



## PHYSICS

### BOOKS - TARGET PHYSICS (MARATHI ENGLISH)

#### RAY OPTICS

##### Classical Thinking

1. Light travels as a

A. electromagnetic radiation

B. longitudinal waves

C. microwaves radiation

D. stationary waves

**Answer: A**



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2. दृश्य प्रकाश की तरंग-दैर्घ्य की परास है-

A. 0 to 1000 Å

B. 1000 to 3000 Å

C. 4000 to 7500 Å

D. 8000 to 9500 Å

**Answer: C**



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3. The study of light without considering diffraction is called

-----

- A. optics
- B. ray optics
- C. refraction
- D. polarisation

**Answer: B**



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4. Ray optics is valid when characteristic dimensions are

- A. much smaller than the wavelength of light.

B. much larger than the wavelength of light.

C. of the same order as that of wavelength of light.

D. of the order of millimetre.

**Answer: B**



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5. The bending of light about corners of an obstacle is called

A. dispersion

B. diffraction

C. reflection

D. polarisation

**Answer: B**



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6. Light from a point source travel in a straight line with a very high speed hence

- A. cast off a sharp shadow of an opaque object.
- B. reflected from a rough surface.
- C. absorbed in the medium.
- D. deviated when incident on an opaque object.

**Answer: A**



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7. Choose the CORRECT statement.

- A. The laws of refraction are valid for spherical mirrors.
- B. The law of polarisation is valid for spherical mirrors.
- C. the laws of reflection are valid for any reflecting surface.
- D. The laws of reflection are not valid for spherical mirrors.

**Answer: C**



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**8.** The geometrical centre of surface of spherical mirror is called its \_\_\_\_\_

- A. centre of curvature
- B. focus
- C. pole

D. optical centre

**Answer: C**



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9. The principle axis of spherical mirror passes through \_\_\_\_\_

A. pole and centre of curvature

B. centre of curvature only

C. focus only

D. pole only

**Answer: A**



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10. A ray of light falls on a mirror normally. What are the values of angle of incidence and the angle of reflection.

A.  $i = 0^\circ, r = 90^\circ$

B.  $i = 90^\circ, r = 0^\circ$

C.  $i = 90^\circ, r = 90^\circ$

D.  $i = 0^\circ, r = 0^\circ$

**Answer: D**



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11. The relation between focal length  $f$  and radius of curvature  $R$  of a spherical mirror is.

A.  $f = \frac{R}{2}$



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

C.  $fR = 2$

D.  $f = \frac{1}{R}$

**Answer: A**



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**12.** An object is at a distance of 10 cm from a concave mirror and the image of the object is at a distance of 30 cm from the mirror on the same side as that of the object. The radius of curvature of the concave mirror is

A. + 15.0 cm

B. + 7.5 cm

C. - 7.5 cm

D.  $-15.0$  cm

**Answer: D**



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**13.** Given a point source of light, which of the following can produce a divergent beam of light ?

A. convex mirror

B. convex lens

C. concave mirror

D. a plane mirror

**Answer: A**



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14. When does a concave mirror form a virtual image ?

- A. beyond C
- B. at C
- C. between C and F
- D. between F and pole

**Answer: D**



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15. For concave mirror, if the object is at the focus  $f$ , the image is

- A. real and at focus,

B. virtual and at radius of curvature.

C. real and imperceptible.

D. virtual and at infinity (imperceptible)

**Answer: D**



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**16.** A virtual image larger than the object can be obtained by

A. a concave lens

B. a plane mirror

C. a convex mirror

D. concave mirror

**Answer: D**



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17. In an experiment to find the focal length of a concave mirror, an object is placed at a distance of 40 cm from it and forms image at 24 cm from the mirror, then the focal length is

A. – 15 cm

B. – 16 cm

C. – 30 cm

D. – 32 cm

**Answer: A**



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18. After reflection, the parallel beam of light appears to come from a point then the type of mirror is \_\_\_\_\_

A. concave

B. plane

C. convex

D. plano-convex

**Answer: C**



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19. Which spherical mirror is divergent ?

A. Convex

B. Concave

C. Plane

D. Concave plane

**Answer: A**



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**20.** A real object is placed at a distance  $f$  from the pole of a convex mirror, in front of the convex mirror. If focal length of the mirror is  $f$ , then distance of the image from the pole of the mirror is

A. less than  $f$

B. equal to  $f$

C. more than  $f$

D. infinity

**Answer: A**



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**21.** The field of view is maximum for

A. plane mirror

B. concave mirror

C. convex mirror

D. parabolic mirror

**Answer: C**



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22. A virtual object placed between the pole and principle focus of a convex mirror produce and image which is

- A. real, magnified and erect.
- B. virtual, diminished and inverted.
- C. virtual, magnified and inverted.
- D. real, diminished and inverted.

**Answer: A**



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23. A convex mirror may be used for all but it can NOT be used for \_\_\_\_\_

- A. a magnifying mirror

B. a reflecting mirror

C. a dentist mirror

D. a carving mirror

**Answer: D**



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**24.** A convex mirror gives an images which is

A. real and inverted.

B. virtual and inverted.

C. virtual and magnified.

D. virtual and diminished.

**Answer: D**



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25. A  $4.5\text{ cm}$  needle is placed  $12\text{ cm}$  away from a convex mirror of focal length  $15\text{ cm}$ . Give the location of the image and the magnification. Describe what happens as the needle is moved farther from the mirror.

A.  $+4.5\text{ cm}$

B.  $+6.7\text{ cm}$

C.  $-4.5\text{ cm}$

D.  $-6.7\text{ cm}$

**Answer: B**



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26. An object is placed at a distance of 25 cm from a spherical mirror, its image is formed behind the mirror at a distance of 5 cm. The focal length and type mirror is

A. + 6.25 cm, concave

B. - 6.25 cm, concave

C. + 6.25 convex

D. - 6.25 cm, convex

**Answer: C**



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27. According to new Cartesian sign convention, all distance measured

A. object

B. image

C. optical centre

D. lens

**Answer: C**



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**28.** According to new Cartesian sign convention, all distance measured

A. to the left of the pole of the mirror or optical centre of a lens are regarded as negative.

- B. to the left of the pole of the mirror or optical centre of a lens are regarded as positive.
- C. vertically upwards are negative
- D. vertically downwards are positive

**Answer: A**



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**29.** While deriving expression for refraction at single curved, surface, the object is considered as

- A. linear object
- B. thick object
- C. point object

D. any size object

**Answer: C**



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**30.** The correct expression for refraction at single convex spherical surface separating two media of refractive indices  $\mu_1$  and  $\mu_2$  ( $\mu_2 > \mu_1$ ) and radius of curvature  $R$  is (  $u$  and  $v$  are object, image distance respectively )

A. 
$$\frac{\mu_1}{u} - \frac{\mu_2}{v} = \frac{(\mu_1 - \mu_2)}{R}$$

B. 
$$\frac{\mu_1}{v} - \frac{\mu_2}{u} = \frac{(\mu_1 - \mu_2)}{R}$$

C. 
$$\frac{\mu_2}{u} - \frac{\mu_1}{v} = \frac{(\mu_2 - \mu_1)}{R}$$

D. 
$$\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{(\mu_2 - \mu_1)}{R}$$

**Answer: D**



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**31.** A point object is situated in air at a distance of 20 cm from a convex refracting surface of 5cm radius. The position of the image is [ $\mu = 1.5$ ]

A. 40 cm

B. 30 cm

C. 25 cm

D. 15 cm

**Answer: B**



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**32.** The focal length of a lens depends on

A. radii of curvatures of two surface only.

B. refractive index of the lens material only.

C. length of the lense.

D. both radii of curvature of two surfaces and refractive index of the lens material.

**Answer: D**



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**33.** The lense formula with normal notation is given by

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

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

$$\text{C. } \frac{1}{u} - \frac{1}{f} = \frac{1}{v}$$

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

**Answer: A**



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**34.** The lens maker's equation is given by

$$\text{A. } \frac{1}{f} = \left( \frac{\mu_1}{\mu_2} - 1 \right) \left( \frac{1}{R_1} + \frac{1}{R_2} \right)$$

$$\text{B. } \frac{1}{f} = \left( \frac{\mu_2}{\mu_1} - 1 \right) \left( \frac{1}{R_1} + \frac{1}{R_2} \right)$$

$$\text{C. } \frac{1}{f} = \left( \frac{\mu_2}{\mu_1} - 1 \right) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\text{D. } \frac{1}{f} = \left( \frac{\mu_1}{\mu_2} - 1 \right) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

**Answer: C**



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35. For convex lens, the radii of curvatures of the first and second surface are  $R_1$  and  $R_2$  respectively. Using new Cartesian sign conventions they are

A.  $-R_1, -R_2$

B.  $-R_1, +R_2$

C.  $+R_1, +R_2$

D.  $+R_1, -R_2$

**Answer: D**



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**36.** A parallel beam of light is incident on a converging lens parallel to its principal axis. As one moves away from the lens on the other side on its principal axis, the intensity of light

- A. continuously decreases.
- B. first decreases and then increases
- C. continuously increases.
- D. first increases and then decreases.

**Answer: D**



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**37.** An object is kept at 0.2m from a convex lens of focal length 0.15 m. Find the position of the image produced.

A. 0.3 m

B. 0.6 m

C. 8 m

D. 11.6m

**Answer: B**



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**38.** A convex lens of focal length  $f$  produces a real image 3 times as that of size of the object, the distance between the object and the lens is

A.  $-\left(\frac{2f}{3}\right)$

B.  $-\left(\frac{3f}{4}\right)$

C.  $-\left(\frac{4f}{3}\right)$

D.  $-\left(\frac{3f}{2}\right)$

**Answer: C**



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**39.** when an object is kept in frnt of a convex lens the distance between it and the real image is 54 cm. if the magnification produced is 2, the focal length of the lens is

A. 4 cm

B. 6 cm

C. 12 cm

D. 24 cm

**Answer: C**



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**40.** What is the focal length of double convex lens for which radius of curvature of either of the surfaces is 30 cm?

$$[{}_a\mu_g = 1.5]$$

A. 50 cm

B. 30 cm

C.  $-30\text{cm}$

D.  $-50\text{cm}$

**Answer: B**



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41. A plano-convex lens has focal length of 20 cm. the radius of its spherical surface is ( ${}_a\mu_g = 1.5$ )

A. 20 cm

B. 15 cm

C. 10 cm

D. 7.5cm

**Answer: C**



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42. The focal length of concave lens, according to new Cartesian sign conventions is

A. negative.



B. positive

C. can be negative only for object kept between optical centre and focus.

D. can be positive only for object kept between optical centre and focus.

**Answer: A**



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**43.** A diverging lens may NOT have \_\_\_\_\_

A. positive focal length

B. negative focal length

C. one plane length

D. one convex surface

**Answer: A**



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**44.** A concave lens of focal length  $f$  produces an image  $\frac{1}{4}$  of the size of the object, the object should be kept at \_\_\_ from the lens.

