PHYSICS

BOOKS - MCGROW HILL EDUCATION PHYSICS (HINGLISH)

REFRACTION OF LIGHT

Elementary Questions

1. During the 19th century, light was considered to be a stream of particles called

A. atoms

B. electrons

C. corpuscles

D. quantas

Answer: C

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2. Who amongst the following used corpuscular theory to explain reflection and refraction of light?

A. Newton

B. Maxwell

C. Young

D. Hertz

Answer: A

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3. Who amongst the following used corpuscular theory to explain the radiations emitted by hot objects?

A. Max Planck

B. Newton

C. Young

D. Einstein

Answer: A

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4. The wave-like character was experimentally proved for light by

A. Newton

B. Young

C. Maxwell

D. none of these

Answer: B

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5. Albert Einstein used corpuscular theory to explain

A. $E = mc^2$

B. photoelectric effect

C. quantisation of charge

D. none of these

Answer: B

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6. Who first proposed that light was wave-like in character?

A. Huygens

B. Newton

C. Young

D. Maxwell

Answer: A

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7. Light is a form of _____ that we can detect with our ____ .

A. energy, ears

B. corpuscles, eyes

C. energy, eyes

D. sensation, skin

Answer: C

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8. The unit of power of a lens is

A. metre

B. dyne

C. dioptre

D. none of these

Answer: C

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9. The least distance of distinct vision for a normal person is about

A. 1 m

B. 0.5 m

C. 0.25 m

D. none of these

Answer: C

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10. The focal length of a lens is 50 cm. Its power would be

A. 50 dioptres

B. 2 dioptres

C. 20 dioptres

D. none of these

Answer: B

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11. The unit of refractive index is

A. metre

B. degree

C. dioptre

D. it has no units

Answer: D

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12. A simple magnifying glass consists of a

A. concave lens

B. convex lens of large focal length

C. convex lens of small focal length

D. plane mirror only

Answer: C

13. How should people wearing spectacles work with a microscope?

    A. they should keep on wearing their

        spectacles.

    B. they should never use the microscope.

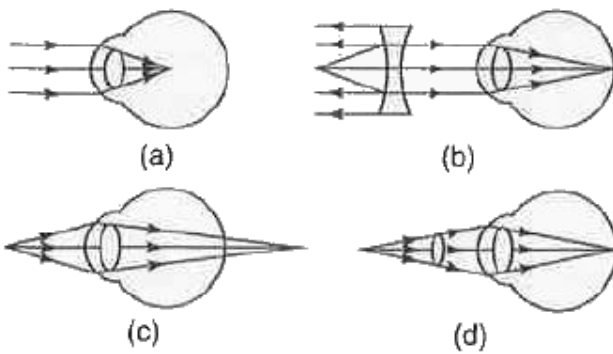C. they should take off their spectacles.

D. they may either put on their spectacles

or they may take off their spectacles.

Answer: C

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14. Figures 9.6 (a), (b), (c), and (d) respectively

correspond to

(a) (b) (c) (d)

A. the short-sighted eye, the correction of long-sight, the long-sighted eye and the correction of short-sight

B. the short-sighted eye, the correction of short-sight, the long-sighted eye and the correction of long-sight

C. the long-sighted eye, correction of short sight, the short-sighted eye and the correction of long-sight

D. none of these

Answer: B

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15. The screen behind the eye lens is called the

A. iris

B. ciliary muscle

C. retina

D. pupil

Answer: C

16. Cornea is a transparent spherical structure which

A. reflects light

B. scatters light

C. refracts light

D. none of these

Answer: C

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17. The image on the retina remains for

A. 20 s

B. 10 s

C. $\dfrac{1}{10}s$

D. $\dfrac{1}{16}s$

Answer: D

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18. The middle vascular coat that darkens the eye chamber and prevents refraction by absorbing the light rays is

A. choroid

B. sclera

C. retina

D. cornea

Answer: A

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19. The amount of light entering the eye is controlled by the

