

Guess Paper – 2014

Class – X

Subject – Physics

Light – Reflection and Refraction

1 mark questions

1. Name the type of mirror which always forms a virtual image for a real object.
2. A ray of light falls on a mirror normally. What are the values of angle of incidence and the angle of reflection?
3. The radius of curvature of a spherical mirror is 20 cm. What is its focal length?
4. In which type of lens linear magnification is always less than one?
5. Where will the image be formed by a concave mirror when an object is placed between the pole and the focus of the mirror?
6. Why is a concave mirror preferred to a plane mirror for shaving?
7. Which mirror has wider field of view?
8. Name a mirror that can give an erect and enlarged image of an object.
9. Write the relation between the refractive index and the speed of light in the medium.
10. If an object is placed at the focus of a convex lens, where is the image formed?
11. Define 1 dioptre power of a lens.
12. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal? Why?
13. What will be the focal length of a lens whose power is given as +2.0 D?
14. Define refractive index of a medium.
15. Which is optically denser out of the two mediums M1 and M2 having refractive index 1.71 and 1.36 respectively.
16. Where should an object be placed in front of a convex lens so as to obtain its magnified erect image?
17. A 1 cm high object is placed at a distance of $2f$ from a convex lens. What is the height of the image formed?

18. What should be the position of an object relative to convex lens so that it behaves like a magnifying glass?
19. A lens has two focal points where as a mirror has only one. Why?
20. Find the power of a concave lens of focal length 2 m.
21. What happens if ray of light travels from a rarer medium to a denser medium?
22. For what angle of incidence, the lateral shift produced by parallel sided glass plate is zero?
23. A doctor has prescribed a corrective lens of power + 1.5 D. Find the focal length of the lens. Is the prescribed lens diverging or converging?

2 mark questions

24. You are given three mirrors of equal size-concave, convex and plane. How will you identify them without touching their surfaces?
25. Which mirror is used as rear-view mirror in automobile to see traffic behind and why this mirror is useful?
26. Distinguish between real and virtual images.
27. A 3.0 cm long object is placed perpendicular to the principal axis of a concave mirror. The distance of the object from the mirror is 30 cm and its image is formed at 60 cm from the mirror on the same side. Find the size of the image formed.
28. State the laws of refraction of light.
29. State two conditions under which a ray of light suffering refraction from medium 1 to medium 2 does not undergo any change in direction
30. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located?
31. Where is the image formed of an object placed at the focus of a convex lens? Give ray diagram.
32. An object is placed at a distance equal to $2f$ in front of a convex lens. Draw a labeled ray diagram to show the formation of image. State two characteristics of the image formed.

33. Is it necessary that an optically denser medium should possess greater mass density than optically rarer medium? Give an example to explain it.
34. If an object 5 cm high is placed at a distance of 12 cm from a convex lens of focal length 8 cm, find the position, nature and height of the image formed.
35. Draw a ray diagram to show the passage of two rays of light through a rectangular slab of glass when the angle of incidence are 0° and any angle less than 90° .
36. What is the nature of image formed by a convex lens when the object is between the focus and optical centre? Draw a ray diagram for the same.
37. Light enters from air to glass having refractive index 1.50. What is the speed of light in the glass? The speed of light in the glass? The speed of light in vacuum is $3 \times 10^8 \text{ ms}^{-1}$.
38. Two medium with refractive index 1.31 and 1.50 are given. In which case (i) bending of light is more (ii) speed of light is more
39. Study the table given below and state the medium in which light will travel fastest. Give reason.

Medium	A	B	C
Refractive Index	1.33	1.5	2.4

40. Draw a ray diagram to show the (i) position and (ii) nature of the image formed when an object is placed between focus F and pole P of a concave mirror.
41. Why does a convex mirror has a virtual principal focus?
42. An object placed 15 cm in front of a lens forms a real image three times magnified. Where is the image formed? What is the focal length of the lens?

3 mark questions

43. The speed of light in air $3 \times 10^8 \text{ m/s}$. If the refractive index of glass is 1.5, find the time taken by light to travel a distance of 10 cm in glass.
44. Name the type of mirror used in the following situations: (a) Headlights of a car. (b) Side/rear-view mirror of a vehicle. (c) Solar furnace.

45. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.
46. An object 5.0 cm in length is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. Find the position of the image, its nature and size.
47. A concave lens has focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image as 15 cm from the lens? Also calculate the size of the image formed.
48. A convex mirror used as a rear-view mirror in a car has a radius of curvature of 3 m. If a bus is located at distance of 5 m from this mirror, find the position of image. What is the nature of the image?
49. What is the S.I. unit of power of lens? Which of the two has a great power: a lens of short focal length or lens of large focal length? A doctor has prescribed a corrective lens of power +1.5 D. Find the focal length of the lens.
50. Write the relation between the angle of incidence and angle of refraction for a medium. The refractive index of glass with respect to water is 1.125. If the speed of light in water is 2.25×10^8 m/s, then calculate the speed of light in glass.
51. An object is 2 m from a lens which forms an erect image one-fourth (exactly) the size of the object. Determine the focal length of the lens. What type of lens is this?
52. What do you understand by the power of a lens? Define also its unit. An object of height 4 cm is placed at a distance of 15 cm in front of a concave lens of power -10 Diopetre. Find the size of the image.
53. An object 50 cm tall is placed on the principal axis of a convex lens. Its 20 cm tall image is formed on the screen placed at a distance of 10 cm from the lens. Calculate the focal length of the lens.
54. A 5.0 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 13 cm. The distance of the object from the lens is 30 cm. Find (i) the position and (ii) the size of the image formed.

55. A convex lens has a focal length of 25 cm. Calculate the distance of the object from the lens if the image is to be formed on the opposite side of the lens at a distance of 75 cm from the lens. What will be the nature of the image.
56. An object 3 cm high is placed at a distance of 20 cm in front of a convex lens of focal length 12 cm. Find the position, nature and size of the image formed.
57. An object 3 cm high is placed at a distance of 9 cm in front of a concave mirror of focal length 10 cm. Find the position, nature and size of the image formed.
58. You are given two lenses of equal size—concave and convex. How will you distinguish them without touching their surfaces?
59. Which lens can be used as a magnifying glass? For which position of object does a convex lens form: a) a virtual and erect image b) a real and inverted image of same size as that of object?

5 mark questions

60. (i) Define: (a) Centre of curvature (b) Pole of concave mirror.
 (ii) State the mirror formula and its magnification.
 (iii) Show by drawing ray-diagram that the image of an object formed by a concave lens is virtual, erect and diminished.
61. (i) Where should an object be placed in front of a convex lens so as to obtain its magnified erect image?
 (ii) An object lies at a distance of $2f$ from a concave lens of focal length f . Draw a ray diagram to illustrate the image formation.
 (iii) A convex lens forms a real and inverted image of a needle at a distance of 50 cm from the lens. If the image is of the same size as the needle, where is the needle placed in front of the lens? Also, find the power of the lens.
62. (i) State the relation between object distance, image distance and focal length of a spherical mirror. (ii) Draw a ray diagram to show the image formed by a concave mirror when an object is placed between pole and focus of the mirror.
 (iii) A concave mirror of focal length 15 cm forms an image of an object kept

at a distance of 10 cm from the mirror. Find position, nature and size of the image formed by it.

63. Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed: (i) At the centre of curvature of a concave mirror. (ii) Between the pole P and focus F of a concave mirror. (iii) In front of a convex mirror. (iv) At 2F of a convex lens. (v) In front of a concave lens.

Human Eye and Colourful World

1 mark questions

1. Define the term “power of accommodation” of human eye.
2. Which defect of vision can be rectified by using a convex lens?
3. What is meant by ‘dispersion of light’?
4. Atmospheric refraction causes advance sunrise and delayed sunset. By how much time is: (a) Sun rise advanced and (b) Sunset delayed?
5. What is the cause of blue colour of the sky?
6. Give the usual names for the following: (a) The screen on which image is formed in the eye. (b) The part which controls the amount of light entering the eye.
7. Write down the name of the defect of vision in which the eye loses its power of accommodation due to old age.
8. Name the phenomenon which causes the twinkling of stars.
9. Name the optical phenomenon involved in the formation of rainbow.
10. How does the sky appear from the surface of the moon?
11. A person with a myopic eye cannot see objects beyond 1.2 m distinctly. What should be the type of the corrective lens used to restore proper vision?
12. Write down the function of the iris in the human eye?
13. Name the muscles responsible for bringing change in the focal length or the lens.
14. Which cells of the retina are responsible for light (black and white) vision?
15. Which nerve connects the light sensitive cells of the retina to the brain?

16. What kind of lens is used in the spectacles of a person suffering from myopia (nearsightedness)?
17. What type of lens is used for correcting the hypermetropia?
18. What is dispersion of light?
19. What is the cause of dispersion of light?
20. What is the condition for observing a rainbow?
21. What is the least distance of distinct vision of a normal human eye?
22. As light rays pass from air into a glass prism, are they refracted towards or away from the normal?