A.  $2f$

B.  $3f$

C.  $4f$

D.  $5f$

**Answer: B**



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45. A concave lens has radii of curvatures of 20 cm and 30 cm respectively. If the refractive index of the material of lens is 1.6 its focal length is given by

A.  $-30$  cm

B.  $-25$  cm

C.  $-20$  cm

D.  $-10$  cm

**Answer: C**



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46. The radius of curvature of each surface of a biconcave lens made up of glass of refractive index 1.5 is 30 cm. The focal length of the lens is

- A. 60 cm
- B. 30 cm
- C.  $-30\text{cm}$
- D.  $-60\text{cm}$

**Answer: C**



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47. If the object is placed at A and the image is formed at B when the rays are refracted through a convex lens. The

position. Of A and B are changeable. Such pair of is called.

- A. pair of focal points.
- B. pair of object and focal points.
- C. conjugate foci.
- D. pair of foci.

**Answer: C**



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**48.** A single lens, which will form the image of a given object at the same point as it formed by the combination of two or more thin lenses, is called as \_\_\_\_\_

- A. equivalent lens

B. added lens

C. concave -convex lens

D. convexo-concave lens

**Answer: A**



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**49.** Two thin lenses may be combined so as to

A. produce diminished image.

B. produce magnified image.

C. produce magnified image.

D. cancel image and no image is formed.

**Answer: B**



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50. Two thin lenses of focal lengths  $f_1$  and  $f_2$  are in contact.

The focal length of this combination is

A.  $f = f_1 + f_2$

B.  $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$

C.  $f = \frac{f_1}{f_2}$

D.  $f = \frac{f_2}{f_1}$

**Answer: B**



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51. Two thin converging lenses of focal length 15 cm and 30 cm are held in contact with each other. The focal length of the combination is

A. 45 cm

B. 15 cm

C. 10 cm

D. 9 cm

**Answer: C**



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52. What is the focal length of a convex lens of focal length 30cm in contact with a concave lens of focal length 20cm. Is



the system a converging or a diverging lens ? Ignore thickness of the lenses.

A. 30 cm

B. 10 cm

C.  $-20\text{cm}$

D.  $-60\text{cm}$

**Answer: D**



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**53.** Two thin lenses, a one convex of focal length 10 cm and other concave lens are kept in contact to form a composite lens of focal length 13 cm . If the combination acts as a converging lense the focal length of second lens is

A.  $-43.33\text{ cm}$

B.  $-6.65\text{ cm}$

C.  $+5.65\text{ cm}$

D.  $+43.33\text{ cm}$

**Answer: A**



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**54.** The least distance of distinct vision for a young adult with normal vision is about :

A.  $25\text{ m}$

B.  $2.5\text{ m}$

C.  $25\text{ m}$

D.  $2.5m$

**Answer: C**



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**55.** A normal eye is unable to see objects at a distance less than distance of distinct vision. It is because

- A. the focal length of the eye-lens is equal to the distance of distinct vision
- B. the distance between eye-lens and retina is equal to distance of distinct vision.
- C. the eye-lens cannot decrease its focal length beyond a limit .

D. the eye-lense cannot decreases its distance from the retina beyond a limit.

**Answer: C**



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**56.** The clarity of image formed on retina of eye depends on the \_\_\_\_\_

- A. visual angle
- B. environmental condition
- C. distance of eye-lense from retina
- D. material of the object whose imae is observed

**Answer: A**



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57. A convex lens of the short focal length held very close to the eye, to observed minute objects clearly is called as \_\_\_\_\_

- A. compound microscope
- B. telescope
- C. simple microscop
- D. special effect camera

**Answer: C**



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58. The magnifying power of simple microscope is

- A. directly proportional to its focal length .
- B. directly proportional to object distnace.
- C. inversely proportional to square of its focal length.
- D. inversely proportional to its length of object distance

**Answer: D**



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**59.** A person using a lens as a simple microscope sees an

- A. inverted virtual image
- B. inveted real image
- C. upright virtual image
- D. upright real magnified image

**Answer: C**



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**60.** The magnifying power of simple microscope, when image is formed at DDV, is (where  $f$  is its focal lengths of)

A.  $\frac{D}{f}$

B.  $\frac{f}{D}$

C.  $\left(1 + \frac{D}{f}\right)$

D.  $\left(1 - \frac{D}{f}\right)$

**Answer: C**



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61. In a simple microscope, if the final image is located at infinity then its magnifying power is

A.  $\frac{f}{D}$

B.  $\frac{D}{f}$

C.  $\frac{L}{f_o}, \frac{D}{f_o}$

D.  $\left(D + \frac{1}{f}\right)$

**Answer: B**



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62. The magnifying power of simple microscope is maximum when image is formed at \_\_\_\_\_

A. infinity



B. focus

C. twice the focus

D. D.D.V.

**Answer: D**



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**63.** When a convex lens of 2.5 cm focal length is used as a magnifying glass, normal eye can see an object clearly at a distance of 25 cm. The magnifying power of the instrument is

A. 110

B. 100

C. 11

D. 10

**Answer: C**



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**64.** The compound microscope is used to see

- A. large object at infinity.
- B. small objects at infinity.
- C. large objects near objective
- D. small objects near objective

**Answer: D**



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65. Compound microscope is NOT used in

- A. travelling microscope in physics laboratory.
- B. pathology laboratories.
- C. science to study details of plant tissues.
- D. watch repairing industry.

**Answer: D**



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66. The focal length of the eye-piece of compound microscope is

- A. greater than the focal of objective.

B. less than the focal length of objective.

C. equal to focal length of the objective.

D. arbitrary

**Answer: A**



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**67.** The length ( $L$ ) of compound microscope when final image is formed at D.D.V. is given by

A.  $(v_o + u_e)$

B.  $(v_o - u_e)$

C.  $(u_o + v_o)$

D.  $(u_o - v_o)$

**Answer: A**



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**68.** When the final image is formed at infinity the magnifying power of compound microscope is (using new Cartesian sign conventions)

A.  $-\left(\frac{v_o}{u_o}\right)\left(\frac{D}{f_e} + 1\right)$

B.  $-\left(\frac{v_o}{u_o}\right)\left(\frac{D}{f_e}\right)$

C.  $-\left(\frac{u_o}{v_o}\right)\left(\frac{D}{f_e} - 1\right)$

D.  $-\left(\frac{u_o}{v_o}\right)\left(\frac{D}{f_e}\right)$

**Answer: B**



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69. Which of the following is NOT an expression for magnifying power of compound microscope when final image is formed at distance of distinct vision ? ( using new Cartesian sign conventions)

A.  $-\left(\frac{v_o}{u_o}\right)\left(\frac{D}{u_e}\right)$

B.  $-\left(\frac{v_o}{u_o}\right)\left(\frac{D}{u_e} + 1\right)$

C.  $-\left(\frac{f_o}{u_o - f_o}\right)\left(1 + \frac{D}{f_e}\right)$

D.  $-\left(\frac{f_o}{u_o - f_o}\right)\left(\frac{D}{f_e}\right)$

**Answer: D**



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70. A compound microscope has a magnifying power of 35. Assume that the final image is formed at DDV (25 cm). If the focal length of eyepiece is 8 cm, the magnification produced by objective is

- A. 1.3
- B. 8.48
- C. 14.12
- D. 12.84

**Answer: B**



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71. The object which are at large distance as compared to the focal length of lens (greater than  $10 \times f$ ) are referred as \_\_\_\_\_

- A. decade objects
- B. nearer objects
- C. distant objects
- D. unpredictable objects

**Answer: C**



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72. The objective of astronomical telescope has

- A. large aperture and large focal length



B. small apetture and small focal length

C. small of aperture and larger focal length .

D. large aperture and small focal length

**Answer: A**



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**73.** In astronomcial telescop, which of the following statement is NOT applicable ?

A. The telescope is light weight.

B. The telescope is very heavy and bulky

C. The telescope suffers spherical aberration.

D. The telescope suffers chromatic aberration.

**Answer: A**



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**74.** The intermediate image formed by the objective is

- A. in the focus plane of objective.
- B. within the focus of objective
- C. beyond the focus of eye- piece.
- D. at twice the distance of focal length of eye-piece.

**Answer: A**



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75. To see terrestrial objects, the final image must be \_\_\_\_\_

- A. inverted and magnified
- B. diminished, inverted and magnified
- C. real, erect and diminished
- D. virtual, erect and magnified

**Answer: D**



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76. When a \_\_\_\_\_ is introduced between objective and eye piece of telescope then it can be used as a terrestrial telescope.

- A. concave lens

B. concave mirror

C. convex lens

D. convex mirror

**Answer: C**



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**77.** When a astronomical telescope is adjusted for normal adjustment the final image is formed at

A. infinity

B. D.D.V. from eye piece.

C. D.D.V from objective

D. focus of eye-piece.

**Answer: A**



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**78.** The length (L) of the astronomical telescope, for normal adjustment is

A.  $\left( \frac{f_o + f_e}{2} \right)$

B.  $\left( \frac{f_o - f_e}{2} \right)$

C.  $f_o + f_e$

D.  $(f_o \times f_e)$

**Answer: D**



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79. The focal length of objective and eye-piece of astronomical telescope are 2 m and 5 cm respectively. The magnifying power of telescope when final image is formed at infinity is

- A.  $-40$
- B.  $-50$
- C.  $-80$
- D.  $-100$

**Answer: A**



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80. Magnifying power of an astronomical telescope is  $M.P.$ . If the focal length of the eye-piece is doubled, then its magnifying power will become

A.  $\frac{M \cdot P}{2}$

B.  $\sqrt{2}M \cdot P$

C.  $2M \cdot P$

D.  $3M \cdot P$

**Answer: A**



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**81.** An astronomical telescope of ten-fold angular magnification has a length of  $44\text{cm}$ . The focal length of the objective is

A. 4 cm

B. 40 cm

C. 44 cm

D. 440 cm

**Answer: B**



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**82.** The objective of reflecting telescope is

A. concave mirror.

B. concave parabolic mirror

C. bi-convex mirror.

D. convex mirror

**Answer: C**



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83. A \_\_\_\_\_ is fixed at focal point of the objective, which reflects the collected rays to eyepiece.