A. iris

B. cornea

C. pupil

D. crystalline lens

Answer: C

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20. Figures 9.7 (a), (b), and (c) respectively, indicate the point of focus in case of

(a)

(b)

(c)
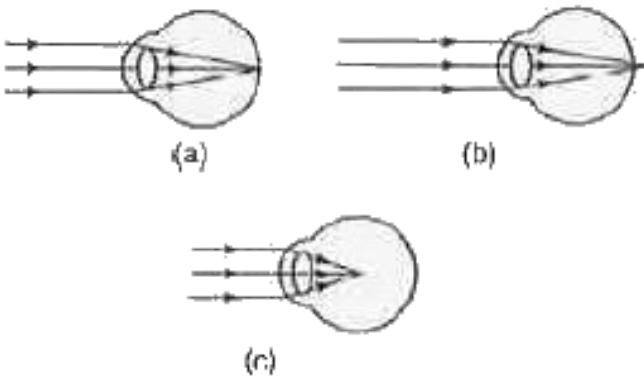
A. the normal eye, the hypermetropic eye and myopic eye

B. the hypermetropic eye, the myopic eye and the normal eye

C. the normal eye, the myopic eye and the hypermetropic eye

D. the myopic eye, the normal eye and the

hypermetropic eye

Answer: A

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21. The eye lens is a

A. transparent double-convex lens

B. transparent double-concave lens

C. transparent concavo-convex lens

D. none of these

Answer: A

22. The eye lens contains a watery liquid called

the

A. aqueous humour

B. peroxide

C. vitreous humour

D. none of these

Answer: A

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23. Long-sightedness is caused by the eyeball being too short. It can be corrected by the use of a

A. convergent lens

B. plane mirror

C. divergent lens

D. none of these

Answer: A

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24. Astigmatism occurs when the cornea does not have a truly spherical shape. This defect can be cured by the use of a

A. concave lens

B. cylindrical lens

C. convex lens

D. plano-convex lens

Answer: B

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25. The power of a lens being +4 dioptres suggests that it is a

A. convex lens

B. plano-convex lens

C. concave lens

D. none of these

Answer: A

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26. When an object moves towards a convex lens, the size of the image

A. decreases

B. increases

C. first decreases then increases

D. remains the same

Answer: B

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27. When an object approaches a convex lens from infinity, the image formed by it shifts

A. away from the lens

B. towards the lens

C. first away and then towards the lens

D. none of these

Answer: A

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28. The amount of light entering our eye gets controlled by the

A. pupil

B. iris

C. cornea

D. eye lens

Answer: A

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29. If the power of a lens is 0.1 D, its focal length is

A. 1 m

B. 10 m

C. 100 m

D. $-10m$

Answer: B

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30. The refraction of light is commonly known as

A. bending

B. scattering

C. reflection

D. interference

Answer: A

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31. When a ray of light passes from an optically

less dense medium to a more dense medium,

it

A. goes undeviated

B. bends towards the normal

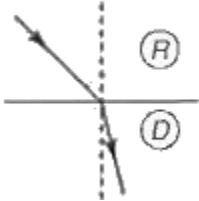C. bends away from the normal

D. none of these

Answer: B

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32. When a ray of light passes from an optically more dense medium to a less dense medium, it

A. goes undeviated

B. bends towards the normal

C. bends away from the normal

D. none of these

Answer: C

33. Which of the following shows the bending of light from rarer (R) into denser (D) medium?

A.

B.

C.

D.
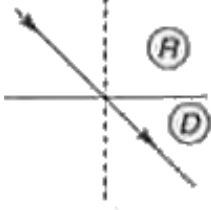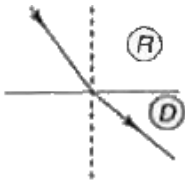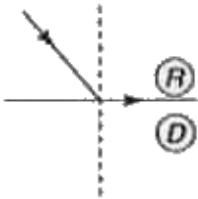
Answer: B
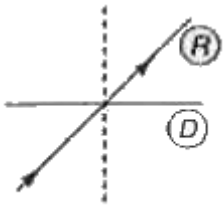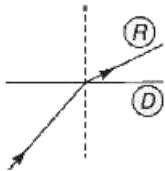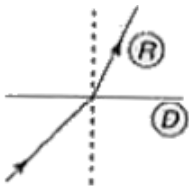
> ▶ Watch Video Solution

34. Which of the following shows the bending of light from denser (D) medium into a rarer (R) medium?
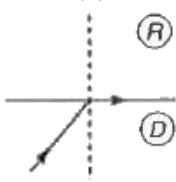
A.