2 mark questions

23. Why does the sun appear reddish early in the morning? Name the defect of vision caused by:
 - (i) Cornea is not perfectly spherical.
 - (ii) Power of accommodation of eye decreases.
24. Why do different coloured rays deviate differently in the prism? Explain.
25. Why is normal eye not able to see clearly the objects placed closer than 25 cm?
26. Explain why, when the sun is over heated at noon, it appears white but when the same sun is near the horizon at sunset, it appears red?
27. What happens when a ray of ordinary light is passed through a triangular glass prism? What will happen if another similar glass prism is placed upside down behind the first prism?
28. What do you mean by (a) Near point (b) Far point.
29. Name the defect of vision due to:
 - (i) Power of the eye is too great.
 - (ii) Focal length of the eye lens is too great.
30. Write the role played by : (i) Iris (ii) Retina
31. What is Presbyopia? How will you correct the same?
32. A ray of white light breaks up into its components while passing through a glass prism. Draw a ray diagram to show the path of rays. Mark the least deviated and most deviated colour in your figure.

33. Why does it take some time to see objects in a dim room when you enter the room from bright sunlight outside?
34. What is Tyndall effect? Explain with an example.
35. Draw a labelled diagram to show the formation of a rainbow.
36. Define the power of accommodation. What is the value power of accommodation for a young adult with normal vision?
37. The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem?
38. Why is a normal eye not able to see clearly the objects placed closer than 25 cm?
39. Explain why the planets do not twinkle.
40. Why does the sun appear reddish early in the morning?
41. Why does the sky appear dark instead of blue to an astronaut?
42. What is cause of myopia (or short sightedness)?
43. What is the cause of hypermetropia (or long-sightedness)?
44. A man can read the number of distant bus clearly but he finds difficulty in reading a book. Name the disease.
45. Distinguish between presbyopia and hypermetropia.
46. A hypermetropic person can see objects clearly at a minimum distance of 150 cm. He has to read typed material at a distance of 25 cm. What corrective lens is needed?
47. Why the danger signals are red in colour?
48. What is presbyopia? Name the type of lens which can be used to correct presbyopia.
49. A person suffering from the eye-defect myopia can see clearly only upto a distance of 2 m. What is the nature and power of lens required to rectify this defect?
50. What happens to the image distance in the eye when we increase the distance of object from the eye?

3 mark questions

51. What is a rainbow? How is a rainbow produced?

52. The near point of a person is at 40 cm from the eye. Find the power of the lens he should use while reading at 25 cm.
53. The sun is visible to us about 2 minutes before actual sunrise and about 2 minutes after the actual sunset. Give reason.
54. Draw a ray-diagram to show the refraction of light through a glass prism. On this diagram mark: (a) incident ray (b) emergent ray, and (c) angle of deviation.
55. A person wears glasses of power -2.5 D. Is the person far sighted or near sighted? What is the far point of the person without glasses?
56. How do you account for the red colour of the sun during sunrise and sunset?
57. The near point of a person is at 40 cm from the eyes. Find the power of lens he should use while reading at 25 cm.
58. What is presbyopia? What cause presbyopia? How is presbyopia corrected?
59. A person with a defective eye-vision is unable to see the object nearer than 1.5 m. He wants to read books at a distance of 30 cm. Find the nature, focal length and power of the lens he needs in his spectacles.
60. A student finds the writing on the blackboard blurred and unclear when sitting on the last bench of the classroom. He however sees the same writing clearly when he sits on the front bench. a) Name the defect of vision he is suffering from. Also list two causes of this defect. b) Name the kind of lens for the correction of this eye-defect. Draw the ray diagram to illustrate how this lens helps him to see clearly.
61. Why does a hypermetropia person prefer to remove his spectacles while looking at the sky. Explain.
62. Explain the terms 'Near point' and 'Far point'. How are these affected by the defect called presbyopia? How is this defect removed?
63. (a) Why does sky appear blue?
(b) Why does the sun appear red at sunset/sunrise?

5 mark questions

64. Explain the refraction of light through a prism. What are angle of deviation and angle of emergence? How are these angles related to the angle of incidence and the angle of prism?

65. Explain Myopia with the help of suitable ray diagrams. How can this defect of vision be corrected? A boy uses spectacles of focal length-50 cm. Name the defect of vision he is suffering from. Compute that power of this lens.
66. What is long sightedness? List two causes for development of long sightedness. Describe with the ray diagram, how this defect may be corrected by using spectacles?
67. What is short sightedness? List two causes for development of short-sightedness. Describe with the ray diagram, how this defect may be corrected by using spectacles?

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