Draw the ray diagrams and find position, nature and size of image formed by a convex lens, when object is placed: At F.



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40. Define the terms: concave mirror convex mirror



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41. APERTURE



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42. Define the principal focus of a lens.



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43. Define the focal length of a spherical mirror.



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44. The image of an object is formed at infinite distance from a concave mirror. The position of the object is _____.



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45. Where should an object be placed so that its real and same size image is formed?



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46. Which mirror is used as a shaving mirror and why ?



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47. Which mirror always forms virtual and erect image which is smaller than the object ?



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48. Which mirror has a wider field of view ?





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49. What is the basic difference between a concave mirror and a convex mirror?



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50. How will you distinguish between a plane mirror, a convex mirror and a concave mirror without touching them?



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51. What is magnification?



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52. Give the characteristics of image formed by a plane mirror.



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53. Give three basic differences between real image and virtual image.



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54. Explain with the help of a diagram the formation of image formed by a plane mirror.



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55. What are the uses of concave and convex mirrors ?



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56. What are cartesian sign conventions used in spherical mirror ? What is the mirror formula ?



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57. A ray of light travelling in glass emerges into air. State whether it will bend towards the normal or away from the normal.



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58. What is a lens ?



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59. What is the basic difference between reflection and refraction of light?



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60. Define one diopetre of power of a lens.



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61. The radius of curvature of a concave mirror is 30 cm what is its focal length?



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62. If the radius of curvature of a convex mirror is 40 cm, then its focal length is



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63. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located ?



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64. An object is placed at a distance of 10cm from a convex mirror of focal length 15cm . Find the position and nature of the image ?



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65. Light enters from air to diamond with refractive index 2.42 What is the speed of light in diamond ? Given, speed light in air is $3 \times 10^8 \text{ m s}^{-1}$.



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66. Calculate speed of light in water of refractive index $4/3$. Given speed of light in air $= 3 \times 10^8 \text{ m / s}$.



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67. The reflective index of water with respect to air is $\frac{4}{3}$ and the reflective index of glass with respect to air is $\frac{3}{2}$. Then the refractive index of water with respect to glass is



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68. An object is 2m from a lens which forms an erect image one-fourth (exactly) the size of the object. Determine the focal length of the lens.

What types of lens is this?





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69. A convex lens of focal length 20 cm is placed at a distance of 24 cm from the screen how far from the lens should an object be placed so as to form a real image on the screen. Also find the nature and magnification of the image produced



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70. A concave lens has focal length of 15 cm. At what distance should an object from the lens be placed so that it forms an image at 10 cm from the lens ? Also, find the magnification of the lens.



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71. A convex lens of power 4 D is placed at a distance of 40 cm from a wall at what distance

from the lens should a candle be placed so that its image is formed on the wall?



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72. Which mirror has a wider field of view ?



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73. Define principal axis of a spherical mirror.



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74. What is concave mirror



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75. What is convex mirror?



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76. Define principal focus.



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77. Define the focal length of a spherical mirror.



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78. What is refraction of light ? Give example.



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79. Define refractive index.



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80. What is a lens ?



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81. Define one diopetre.



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82. What is the nature of the mirror having focal length - 15 cm?



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83. A mirror has magnification 0.4, What type of the mirror is and what type of the image is formed?



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84. A ray strikes the mirror normally, what is the angle of incidence?



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85. The power of a lens is $+2.0\text{D}$. Its focal length should be:

A. 20 cm

B. 40 cm

C. 10 cm

D. 50 cm

Answer:



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86. Nature of image of a real object formed by convex mirror is always

A. real,inverted an smaller than the object

B. virtual,inverted and smaller than the
object

C. virtual,erect and smaller than the object

D. virtual,erect and bigger than the object.

Answer:



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87. The mirrors used as rear-view mirrors in vehicles are

- A. concave mirror
- B. plane mirror
- C. convex mirror
- D. any spherical mirror

Answer:



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88. $\frac{\sin i}{\sin r}$ relation was given by

A. newton

B. raman

C. snell

D. faraday

Answer:



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89. The focal length of a lens is expressed by which of the following:

A. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

B. $\frac{1}{f} = \frac{1}{V} - \frac{1}{u}$

C. $\frac{1}{f} = \frac{1}{u} = \frac{1}{u}$

D. $\frac{1}{f} = \frac{1}{u} - (1)(u)$

Answer:



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90. The relation between the radius of curvature R and focal length (f) of a concave mirror is.....

A. $f=r$

B. $f = \frac{r}{2}$

C. $R=f/2$

D. $R = \frac{f}{4}$

Answer:



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91. The unit of power of a lens is

A. coulomb

B. watt

C. joule

D. diopetre

Answer:



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92. Power of a lens is $-5d$, its focal length is:

A. 20 cm

B. -20cm

C. -2cm

D. 5 cm

Answer:



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93. Shaving mirrors are

A. convex mirrors

B. plane mirror

C. concave mirrors

D. parabolic mirrors

Answer:



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94. Twinkling of stars is due to atmospheric

A. reflection of light

B. dispersion of light

C. interference of light

D. refraction of light

Answer:



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95. The defect of vision which cannot be corrected by using spectacles is :

A. Myopia

B. presbyopia cataract

C. cataract

D. hypermetropia

Answer:



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96. Which one of the following materials cannot be used to make a lens ?

A. clay

B. glass

C. water

D. plastic

Answer:



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97. Where should an object be placed in front of a convex lens to get a real to get real image of the size of the object ?

A. at principal focus of the lens

B. at twice the focal length of lens.

C. at infinity

D. between optical centre of the lens and its principal focus.

Answer:



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98. A spherical mirror and a thin spherical lens have each a focal length of -15cm . The mirror and lens are likely to be

A. both are concave

B. both are convex

C. mirror is concave and lens is convex

D. mirror is convex but lens is concave.

Answer:



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99. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be

A. plane

B. concave

C. conccoavo-convex

D.

Answer:



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100. The value of refractive index of diamond is

A. 2.42

B. 2.43

C. 2.45

D. 2.4

Answer:



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