B.

C.

D.

Answer: B

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35. The cells in the retina that are able to

distinguish between different colours are

A. rod shaped

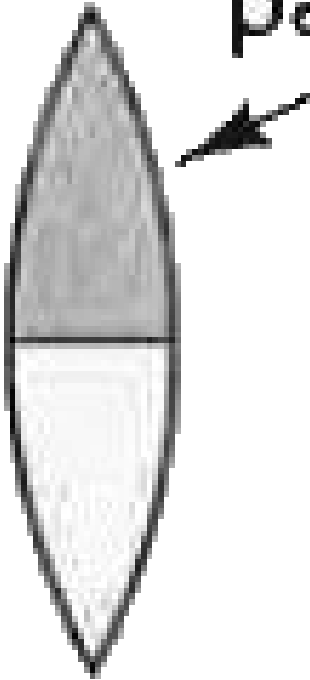B. cone-shaped

C. cuboid shaped

D. long and flat

Answer: B

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36. How will the image formed by a convex lens

be affected if the upper half of the lens is

wrapped with a black paper?

Black
paper

A. the size of the image is reduced to one

half.

B. the upper half of the image will be

absent.

C. the brightness of the image is reduced.

D. there will be no effect.

Answer: C

37. A green leaf placed in a dark room is illuminated by red light. The leaf will appear to be

A. green

B. red

C. yellow

D. black

Answer: D

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38. An object looks red when seen through a piece of red glass. What is the actual colour of the object?

A. Red only

B. White only

C. Red or green

D. Black

Answer: A

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39. The mirror formula is given by

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

where the symbols have their usual meanings.

Then the lens formula is given by

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

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

C. $\dfrac{1}{v} + \dfrac{1}{u} = -\dfrac{1}{f}$

D. none of these

Answer: B

40. A convex lens is also called a

A. diverging lens

B. converging lens

C. cylindrical lens

D. none of these

Answer: B

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41. A lens is called a thin lens if its overall thickness is

    A. small

    B. large

    C. infinitely large

    D. none of these

Answer: A

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42. In optical instruments, the lenses are used to form images by

A. reflection

B. refraction

C. dispersion

D. scattering

Answer: B

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43. A lens which is thicker in the middle and thinner at the edges is called a _____ lens.

A. convex

B. concave

C. cylindrical

D. none of these

Answer: A

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44. A lens which is thinner at the middle and thicker at the edges is called a _____ lens.

A. convex

B. concave

C. cylindrical

D. none of these

Answer: B

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45. The principal axis is also called _____ of the lens.

A. optical axis

B. x-axis

C. y-axis

D. axis

Answer: A

46. The power of a lens can't be measured in

A. m

B. W

C. h.p.

D. all the above

Answer: D

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47. 1 D is equal to

A. 1 m

B. 1 cm

C. $1m^{-1}$

D. $1cm^{-1}$

Answer: C

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48. If f is focal length of the lens, then the power of a lens is equal to

A. $\dfrac{100}{f(cm)}$

B. $\dfrac{10}{f(cm)}$

C. $\dfrac{100}{f(m)}$

D. $\dfrac{1}{100f(cm)}$

Answer: A

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49. Which of the following term is not associated with a lens?

A. Aperture

B. Focal length

C. Principal focus

D. Efficiency

Answer: D

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50. To construct a ray diagram, you need at least _____ whose path(s) after refraction through the lens are known.