- A. small convex mirror
- B. small concave mirror
- C. small convex lens
- D. large concave lens

**Answer: A**



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84. Out of the following optical instruments which one is independent of chromatic and spherical aberrations ?

- A. terrestrial telescope

B. astronomical telescope

C. Cassegrain telescope

D. Galilean telescope

**Answer: C**



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**85.** Two thin lenses power  $+15D$  and  $-5D$  are combined together. Their equivalent focal length is

A. 10 cm

B. 12.5 cm

C. 16.6 cm

D. 8.33cm

**Answer: A**



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**86.** An optical instrument , in general, extends our range of vision by

- A. making the incident rays, subtend a smaller angle at the eye.
- B. making the incident rays, subtend a larger angle at the eye.
- C. producing inverted image.
- D. producing real image.

**Answer: B**

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**87.** For observing fainter distance objects and for high resolving power which of the following telescope should be used ?

- A. refracting telescope
- B. terrestrial telescope
- C. astronomical telescope
- D. reflecting telescope

**Answer: D**

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88. The reciprocal of  $\left(\frac{\mu_2 - \mu_1}{R}\right)$  gives the value of

- A. focal length of curved surface.
- B. power of surface.
- C. refractive index of surface.
- D. radius of curvature of surface.

**Answer: A**



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89. The magnifying power of simple microscope is 6 when the image is formed at distance of distinct vision (25 cm) from its optical centre. The focal power of the simple microscope in dioptre is

A.  $-20$

B.  $-2$

C.  $2$

D.  $20$

**Answer: D**



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## Criticalthinking

1. A concave mirror is placed on a horizontal table, with its axis directed vertically upwards. Let  $O$  be the pole of the mirror and  $C$  its centre of curvature. A point object is placed at  $C$ . It has a

real image, also located at C. If the mirror is now filled with water, the image will be.

- A. real and remain at C
- B. real and located at a point between C and infinity
- C. virtual and located at a point between C and O.
- D. real and located at a point between C and O

**Answer: D**



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**2. In case of reflection from curved surface**

- A. the normal is considered to be tangent to the spherical surface at the point of incidence

- B. the normal is considered to be drawn at the pole of the spherical surface only
- C. the normal is the principal axis only.
- D. the normal is not required.

**Answer: A**

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3. A boy and lamp post are 80 m away from a concave mirror of focal length 20 cm. the boy walks 40 m towards the mirror. The boy will see

- A. his image inverted and same size while that of the lamp post as inverted and diminished.



B. inverted and diminished images of both himself and the lamp post.

C. his image inverted and enlarged while that of the lamp post as inverted and same sizes

D. his image erect and enlarged while that of the lamp post as inverted and same size.

**Answer: A**



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4. A person standing 12 cm away from mirror A of focal length 10 cm see his image inverted and enlarged. When the mirror A is replaced by mirror B of same focal length the person

observes diminished and erect image. Mirrors A and B are respectively.

- A. concave and plane
- B. concave and convex
- C. convex and plane
- D. convex and concave.

**Answer: B**



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5. A plane mirror reflecting a ray of incident light is rotated through an angle  $q$  about an axis through the point of incidence in the plane of the mirror perpendicular to the plane of incidence, then

(1) The reflected ray rotates through an angle  $2q$

(2) The incident ray is fixed

(3) The reflected ray does not rotate

(4) The reflected ray rotates through an angle  $q$

A. does not rotate

B. rotates through an angle  $\left(\frac{\theta}{2}\right)$

C. rotates through an angle  $\theta$

D. rotates through an angle  $(2\theta)$

**Answer: D**



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6. In a concave mirror experiment, an object is placed at a distance  $x_1$  from the focus and the image is formed at a

distance  $x_2$  from the focus. The focus length of the mirror would be

A.  $x_1x_2$

B.  $\sqrt{x_1x_2}$

C.  $\frac{x_1 + x_2}{2}$

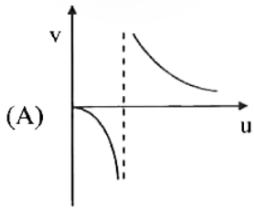
D.  $\sqrt{\frac{x_1}{x_2}}$

**Answer: B**

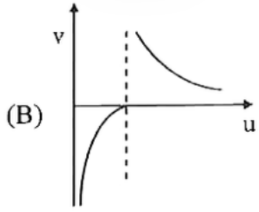


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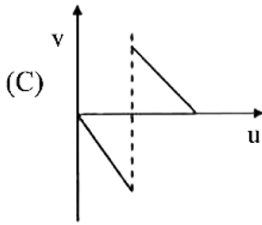
7. As the position of an object ( $u$ ) reflected from a concave mirror is varied, the position of the image ( $v$ ) also varies. By plotting the  $u$  changes from 0 to  $+\infty$  the graph between  $v$  versus  $u$  will be



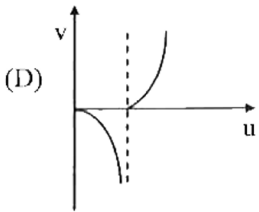
A.



B.



C.



D.

**Answer: A**



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8. Assertion : A double convex lens ( $\mu = 1.5$ ) has focal length  $10\text{cm}$ . When the lens is immersed in water ( $\mu = 4/3$ ) its focal length becomes  $40\text{cm}$ .

$$\text{Reason : } \frac{1}{f} = \frac{\mu_1 - \mu_m}{\mu_m} \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

- A. 8 cm
- B. 20 cm
- C. 30 cm
- D. 40 cm

**Answer: D**

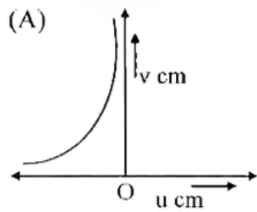


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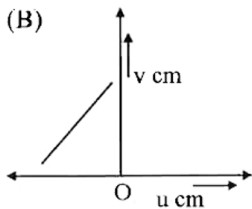
9. A student measures the focal length of a convex lens by putting an object pin at a distance  $u$  from the lens and

measuring the distance  $v$  of the image pin. The graph between

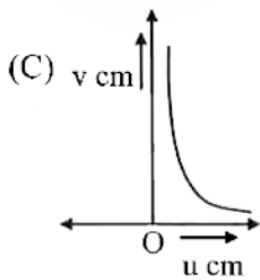
$u$  and  $v$  plotted by the student should look like



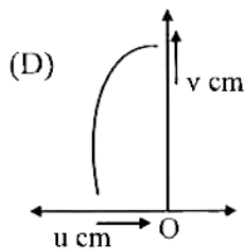
A.



B.



C.

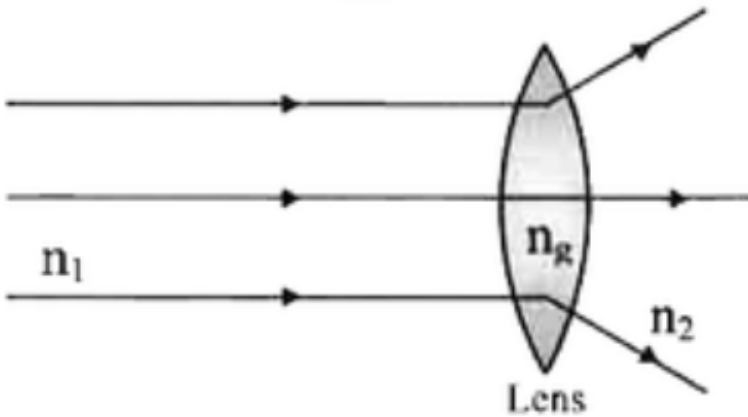


D.

Answer: A

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10. The ray diagram could be correct



- A. If  $n_1 = n_2 = n_g$
- B. If  $n_1 = n_2$  and  $n_1 < n_g$
- C. If  $n_1 = n_2$  and  $n_1 > n_g$
- D. Under no circumstances



**Answer: C**



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**11.** How does the magnification ( $m$ ) of the real image formed by a lens vary with the distance ( $x$ ) of the object from the focus of a concave mirror ?

A.  $m \propto r$

B.  $m \propto \frac{1}{x}$

C.  $m \propto x^2$

D.  $m \propto \frac{1}{x^2}$

**Answer: B**



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12. An object is placed at a distance of  $f/2$  from a convex lens.

The image will be

A. at one of the foc, virtual and double is its size.

B. at one  $2f$  and same size

C. at one  $2f$  virtual and erect.

D. virtual and half of size

**Answer: A**



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13. The power of a thin convex lens ( ${}_a\mu_g = 1.5$ ) is  $+5.0D$ .