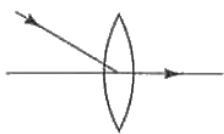A. one ray

B. two rays
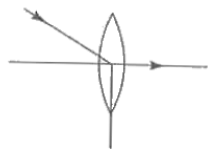
C. three rays

D. none of these

Answer: B

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51. Which of the following diagrams correctly represents the ray of light passing through the optical centre?
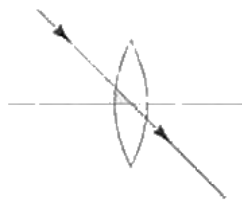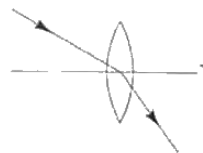
A.

B.

C.

D.

Answer: C

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52. A ray of light coming parallel to the principal axis after passing through a convex lens, passes through its

A. optical centre

B. focus

C. centre of curvature

D. none of these

Answer: B

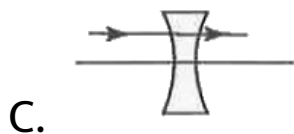**53.** The focal length can be expressed in

A. metre

B. dioptre

C. watt

D. horse power

Answer: A

54. Which of the following diagrams correctly rep resents the passage of a ray of light through a concave lens?

A.

B.

C.

D.
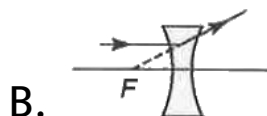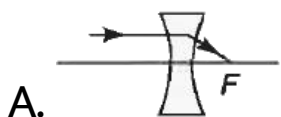
Answer: B

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55. Where should an object be placed so that a real and inverted image of same size is obtained by a convex lens.

    A. Between the lens and its focus

    B. At the focus

    C. At twice the focal length

    D. At infinity

Answer: C

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56. A concave lens always gives

A. virtual image

B. erect image

C. diminished image

D. all the above

Answer: D

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57. The power of a lens whose focal length is one metre is ____ dioptre.

A. one

B. ten

C. hundred

D. none of these

Answer: A

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58. The focal length of a lens is -0.4m. The lens is

A. convex

B. concave

C. cylindrical

D. none of these

Answer: B

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59. The power of a lens is a measure of its degree of

    A. convergence only

    B. divergence only

    C. convergence or divergence

    D. none of these

Answer: C

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60. The focal length of a lens is 0.1 m. Then the lens must be

A. convex

B. concave

C. cylindrical

D. none of these

Answer: A

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61. Hypermetropia is due to the _____ of the eye.

A. low converging power

B. low diverging power

C. high converging power

D. high diverging power

Answer: A

62. Long-sightedness is to hypermetropia as short-sightedness is to

A. myopia

B. focusing

C. astigmatism

D. accommodation

Answer: A

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63. Which of the following lens is used to minimise hypermetropia?

A. Convex lens

B. Concave lens

C. Cylindrical lens

D. None of these

Answer: A

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64. Which of the following lens is used to minimise myopia?

A. Convex lens

B. Concave lens

C. Cylindrical lens

D. None of these

Answer: B

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65. The human eye forms the image of an object at its

A. cornea

B. iris

C. pupil

D. retina

Answer: D

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66. The change in focal length of an eye-lens to focus the image of object at varying distances is done by the action of the

    A. pupil

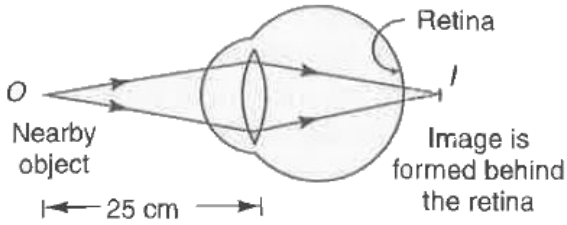   B. ciliary muscles

    C. retina

    D. blind spot

Answer: B

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67. Figure 9.13 shows the eye suffering from

A. hypermetropia

B. myopia

C. astigmatism

D. none of these

Answer: A

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68. Figure 9.14 shows the eye suffering from

Parallel rays from distant object (an infinity)