When it is placed in liquid of refractive index  ${}_a\mu_l$  then it

behaves as a concave lens of focal length 100 cm. the refractive index of liquid  ${}_a\mu_i$  will be

A. 1.875

B. 1.68

C.  $\sqrt{3}$

D.  $\sqrt{2}$

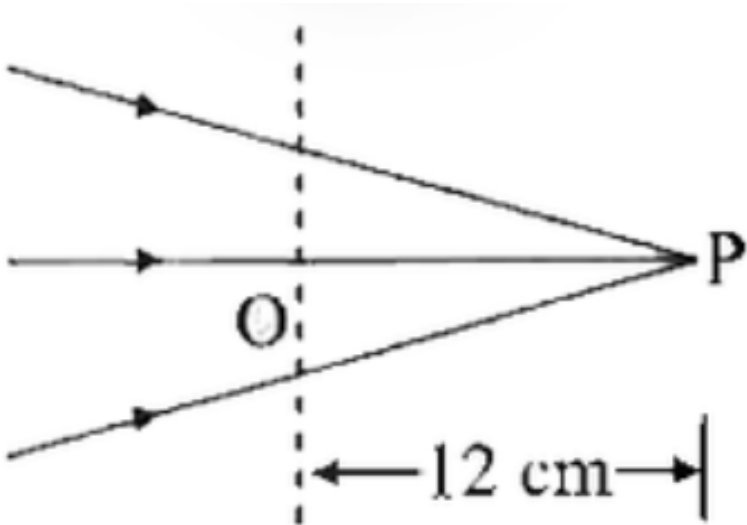
**Answer: A**



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14. Figure given below shows a beam of light converging at point P. When a concave lens of focal length 16 cm is introduced in the path of the beam at a place O shown by dotted line such that OP becomes the axis of the lens, the

beam converges at a distance  $x$  from the lens. the value  $x$  will be equal to



- A. 12 cm
- B. 24 cm
- C. 36 cm
- D. 48 cm

**Answer: D**

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15. A screen is placed 90 cm from an object. The image an object on the screen is formed by a convex lens two different locations separated by 20 cm. the focus length of the lense is

A.  $20.4\text{cm}$

B.  $21.4\text{cm}$

C.  $22.5\text{cm}$

D.  $28.5\text{cm}$

**Answer: B**



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16. When two thin lenses are kept in contact, the focal length of the combination is

- A. the geometric mean of the two focal lengths.
- B. the same as the larger focal length
- C. greater than either focal length
- D. smaller than either focal length

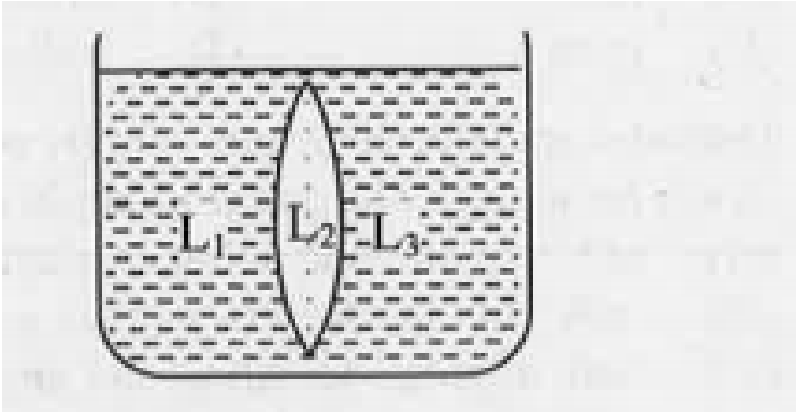
**Answer: D**



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17. As shown in the figure, the liquids  $L_1$ ,  $L_2$  and  $L_3$  have refractive indices 1.55, 1.50 and 1.20 respectively. Therefore, the

arrangement corresponds to



- A. a bi-convex lens
- B. a bi-concave lens
- C. a concavo-convex lens.
- D. a convexo-concave lens.

**Answer: C**



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18. When two or more lenses of magnification  $m_1, m_2, m_3$  are kept in contact, the total magnification ( $m$ ) produced is given by

A.  $m = m_1 + m_2 + m_3 + \dots +$

B.  $m = m_1 + m_2 - m_3 - m_4 \dots$

C.  $m = \frac{m_1 m_2}{m_3} + \frac{m_2 m_4}{m_4} + \dots$

D.  $m = m_1 \times m_2 \times m_3 \times \dots$

**Answer: D**



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19. A concave lens and a convex lens have same focal length of  $20\text{cm}$  and both put in contact this combination is used to view



an object  $5\text{cm}$  long kept at  $20\text{cm}$  from the lens combination.

As compared to object the image will be

- A. magnified and inverted.
- B. reduced and erect
- C. of the same size as the object and erect
- D. of the same size as the object but inverted

**Answer: C**



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**20.** If we need a magnification of 400 from compound microscope of tube length 150 mm and an objective of focal length 5 mm, the focal length of the eye-piece, should be close to : (final Image is at infinity).

A.  $2.0\text{cm}$

B.  $2.2\text{cm}$

C.  $2.4\text{cm}$

D.  $2.5\text{cm}$

**Answer: B**



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**21.** When objects at different distances are seen by the eye, which of the following remain constant?

A. The focal length of the eye lens

B. The object distance from the eye lens.

C. The radii of curvature of the eye lens.

D. The image distance from the eye lens.

**Answer: D**

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22. If astronomical telescope of length  $1.53m$  has magnifying power of magnitude 50, the values of  $f_o$  and  $f_e$  are

A.  $f_o = 0.03m, f_e = 1.5m$

B.  $f_o = 1.55m, f_e = 0.02m$

C.  $f_o = 1.55m, f_e = -0.03m$

D.  $f_o = 1.5m, f_e = 0.03m$

**Answer: D**

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23. When we view object of height 15 m with a telescop of magnifying power 10. the object appears \_\_\_\_\_

- A. 10 times taller
- B. 15 times taller
- C. 10 times taller
- D. 15 times taller

**Answer: C**



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24. The focal length of the objective and eye piece of a telescope are respectively  $100\text{cm}$  and  $2\text{cm}$ . The moon

subtends and angle of  $0.5^\circ$ , the angle subtended by the moon's image will be.

A.  $100^\circ$

B.  $50^\circ$

C.  $25^\circ$

D.  $10^\circ$

**Answer: C**



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**25.** The objective of telescope  $A$  has a diameter 3 times that of the objective of telescope  $B$ . How much greater amount of light is gathered by  $A$  compared to  $B$ ? Show that range of  $A$  is three times the range of  $B$ .

A.  $\frac{1}{9}$

B.  $\frac{1}{3}$

C. 3

D. 9

**Answer: D**



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**26.** A fly is sitting on the objective of a telescope pointed to the moon taken through the telescope ?

A. The entire field of vision is blocked.

B. There is an image of the fly on the photograph

C. There is no effect at all

D. The image of the moon is of lesser intensity.

**Answer: D**

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27. An object is placed at a distance  $u$  from a concave mirror and its real image is formed on the screen placed at distance  $v$  from the mirror. If  $f$  is the focal length of the mirror, then the graph between  $\frac{1}{v}$  versus  $\frac{1}{u}$  is (magnitude only)

A. 

B. 

C. 

D. 

**Answer: B**



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**28.** The distance between an object and the screen is 75 cm. When a convex lens of focal length 12 cm is placed in the between the object and the screen, magnification of real formed can be (magnitude only)

A. 2

B. 4

C. 8

D. 16

**Answer: B**



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29. Two similar planoconvex lenses are combined together in three different ways as shown in the adjoining figure. The ratio of the focal lengths in three cases will be



A. 2 : 2 : 1

B. 1 : 1 : 1

C. 1 : 2 : 2

D. 2 : 1 : 1

**Answer: B**



30. A virtual cannot be caught on a screen, Yet when we see a virtual image, we bring it to the screen i.e., retina of our eye.

This happens because

- A. we have two eyes
- B. eye lens is convergent
- C. eye lens is divergent
- D. image on retina is in the form of electrical neural pulse.

**Answer: B**



31. When the wavelength of the light used is increased, the focal length of a spherical mirror

- A. remains the same
- B. decreases to half its value.
- C. decreases slightly
- D. increases.

**Answer: A**



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32. If two power of a thick lense is  $P_1$  and that of a thin lens is  $P_2$  then

- A.  $P_1 < P_2$

B.  $P_1 = P_2$

C.  $P_1 > P_2$

D.  $P_1 = \frac{P_2}{2}$

**Answer: C**



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**33.** How will you arrange the two plane mirrors so that whatever may be the angle of incidence, the incident ray and the reflected ray from the two mirrors will be parallel to each other ?

A. The two plane mirrors should be parallel to each other

B. Two plane mirrors should be inclined at an angle of  $30^\circ$

C. Two plane mirrors should be inclined at an angle of  $45^\circ$

D. Two plane mirrors should be perpendicular to each other

**Answer: D**



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**34.** An object is placed in front of a convex mirror at a distance of 50cm. A plane mirror is introduced covering the lower half of the convex mirror. If the distance between the object and the plane mirror is 30cm, it is found that there is no parallax between the images formed by the two mirrors. What is the radius of curvature of the convex mirror?

A.  $12.5\text{cm}$

B.  $15.0\text{cm}$

C.  $25.0\text{cm}$

D.  $30.0\text{cm}$

**Answer: C**



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**35.** A square wire of side  $3.0\text{cm}$  is placed  $25\text{cm}$  away from a concave mirror of focal length  $10\text{cm}$ . What is the area enclosed by the image of the wire? The centre of the wire is on the axis of the mirror, with its two sides normal to the axis.

A.  $2\text{cm}^2$

B.  $4\text{cm}^2$

C.  $6\text{cm}^2$

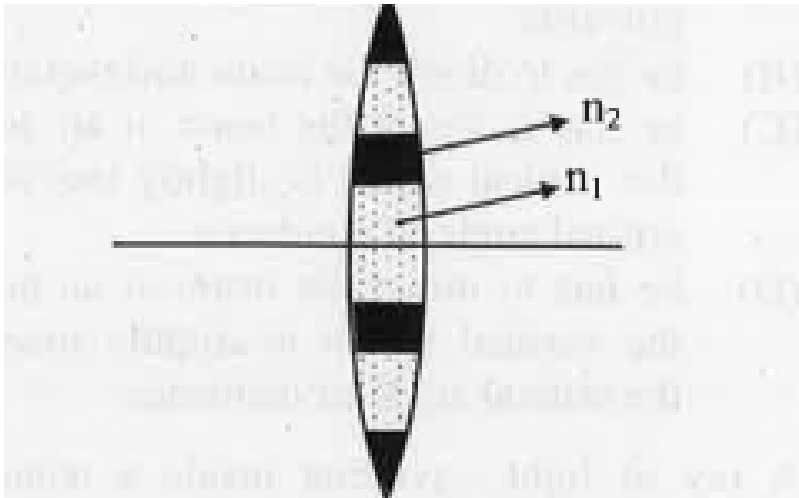
D.  $8\text{cm}^2$

Answer: B



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36. The lens shown in the figure drawn below is made of two different materials. A point object is placed on the axis. The number of images formed is \_\_\_\_\_.



A. zero

B. one

C. two

D. four

**Answer: C**



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**37.** If a lens is cut into two pieces perpendicular to the principal axis and only one part is used, the intensity of the iamage will be

A. same

B.  $\frac{1}{2}$  times

C. 2 times

D. infinite



**Answer: A**



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**38.** Assertion : A concave mirror and convex lens both have the same focal length in air. When they are submerged in water, they will have same focal length.

Reason refractive index of water is smaller than be refractive index of air.

A. Assertion is True, Reason is True , Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True : Reason is not correct explanation for Assertion.

C. Assertion is True. Reason is False

D. Assertion is False, Reason is False.

**Answer: D**



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### Competitive Thinking

1. An object is placed at a distance of  $40\text{cm}$  from a concave mirror of focal length  $15\text{cm}$ . If the object is displaced through a distance of  $20\text{cm}$  towards the mirror, the displacement of the image will be

- A. 30 cm away from the mirror
- B. 36 cm away from the mirror
- C. 30 cm towards the mirror

D. 36 cm towards the mirror

**Answer: B**



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2. A point object is placed at a distance of 30 cm from a convex mirror of focal length 30 cm. The image will form at

A. infinity

B. focus

C. pole

D. 15 cm behind the mirror

**Answer: D**



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3. Which of the following statements is incorrect?

- A. The magnification produced by a convex mirror is always less than one.
- B. A virtual, erect, same sized image can be obtained using a plane mirror.
- C. A virtual, erect, magnified image can be formed using a concave mirror.
- D. A real, inverted, same-sized image can be formed using a convex mirror.

**Answer: D**



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4. A concave mirror of focal length  $f$  (in air) is immersed in water ( $\mu = 4/3$ ). The focal length of the mirror in water will be

A.  $\frac{4}{3}f$

B.  $\frac{3}{4}f$

C.  $f$

D.  $\frac{7}{3}f$

**Answer: C**



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5. A linear object of height 10 cm is kept in front of concave mirror of radius of curvature 15 cm, at distance of 10 cm. The

image formed is

- A. magnified and erect
- B. magnified and inverted
- C. diminished and erect
- D. diminished and inverted

**Answer: B**



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6. A person wants a real image of his own, 3 times enlarged. Where should he stand in front of a concave mirror of radius of curvature of 30cm.

- A. 90 cm

B. 10 cm

C. 20 cm

D. 30 cm

**Answer: C**



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7. Consider a light source placed at a distance of 1.5 m along the axis facing the convex side of a spherical mirror of radius of curvature 1m. The position ( $s$ ), nature and magnification ( $m$ ) of the image are

A.  $s'=0.375$  m, Virtual, upright,  $m=0.25$

B.  $s'=0.375$  m, Real, inverted,  $m=0.25$

C.  $s'=3.75$  m, Virtual, inverted,  $m=2.5$

D.  $s'=3.74$  m, Real upright,  $m=2.5$

**Answer: A**



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8. The power of plane mirror is \_\_\_\_\_.

A.  $\infty$

B. 0

C. 2D

D. 4D

**Answer: B**



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9. Two convex lenses of focal lengths  $f_1$  and  $f_2$  form images with magnification  $m_1$  and  $m_2$ , when used individually for an object kept at the same distance from the lenses. Then  $f_1 / f_2$  is

A.  $\frac{m_1(1 + m_1)}{m_2(1 + m_2)}$

B.  $\frac{m_1(1 + m_2)}{m_2(1 + m_1)}$

C.  $\frac{m_2(1 + m_1)}{m_1(1 + m_2)}$

D.  $\frac{m_2(1 + m_2)}{m_1(1 + m_1)}$

**Answer: B**



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10. According to Cartesian sign convention, in ray optics

A. all distances are taken negative

B. all distances in the direction of incident ray are taken positive

C. all distances are taken positive

D. all distances in the direction of incident ray are taken negative

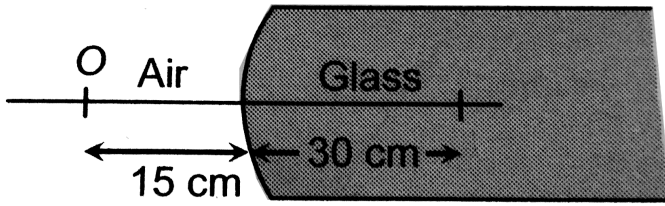
**Answer: B**



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11. A point object  $O$  is placed in front of a glass rod having spherical end of radius of curvature  $30\text{cm}$ . The image would be

formed at



- A. 30 cm left
- B. infinity
- C. 1 cm to the right
- D. 18 cm to the left

**Answer: A**

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12. A candle placed 25 cm from a lens, forms an image on a screen placed 75 cm on the other end of the lens. The focal

length and type of the lens should be

- A. + 18.75 cm and convex lens
- B. 18.75 cm and concave lens
- C. + 20.25 cm and convex
- D. – 20.25 cm and concave lens

**Answer: A**



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**13.** Focal length of a convex lens is 20 cm and its R.I. is 1.5. It produces an erect, enlarged image if the distance from the object of the lens is

- A. 40 cm

B. 30 cm

C. 15 cm

D. 20 cm

**Answer: C**



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**14.** A convex lens (with material of refractive index of  $\frac{3}{2}$ ) has two surfaces of equal radii of curvature  $R$ . The magnitude of its focal length is

A.  $\frac{R}{2}$

B.  $R$

C.  $2R$

D. zero

**Answer: B**



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15. Convex lens made up of glass ( $\mu_g = 1.5$ ) and radius of curvature  $R$  is dipped into water. Its focal length will be (Refractive index of water =  $4/3$ )

A.  $4R$

B.  $2R$

C.  $R$

D.  $R/2$

**Answer: A**



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16. A convex glass lens ( $\mu_g = 1.5$ ) has a focal length of 8 cm when placed in air. What is the focal length of the lens when it is immersed in water ?

$$\left(\mu_w = \frac{4}{3}\right)$$

- A. 4 cm
- B. 8 cm
- C. 16 cm
- D. 32 cm

**Answer: D**



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17. A double convex thin lens made of glass (refractive index  $\mu = 1.5$ ) has both radii of curvature of magnitude 20 cm . Incident light rays parallel to the axis of the lens will converge at a distance L such that

A.  $L=20$  cm

B.  $L=10$  cm

C.  $L=40$  cm

D.  $L = \frac{20}{3}$  cm

**Answer: A**

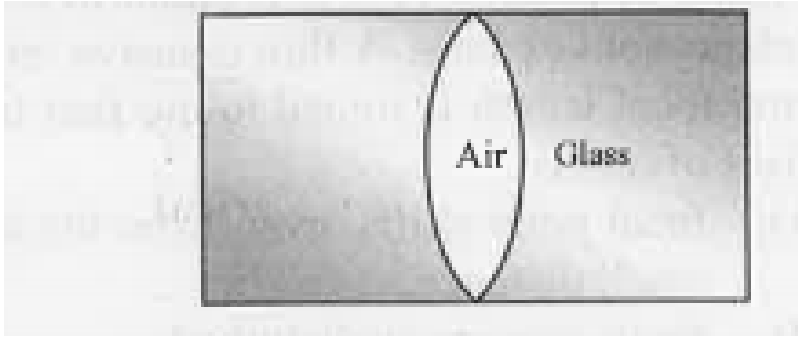


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18. In the figure an air lens of radii of curvature 10 cm ( $R_1 = R_2 = 10\text{cm}$ ) is cut in a cylinder of glass ( $n = 1.5$ ). The



focal length and the nature of the lens is



- A. 15 cm, concave
- B. 15 cm, convex
- C.  $\infty$ , neither concave nor convex
- D. 0, concave

**Answer: A**



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19. A plano-convex lens is made of material having refractive index 1.5. The radius of curvature of curved surface is 60 cm. The focal length of the lens is \_\_\_\_\_ cm.

- A. - 60
- B. 120
- C. 60
- D. - 120

**Answer: B**



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20. Two identical thin planoconvex glass lenses (refractive index 1.5) each having radius of curvature of  $20\text{cm}$  are placed

with their convex surfaces in contact at the centre. The intervening space is filled with oil of refractive index 1.7. The focal length of the combination is

- A.  $-20$  cm
- B.  $25$  cm
- C.  $-50$  cm
- D.  $50$  cm

**Answer: C**



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**21.** A thin convex lens made from crown glass  $\left(\mu = \frac{3}{2}\right)$  has focal length  $f$ . When it is measured in two different liquids having refractive indices  $\frac{4}{3}$  and  $\frac{5}{3}$ , it has the focal lengths  $f_1$

and  $f_2$  respectively . The correct relation between the focal lengths is ,

- A.  $f_1 = f_2 < f$
- B.  $f_1 > f$  and  $f_2$  becomes negative
- C.  $f_2 > f$  and  $f_1$  becomes negative
- D.  $f_1$  and  $f_2$  both become negative

**Answer: B**



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**22.** In an optics experiment, with the position of the object fixed, a student varies the position of a convex lens and for each position, the screen is adjusted to get a clear image of the object. A graph between the object distance  $u$  and the

image distance  $v$ , from the lens, is plotted using the same scale for the two axes. A straight line passing through the origin and making an angle of  $45^\circ$  with x-axis meets the experimental curve at P. The coordinates of P will be.

A.  $(2f, 2f)$

B.  $\left(\frac{f}{2}, \frac{f}{2}\right)$

C.  $(f, f)$

D.  $(4f, 4f)$

**Answer: A**



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**23.** The equiconvex lens has focal length  $f$ . If is cut perpendicular to the principal axis passing through optical

centre, then focal length of each half is

A.  $\frac{f}{2}$

B.  $f$

C.  $\frac{3f}{2}$

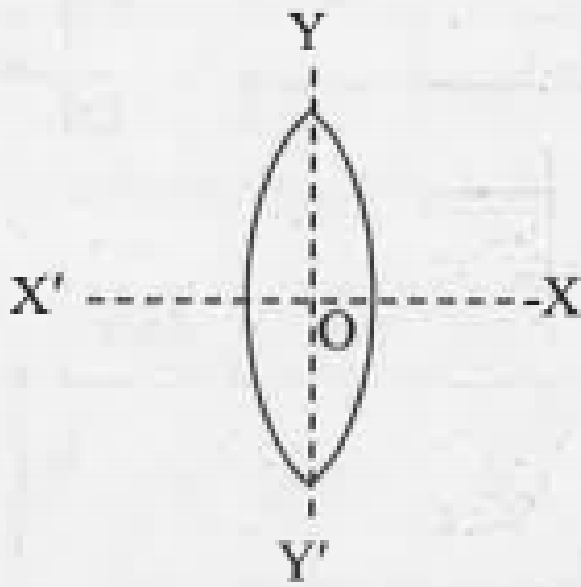
D.  $2f$

**Answer: D**



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**24.** An equiconvex lens is cut into two halves along (i)  $XOX'$  and (ii)  $YOY'$  as shown in the figure. Let  $f$ ,  $f'$ ,  $f''$  be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively.