Retina

Image

Image is formed in front of the retina
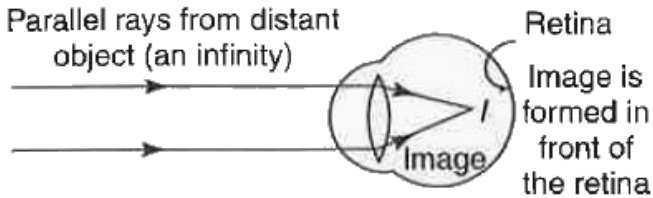
A. hypermetropia

B. myopia

C. astigmatism

D. none of these

Answer: B

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69. When an object is placed between F and 2F in front of a convex lens, the image formed is

A. real and inverted

B. beyond 2F

C. magnified

D. all the above

Answer: D

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70. The magnifying power of an optical instrument is expressed in

A. m

B. m^{-1}

C. D

D. it has no unit

Answer: D

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71. A magnifying glass comprises a simple

A. convex lens

B. convex mirror

C. concave lens

D. concave mirror

Answer: A

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72. The least distance of distinct vision for a normal person is

A. 1 m

B. 25 cm

C. 25 m

D. none of these

Answer: B

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73. The power of a lens having a focal length of 1 cm is

    A. 1 D

    B. 10 D

    C. $\dfrac{1}{10}D$

    D. 100 D

Answer: D

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74. A camera is an optical instrument which makes use of a

A. convex lens

B. concave lens

C. cylindrical lens

D. none of these

Answer: A

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75. The inability of a lens to bring all the rays coming from a point object to focus at one single point is called

A. spherical aberration

B. parallex

C. optical illusion

D. none of these

Answer: B

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76. The spherical aberration can be minimised by

A. reducing the aperture of the lens

B. using specially made meniscus lens

C. combination of lenses made of different glasses

D. none of these

Answer: D

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77. Our eye makes use of the property of

A. convex lens

B. concave lens

C. cylindrical lens

D. none of these

Answer: A

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78. Most of the refraction of light takes place in the

A. iris

B. cornea

C. pupil

D. retina

Answer: B

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79. The central circular aperture of _____ is called _____ .

A. iris, pupil

B. pupil, iris

C. retina, iris

D. none of these

Answer: A

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80. When the light is very bright,

    A. the iris makes the pupil expand

    B. the iris makes the pupil contract

    C. the iris and the pupil remain as they are

    D. none of these

Answer: B

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81. Who discovered by his experiments with glass prisms that white light consists of seven colours?
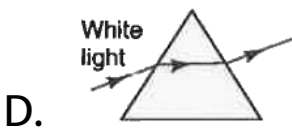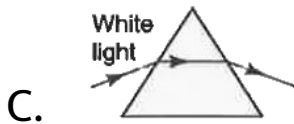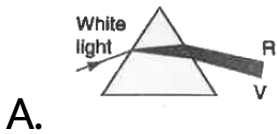
A. Newton

B. Faraday

C. Maxwell

D. Young

Answer: A

82. Which of the following figures correctly represents the passage of white light through a prism?

A.

White light ... R V

B.

V ... R

C.

White light

D.

White light

Answer: A

83. Which of the following figures is correct when a monochromatic light passes through a prism?

A.

B.

C.