Choose the correct statement form the following.

- A.  $f'=2f, f'=f$
- B.  $f'=f, f''=f$
- C.  $f'=2f, f''=2f$
- D.  $f'=f, f''=2f$

**Answer: D**



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**25.** A converging beam of rays is incident on a diverging lens. Having passed through the lens the rays intersect at a point  $15\text{cm}$  from the lens. If the lens is removed, the point where the rays meet, move  $5\text{cm}$  closer to the mounting that holds the lens. Find the focal length of the lens.

A.  $-30\text{ cm}$

B.  $5\text{ cm}$

C.  $-10\text{ cm}$

D.  $20\text{ cm}$

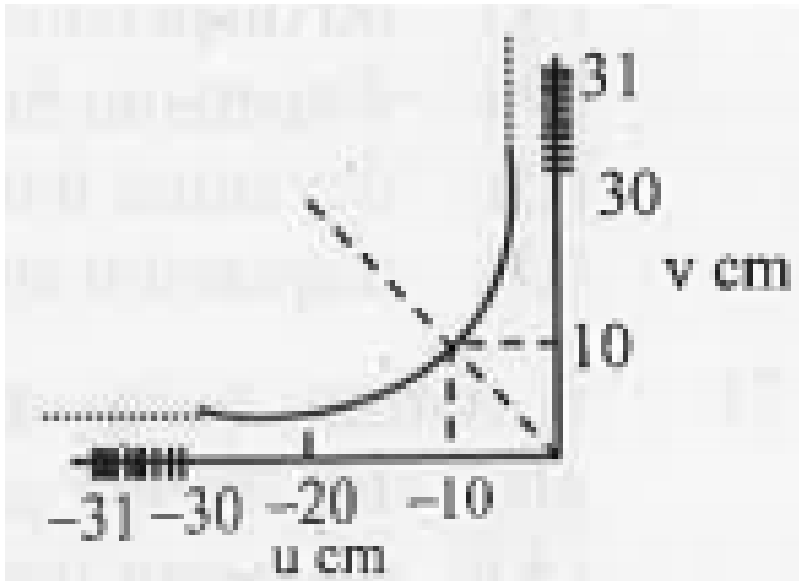
**Answer: A**



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26. Graph of position of image vs position of point object from a convex lens is shown. Then, focal length of the lens is



- A.  $0.50 \pm 0.05\text{cm}$
- B.  $0.50 \pm 0.10\text{cm}$
- C.  $5.00 \pm 0.05\text{cm}$
- D.  $5.00 \pm 0.10\text{cm}$

**Answer: D**

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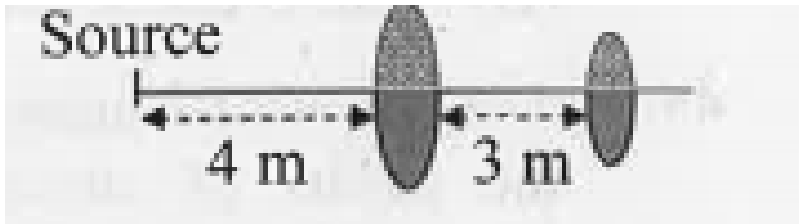
27. Calculate the focal length of a reading glass of a person, if the distance of distinct vision is 75cm.

- A. 75.2 cm
- B. 25.6 cm
- C. 100.4 cm
- D. 37.5 cm

**Answer: D**

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28. An object is located 4 m from the first of two thin converging lenses of focal lengths 2 m and T m respectively. The lenses are separated by 3 m. The final image formed by the second lens is located from the source at a distance of



- A. 8.0 cm
- B. 7.5 m
- C. 6.0 m
- D. 6.5 m

**Answer: B**



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29. A beam of parallel rays is brought to focus by a planoconvex lens. A thin Concave lens of the same focal length is joined to the first lens. The effect of this is

- A. focal point shifts away from the lens by a small distance.
- B. focus remains undisturbed.
- C. focus shifts to infinity.
- D. focal point shifts towards the lens by a small distance.

**Answer: C**



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30. A plano-convex lens fits exactly into a plano-concave lens. Their plane surfaces are parallel to each other. If the lenses are

made of different material of refractive indices  $\mu_1$  and  $\mu_2$  and  $R$  is the radius of curvature of the curved surface of the lenses, then focal length of the combination is

A.  $\frac{R}{2(\mu_1 + \mu_2)}$

B.  $\frac{R}{2(\mu_1 - \mu_2)}$

C.  $\frac{R}{(\mu_1 - \mu_2)}$

D.  $\frac{R}{(\mu_2 - \mu_1)}$

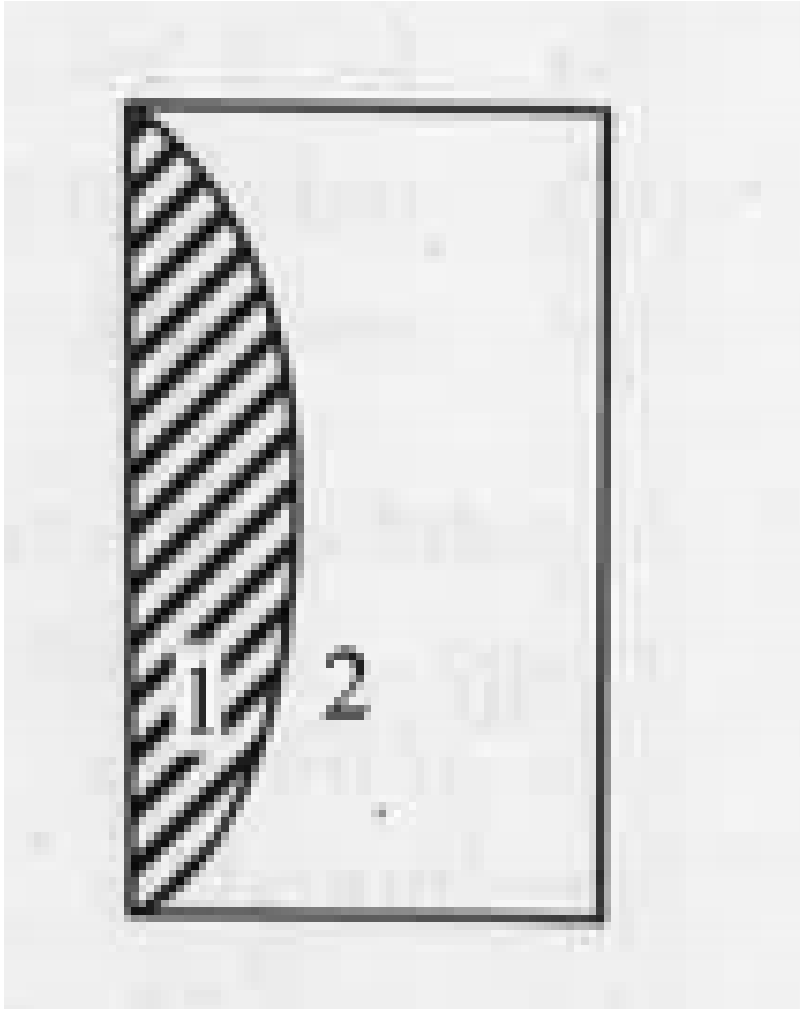
**Answer: C**



**Watch Video Solution**

**31.** A plano-convex lens fits exactly into plano-concave lens as shown in the figure. Their plane surfaces are parallel to each other. If the lenses are made of different materials of refractive

indices 1.6 and 1.5 respectively, if  $R$  is the radius of curvature of curved surface of lenses, then the focal length of the combination



A.  $\frac{R}{6.2}$

B.  $\frac{R}{0.2}$

C.  $\frac{R}{3.1}$

D.  $\frac{R}{0.1}$

**Answer: D**



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**32.** Two lenses of power  $+12$  and  $-2$  dioptres are placed in contact. The combined focal length of the combination will be

A. 10 cm

B. 12.5 cm

C. 16.6 cm

D. 8.33 cm

**Answer: A**



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**33.** A convex lens and a concave lens are placed in contact. The ratio of magnitude of the power of the convex lens to that of the concave lens is 4:3. If the focal length of the convex lens is 12 cm, then the focal length of the combination will be

A. 16 cm

B. 24 cm

C. 32 cm

D. 48 cm

**Answer: D**



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34. Two identical glass ( $\mu_g = 3/2$ ) equiconvex lenses of focal length  $f$  are kept in contact. The space between the two lenses is filled with water ( $\mu_w = 4/3$ ). The focal length of the combination is

A.  $3f/4$

B.  $f/3$

C.  $f$

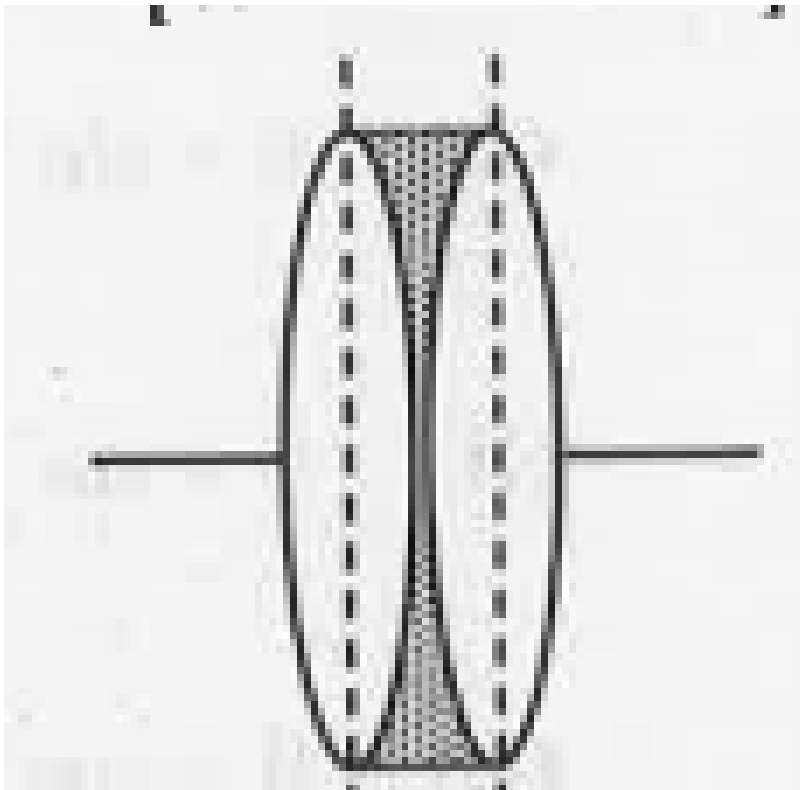
D.  $4f/3$

**Answer: A**



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35. Two identical equiconvex lenses, each of focal length 'f' are placed side by side in contact with each other with a layer of water in between them as shown in the figure. If refractive index of the material of the lenses is greater than that of water, how the combined focal length 'F' is related of 'f'?