D.
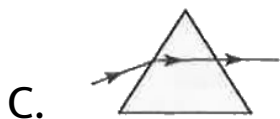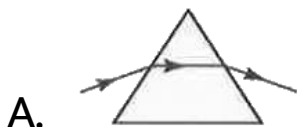
Answer: A

84. The light which refracts most while passing through a prism is

A. red

B. violet

C. indigo

D. yellow

Answer: B

85. Which of the following colours of light undergoes the least deviation while passing through a glass prism?

A. Red

B. Blue

C. Yellow

D. Green

Answer: A

86. Which of the following colour of light undergoes the maximum deviation while passing through a glass prism?

A. Red

B. Blue

C. Violet

D. Green

Answer: C

87. Which of the following sources of light is different from others?

A. Sunlight

B. White light

C. Light from a bulb

D. Sodium light

Answer: D

88. The wavelength of light is expressed in

A. metre

B. micron

C. light year

D. angstrom

Answer: D

Higher Order Thinking Questions

1. On grinding a lens, its focal length

A. increases

B. decreases

C. remains same

D. nothing can be decided

Answer: A

2. On entering a denser medium, the wavelength of light

A. increases

B. decreases

C. remains same

D. first increases then decreases

Answer: B

3. Velocity (v) of light in a medium (refractive index μ) vary as

A. $\mu \propto v^2$

B. $\mu \propto \dfrac{1}{v^2}$

C. $\mu \propto v$

D. $\mu \propto \dfrac{1}{v}$

Answer: D

4. Refractive index is minimum for

A. vacuum

B. air

C. glass

D. diamond

Answer: A

5. Refractive index is maximum for

A. glass

B. water

C. air

D. diamond

Answer: D

6. The value of refractive index of diamond is

A. 1

B. 1.2

C. 2

D. 2.42

Answer: D

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7. If d is the real path length, then the optical path length (in medium of refractive index μ) is equal to

A. μd

B. $\dfrac{d}{\mu}$

C. $\dfrac{\mu}{d}$

D. $\dfrac{1}{\mu d}$

Answer: A

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8. If μ_1, μ_2 are refractive indices of a body and its surrounding medium respectively, then the body would disappear if

A. $\mu_1 > \mu_2$

B. $\mu_1 < \mu_2$

C. $\mu_1 = \mu_2$

D. $\mu_1 \geq \mu_2$

Answer: C

9. Refractive index (μ) of a medium depends upon

    A. temperature of the medium

    B. wavelength of the incident light

    C. nature and physical state of the medium

    D. all the above

Answer: D

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10. With increase in temperature of the medium, its refractive index

A. increases

B. decreases

C. remains same

D. either (a) or (b)

Answer: B

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11. If d actual thickness of a plate of refractive index μ, then decrease in its thickness due to refraction of light will be

A. $d(\mu - 1)$

B. $\dfrac{d}{\mu}$

C. $d\left(1 - \dfrac{1}{\mu}\right)$

D. $\dfrac{d}{(\mu - 1)}$

Answer: C

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12. In terms of wavelength of light (λ), intensity (I) of scattered light is related as

A. $I \propto \lambda^4$

B. $I \propto u^2$

C. $I \propto \dfrac{1}{\lambda^2}$

D. $I \propto \dfrac{1}{\lambda^4}$

Answer: D

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13. The blue colour of sky can be explained on the basis of

A. reflection of light

B. refraction of light

C. dispersion of light

D. scattering of light

Answer: D

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14. Which of the following physical quantities change during refraction of light?
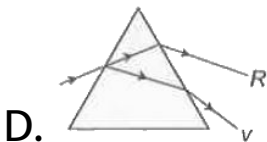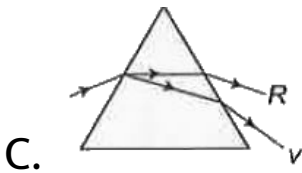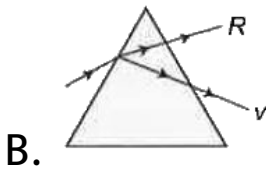
A. Intensity of light

B. Speed of light

C. Wavelength of light

D. All the above

Answer: D

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15. Which of the following figures shows a correct representations of deviation and dispersion of light by a prism?

A.

B.

C.

D.
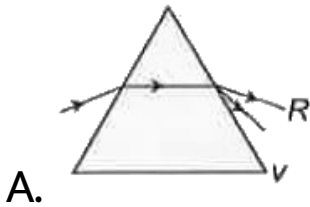
Answer: C

16. A completely transparent material will be invisible in vacuum when its refractive index μ is

    A. unity

    B. less than unity

    C. more than unity

    D. infinity

Answer: A

17. A tank of height 50 m is filled with oil fully. If the bottom of the tank appears to be 40 m below its top, the refractive index of the oil should be

A. $\dfrac{4}{5}$

B. $\dfrac{1}{5}$

C. $\dfrac{1}{4}$

D. $\dfrac{5}{4}$

Answer: D

18. The time taken by light to cross a glass slab

of thickness 4 mm and refractive index 3 is

    A. $8 \times 10^{-12} s$

    B. $8 \times 10^{-10} s$

    C. $4 \times 10^{-11} s$

    D. $2 \times 10^{-11} s$

Answer: C

19. Two lenses of power 2.5 D and 1.5 D are joined together. The power of the new lens formed is

A. $\dfrac{3}{5}D$

B. $\dfrac{5}{3}D$

C. 4 D

D. 1 D

Answer: C

20. The focal length of a glass lens in air is f. When immersed in water (refractive index μ) its focal length would be

A. f

B. $< f$

C. $> f$

D. nothing can be decided

Answer: C

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21. Focal length of a glass lens in air is 2.5 cm. Its focal length when immersed in water would be

    A. $2 \times 2.5 cm$

    B. $4 \times 2.5 cm$

    C. $6 \times 2.5 cm$

    D. $\left(\dfrac{2.5}{4} \right) cm$

Answer: B

22. A fish 12 cm long is 5 cm under the water level. Its length when viewed vertically above will be

A. 12 cm

B. 7 cm

C. 5 cm

D. none of these

Answer: A

23. A convex lens of focal length x and a concave lens of focal length y are placed in contact. The focal length of the combination is

A. (x + y)

B. (x - y)

C. $\dfrac{xy}{x + y}$

D. $\dfrac{xy}{y - x}$

Answer: D

24. Two thin lenses of focal lengths 20cm and 25cm are placed in contact. The effective power of the combination is

    A. 5 D

    B. 9 D

    C. 45 D

    D. none of these

Answer: B

25. A convex lens of focal length f produces a real image m times the size of an object, then the distance of the object from the lens is

A. $(m + 1)f$

B. $(m - 1)f$

C. $\left(\dfrac{m + 1}{m}\right)f$

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

Answer: C

26. An object is placed at a distance of $f/2$ from a convex lens. The image will be

    A. at f, real and inverted

    B. at 2f, virtual and erect

    C. at $\dfrac{3f}{2}$, real and inverted

D. at one of the foci, virtual and double its

 size

Answer: D

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27. When a thin convex lens is put in contact

with a thin concave lens of the same focal

length (f), then the resultant combination has

focal length equal to

A. 2f

B. f

C. zero

D. infinity

Answer: D

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28. Sun appears red at sunrise and sunset because red colour is

A. least dispersed

B. least scattered

C. most scattered

D. most refracted

Answer: B

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29. Which of the following colours is scattered

minimum?

A. Violet

B. Yellow

C. Blue

D. Red

Answer: D

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30. The colour of a star is an indication of its

A. size

B. temperature

C. weight

D. distance

Answer: D

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31. The sky appears blue because

A. red light is absorbed

B. blue light is absorbed

C. blue light is scattered the most

D. it is natural colour

Answer: C

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32. The focal length of the lens in the human eye is maximum when it is looking at an object at

A. a very small distance from the eye

B. 0.25 m from the eye

C. 1 m from the eye

D. infinity

Answer: D

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33. A cylindrical lens is required to correct

A. Myopia

B. Hypermetropia

C. Presbyopia

D. Astigmatism

Answer: D

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34. A person cannot see the objects beyond 1 m. The power of a lens required to correct this vision will be

A. $-1D$

B. $+2D$

C. 0.5D

D. 2.5D

Answer: A

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35. Focal length of a convex lens will be maximum for

A. red light

B. blue light

C. yellow light

D. green light

Answer: A

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36. An astronaut in a spsceship sees the outer

space as

A. red

B. blue

C. white

D. black

Answer: D

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37. The minimum distance between an object and its real image formed by a convex lens (of focal length f) is

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

B. f

C. 2f

D. 4f

Answer: D

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