A.  $F > f$

B.  $\frac{f}{2} < F < f$

C.  $F < \frac{f}{2}$

D.  $F=f$

**Answer: B**



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**36.** A bi-convex lens is formed with two thin plano convex lenses as shown in the figure. Refractive index  $n$  of the first lens is 1.5 and that of the second lens is 1.2. Both the curved surfaces are of the same radius of curvature  $R = 14$  cm. For this bi-convex lens, for an object distance of 40 cm, the image distance will be



A.  $-280.0$  cm

B.  $40.0$  cm

C.  $21.5$  cm

D.  $13.3$  cm

**Answer: B**



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**37.** Two convex lenses of focal length  $f_1$  and  $f_2$  are mounted coaxially separated by a distance. If the power of the combination is zero, the distance between the lenses is

A.  $d = (f_1 + f_2)$

B.  $d = (f_1 - f_2)$

$$C. d = \sqrt{f_1 f_2}$$

$$D. d = \frac{(f_1 - f_2)}{2}$$

**Answer: A**



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**38.** A diverging lens with magnitude of focal length  $25\text{cm}$  is placed at a distance of  $15\text{cm}$  from a converging lens of magnitude of focal length  $20\text{cm}$ . A beam of parallel light falls on the diverging lens. The final image formed is.

- A. real and at a distance of 40 cm from the divergent lens.
- B. real and at a distance of 6 cm from the convergent lens.
- C. real and at a distance of 40 cm from convergent lens.
- D. virtual and at a distance of 40 cm from convergent lens.

**Answer: C**



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**39.** A convex lens of focal length 12.5 cm is used as a simple microscope. When the image is formed at infinite, magnification is \_\_\_\_\_ (Near point for the normal vision is 25 cm).

A. 25

B. 2.5

C. 2.0

D. 1

**Answer: C**



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40. Least distance of distinct vision is 25 cm . Magnifying power of simple microscope of focal length 5 cm is

A.  $\frac{1}{5}$

B. 5

C.  $\frac{1}{5}$

D. 6

**Answer: D**



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41. In compound microscope, the focal length and aperture of the objective used is respectively

A. large and large

B. large and small

C. short and large

D. short and small

**Answer: D**



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**42.** In a compound microscope, the intermediate image is

A. virtual, erect and magnified.

B. real erect and magnified.

C. real, inverted and magnified.

D. virtual erect and reduced.



**Answer: C**



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**43.** A compound microscope consists of an objective of focal length 1.0 cm and an eyepiece of focal length 5.0 cm separated by 12.2 c.a. At what distance from the objective should an object be placed to focus it properly so that the final image is formed at the least distance of clear vision (25cm)? b. calculate the angular magnification in this case.

- A. – 1.1 cm
- B. – 2.1cm
- C. – 1.5 cm
- D. – 2.5 cm

**Answer: A**



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**44.** An observer looks at a distant tree of height 10m with a telescope of magnifying power of 20. to the observer the tree appears:

- A. 10 times nearer
- B. 20 times taller
- C. 20 times nearer
- D. 10 times taller

**Answer: C**



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45. An astronomical telescope has an angular magnification of magnitude 5 for distant object. The separation between the objective and the eyepiece is 36 cm and the final image is formed at infinity. The focal length  $f_o$  of the objective and the focal length  $f_e$  of the eyepiece are

A.  $f_o = 45\text{cm}$  and  $f_e = -9\text{cm}$

B.  $f_o = 7.2\text{cm}$  and  $f_e = 5\text{cm}$

C.  $f_o = 50\text{cm}$  and  $f_e = 10\text{cm}$

D.  $f_o = 30\text{cm}$  and  $f_e = 6\text{cm}$

**Answer: D**



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**46.** On which of the following does the magnifying power of a telescope depends

- A. The focal length of the objective only.
- B. The diameter of aperture of the objective only.
- C. The focal length of objective and that of the eye piece.
- D. The diameter of aperture of the objective and that of the eye piece.

**Answer: C**



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**47.** The number of lenses in a terrestrial telescope is

A. two

B. three

C. four

D. six

**Answer: B**



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**48.** To avoid spherical aberration, quality reflecting telescopes use mirrors whose cross-sectional shapes are

A. prismatic

B. elliptic

C. parabolic

D. spherical

**Answer: C**



**Watch Video Solution**

**49.** An astronomical telescope has objective and eyepiece of focal lengths  $40\text{cm}$  and  $4\text{cm}$  respectively. To view an object  $200\text{cm}$  away from the objective, the lenses must be separated by a distance :

A.  $50.0\text{ cm}$

B.  $54.0\text{cm}$

C.  $37.3\text{ cm}$

D.  $46.0\text{ cm}$

**Answer: B**



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**50.** A telescope using an eye piece of focal length 3 cm has a magnification 10 in normal adjustment. If the telescope is now used to view an object placed at a distance of 180 cm from the objective, the new length of the telescope is (assume final image is at infinity).

A. 36 cm

B. 39 cm

C. 32 cm

D. 33 cm

**Answer: B**



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51. In an astronomical telescope in normal adjustment a straight black line of length  $L$  is drawn on inside part of objective lens. The eye piece forms a real image of this line. The length of this image is  $I$ . The magnification of the telescope is

A.  $\frac{L}{I}$

B.  $\frac{L}{I} + 1$

C.  $\frac{L}{I} - 1$

D.  $\frac{L + I}{L - I}$

**Answer: A**



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52. The ratio of the diameter of the sun to the distance between the earth and the sun is approximately 0.009. The approximate diameter of the image of the sun formed by a concave spherical mirror of radius of curvature 0.4 m is

A.  $4.5 \times 10^{-6} m$

B.  $4.0 \times 10^{-6} m$

C.  $3.6 \times 10^{-3} m$

D.  $1.8 \times 10^{-3} m$

**Answer: D**



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53. A point object is held above a thin equiconvex lens at its focus. The focal length is 0.1 m and the lens rests on a

horizontal thin plane mirror. The final image will be formed at

- A. infinite distance above the lens.
- B. 0.1 m above the centre of the lens.
- C. infinite distance below the lens.
- D. 0.1 m below the centre of the lens.

**Answer: B**



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**54.** A concave lens of glass, refractive index 1.5 has both surfaces of same radius of curvature  $R$ . On immersion in a medium of refractive index 1.75, it will behave as a

- A. convergent lens of focal length  $3.5 R$

B. convergent lens of focal length  $3R$

C. divergent lens of focal length  $3.5R$

D. divergent lens of focal length  $3R$ .

**Answer: A**



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**55.** Given a point source of light, which of the following can produce a parallel beam of light

A. Convex mirror.

B. Concave mirror.

C. Concave lens.

D. Two plane mirrors inclined at an angle of  $90^\circ$

Answer: B



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56. choose the correct option

	Column I		Column II
i.	Connecting link between pisces and amphibians	a.	Lungfish
ii.	Connecting link between reptiles and mammals	b.	Duck-billed platypus
		c.	<i>Peripatus</i>
		d.	Snail

A.

$i \rightarrow a$  and  $d$ ,  $ii \rightarrow b$  and  $c$ ,  $iii \rightarrow b$  and  $d$ ,  $iv \rightarrow b$  and  $c$

B.

$i \rightarrow c$  and  $d$ ,  $ii \rightarrow b$  and  $d$ ,  $iii \rightarrow b$  and  $c$ ,  $iv \rightarrow a$  and  $d$

C.

$i \rightarrow b$  and  $c$ ,  $ii \rightarrow b$  and  $c$ ,  $iii \rightarrow b$  and  $d$ ,  $iv \rightarrow a$  and  $d$

D.

$i \rightarrow a$  and  $c$ ,  $ii \rightarrow a$  and  $d$ ,  $iii \rightarrow a$  and  $b$ ,  $iv \rightarrow c$  and  $d$

**Answer: C**



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57. An infinitely long bar lies along the axis of a concave mirror of focal length  $f$ . The nearer end of bar is at a distance  $v > f$  from the mirror. Its image will have a length

A.  $\frac{uf}{u+f}$

B.  $\frac{uf}{u-f}$

C.  $\frac{f^2}{u + f}$

D.  $\frac{f^2}{u - f}$

**Answer: D**



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**58.** Diameter of a plano-convex lens is 6cm and thickness at the centre is 3mm. If speed of light in material of lens is  $2 \times 10^8 \frac{m}{s}$ , The focal length of the lens is

A. 15 cm

B. 20 cm

C. 30 cm

D. 10 cm

**Answer: C**



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**59.** The image of an object, formed by a plano-convex lens at a distance of 8m behind the lens, is real and is one-third the size of the object. The wavelength of light inside the lens is  $\frac{2}{3}$  times the wavelength in free space. The radius of the curved surface of the lens is

A. 1 m

B. 2 m

C. 3 m

D. 6 m

**Answer: C**



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60. By placing a convex lens of focal length equal to 15.0 cm between an object and a screen separated by a distance of 75.0 cm, the sizes of the images obtained are 6.0 cm and  $\frac{2}{3} \text{ cm}$ .

The size of the object must be

A. 2.0 cm

B. 4.0 cm

C. 3.0 cm

D. 1.5 cm

**Answer: A**



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61. For a normal eye, the cornea of eye provides a converging power of  $40D$  and the least converging power of the eye lens behind the cornea is  $20D$ . Using this information, the distance between the retina and the cornea eye lens can be estimated to be

A. 5 cm

B. 2.5 cm

C. 1.67 cm

D. 1.5 cm

**Answer: C**



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**62.** A person can see objects clearly only when they lie between  $50\text{cm}$  and  $400\text{cm}$  from his eyes. In order to increase the maximum distance of distinct vision to infinity, the type and power of the correcting lens, the person has to use, will be

- A. convex,  $+0.15$  dioptre
- B. convex,  $+2.25$  dioptre
- C. concave,  $-0.25$  dioptre
- D. concave,  $-0.2$  dioptre

**Answer: C**



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63. The focal length of a plano-convex lens is  $f$  and its refractive index is 1.5 it is kept over a plane glass plate with its curved surface touching the glass plate. The gap between the lens and the glass plate is filled by a liquid. As a result the effective focal length of the combination becomes  $2f$ . Then the refractive index of the liquid is

A. 1.5

B. 2

C. 1.25

D. 1.33

**Answer: C**



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64. A convex lens of glass ( $\mu_g = 1.45$ ) has focal length  $f_g$  in air. The lens is immersed in a liquid of refractive index ( $\mu_l$ ) 1.3.

The ratio of the  $f_{liquid} / f_g$  is

A. 3.9

B. 0.23

C. 0.43

D. 0.39

**Answer: A**



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65. Convex lens is made of glass of refractive index 1.5 If the radius of curvature of each of the two surfaces is  $20\text{cm}$  find

the ratio of the powers of the lens, when placed in air to its power, when immersed in a liquid of refractive index 1.25.

A. 2 : 5

B. 5 : 2

C. 3 : 2

D. 2 : 3

**Answer: B**



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**66.** Relative difference of focal lengths of objective and eye lens in the microscope and telescope is given as

A. It is equal in both.

B. It is more in telescope.

C. It is more in microscope.

D. It may be more in any one.

**Answer: B**



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**67.** Three thin lenses are combined by placing them in contact with each other to get more magnification in an optical instrument. Each lens has a focal length of 3 cm. If the least distance of distinct vision is taken as 25 cm, the total magnification of the lens combination in normal adjustment is

A. 9

B. 26

C. 300

D. 3

**Answer: D**



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- 68.** If the focal length of the objective lens is increased then
- A. microscope will increase but that of telescope decrease.
  - B. microscope and telecope both will increase.
  - C. microcope and telescope both will decrease.
  - D. microscope will decrease but that of telescope will increase.

**Answer: D**



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## Evaluation Test

1. When image is formed by reflection, the field of view is maximum for

- A. plane mirror
- B. convex mirror
- C. concave mirror
- D. cylinder mirror.

**Answer: B**



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2. A candle flame 2 cm high is placed at distance of 2 meter from a wall. How far from the wall must a concave mirror to placed in order to form an image of the flame 6 cm high on the wall ?

A. 225 cm

B. 300cm

C. 450 cm

D. 500 cm

**Answer: B**



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3. An infinitely long rod lies along the axis of a concave mirror of focal length  $f$ . The near end of the rod is distance  $u > f$

from the mirror. Its image will have length

A.  $\frac{uf}{u - f}$

B.  $\frac{f^2}{u - f}$

C.  $\frac{f^2}{u + f}$

D.  $\frac{uf}{u + f}$

**Answer: B**



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**4. Assertion :** If objective and eye lens of a microscope are interchanged then it can work as telescope.

**Reason :** The object of telescope has large focal lengths.

A. Assertion is True, Reason is True , Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True : Reason is not correct explanation for Assertion.

C. Assertion is True. Reason is False

D. Assertion is False, Reason is False.

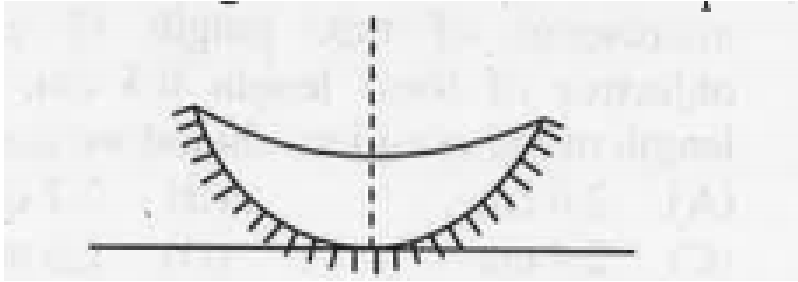
**Answer: D**



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5. The convex surface of a thin concavo-convex lens of glass of refractive index 1.5 has radius of curvature 10 cm. The concave surface has a radius of curvature 30 cm. The convex side is silvered and placed on a horizontal surface. Then where should

a pin be placed on the optic axis such that its image is formed at the same place?



A.  $7.5\text{cm}$

B.  $12\text{cm}$

C.  $15\text{cm}$

D.  $21\sqrt{2}\text{ cm}$

**Answer: A**



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**6. Focal length of a convex/ concave mirror depends on**

A. distance of object  $u$ .

B. distance of image  $v$

C. both  $u$  and  $v$ .

D. radius of curvature

**Answer: D**



**Watch Video Solution**

7. A convex lens focal length 30 cm made of glass of refractive index 1.5 is immersed in water having refractive 1.33. The change in the focal length of lens is

A. 62.3 cm

B. 87.4cm

C.  $58.2\text{cm}$

D.  $73.6\text{cm}$

**Answer: B**



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8. Magnifying power of a telescope in normal adjustment when final images of a star is formed at infinity is 9. the image of a star is formed at

A. 54 cm

B. 9 cm

C. 6 cm

D. 36 cm

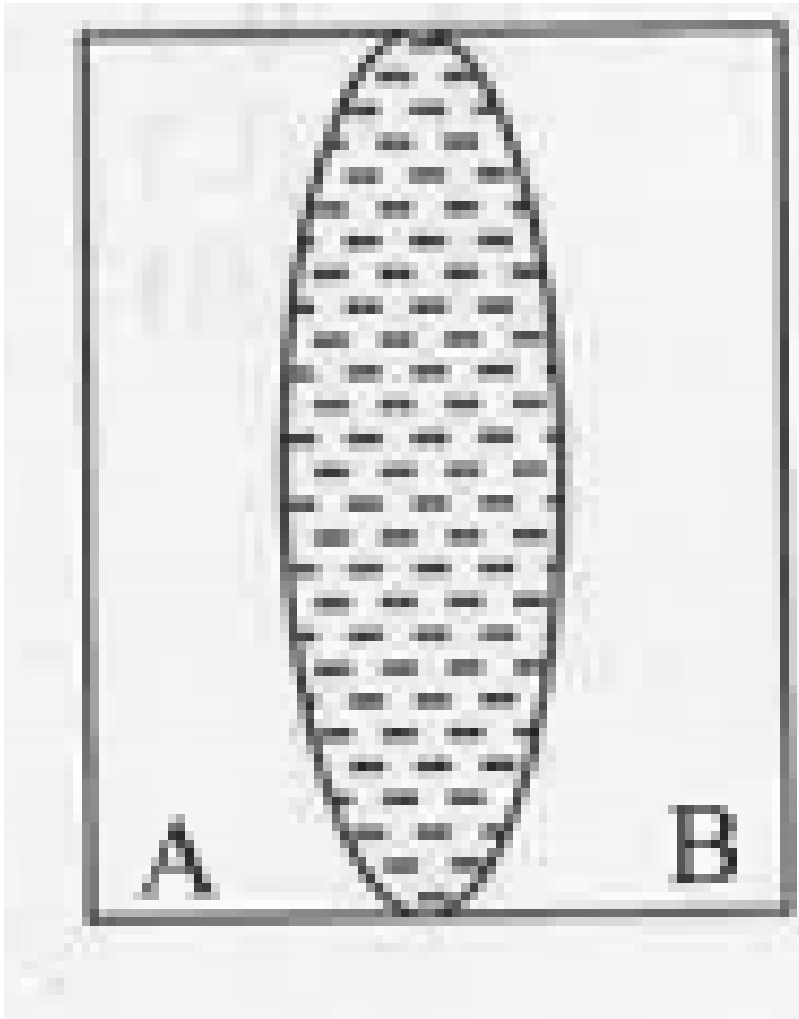
**Answer: A**



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**9.** Two plano-concave lenses (1 and 2) of glass of refractive index 1.5 have radii of curvature 20 cm and 10 cm. They are placed in contact with their curved surface towards each other and the space between them is filled with liquid of refractive

index  $4/3$ . Then the combination is



A. concex lens of focallenght 40 cm

B. concave lens of focal length 40 cm

C. concave lens of focal lengths 66.6 cm



D. convex lens of focal length 66.6 cm

**Answer: B**



**Watch Video Solution**

**10. Assertion :** If radius of curvature of mirror is doubled, focal length is halved.

**Reason :** Radius of curvature = 2 times the focal length

A. Assertion is True, Reason is True , Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True : Reason is not correct explanation for Assertion.

C. Assertion is True. Reason is False

D. Assertion is False, Reason is False.

**Answer: D**



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**11.** An experiment needs to heat a small sample to 700 K, but the only available oven has a maximum temperature of 500 K. Could experimenter heat the sample to 700 K by using a large lens to concentrate the radiation from the oven into the sample ?

- A. Yes, if the sample is placed at the focal point of the lens
- B. No, because it would violate the law of conservation of energy.
- C. No, because it would violate the second law of thermodynamics

D. Yes, if the areas of the front of the oven is at least much as the area of the front of the sample

**Answer: A**



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**12. Assertion :** A dentist uses a convex mirror to examine a small cavity in the tooth.

**Reason :** A convex mirror forms only diminished virtual images.

A. Assertion is True, Reason is True , Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True : Reason is not correct explanation for Assertion.

C. Assertion is True. Reason is False

D. Assertion is False, Reason is False.

**Answer: D**



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**13.** A man with normal near- point (25c m) reads a book with small print using a magnifying glass L a thin convex lens of focal length 5 cm.

(i) What is the closest and the farthest distance at which he can read the book when viewing thorough the magnifying glass ?

(ii) What is the maximum and the minimum angular magnification (magnifying power) possible using the above simple microscope ?

A.  $-5:6$

B.  $5:6$

C.  $6:5$

D.  $-6:5$

**Answer: B**



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**14.** For a given compound microscope, increase in length of tube

A. increases magnifying power

B. has no effect on magnifying power

C. decreases magnifying power

D. doubles the magnifying power

**Answer: C**



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**15.** Which of the following (referred to a spherical mirror) do (does) not depend on whether the rays are paraxial or not?

A. Radius of curvature

B. Focus

C. Pole

D. Principal axis.

**Answer: B**



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**16. Assertion :** A single lens produces a coloured image of an object illuminated by white light.

**Reason :** The refractive index of material of lens is different for different wavelengths of light.

A. Assertion is True, Reason is True , Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True : Reason is not correct explanation for Assertion.

C. Assertion is True. Reason is False

D. Assertion is False, Reason is False.

**Answer: A**



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