



INDIAN SCHOOL AL WADI AL KABIR



Class: X	DEPARTMENT OF SCIENCE: 2026-27 SUBJECT: PHYSICS	DATE: 26/08/2026
WORKSHEET NO: 3 (WITH ANSWERS)	TOPIC: HUMAN EYE AND THE COLOURFUL WORLD	A4 FILE FORMAT (PORTFOLIO)
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

OBJECTIVE TYPE QUESTIONS (1 MARK)

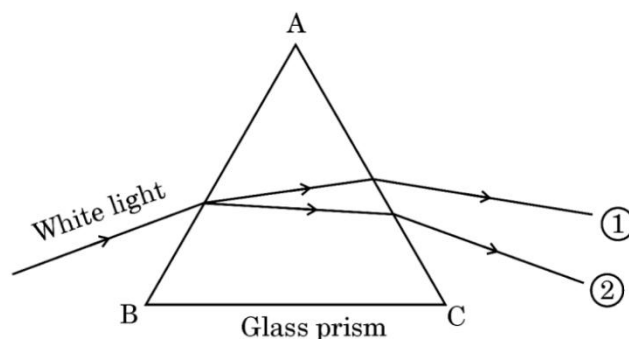
- Vision defect far-sightedness is found in the eye defect named as: (CBSE 2026)
 - Myopia and cataract
 - Myopia and hypermetropia
 - Presbyopia and hypermetropia
 - Presbyopia and myopia
- Which of the following options is the correct sequence of colours from top to bottom on the screen? (CBSE 2026)
 - Red, Green, Yellow, Violet, Blue
 - Red, Yellow, Green, Blue, Violet
 - Violet, Blue, Green, Yellow, Red
 - Violet, Red, Green, Yellow, Blue
- Observe the given ray diagram showing refraction through a prism and choose the correct option for the colour of rays 1 and 2: (CBSE 2026)

Colour of ray 1

colour of ray 2

- Blue
- Green
- Red
- Violet

- Red
- Yellow
- Violet
- Red



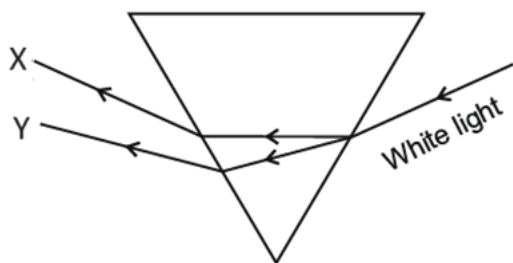
In bifocal lenses used for the correction of presbyopia:

- the upper portion is of convex lens for the near vision and lower part is of concave lens for the distant vision.
- the upper portion is of convex lens for the distant vision and lower part is of concave lens for the near vision.
- the upper portion is of concave lens for the near vision and lower part is of convex lens for the distant vision.

- d) the upper portion is of concave lens for the distant vision and lower part is of convex lens for the near vision.
- 4) A person gets out in the sunlight from a dark room. How does his pupil regulate and control the light entering in the eye?
- The size of pupil will decrease, and less light will enter the eye.
 - The size of pupil will decrease, and more light will enter the eye.
 - The size of pupil will remain the same, but more light will enter the eye.
 - The size of pupil will remain the same, but less light will enter the eye.
- 5) When white light enters a glass prism from the air, the angle of deviation is least for the pair of eye parts responsible for admitting different amount of light in to the eyes is (CBSE 2026)

- Iris and pupil
- Ciliary muscles and pupil
- Retina and Iris
- Ciliary muscles and cornea

- 6) A person went for a medical check-up and found that the curvature of his eye lens was increasing. Which defect is he likely to suffer from?
- Myopia
 - Presbyopia
 - Cataract
 - Hypermetropia
- 7) The part of human eye which controls the amount of light entering into it.
- Iris
 - Cornea
 - Ciliary muscles
 - Pupil
- 8) In the diagram given below X and Y are the end colors of the spectrum of white light. The color of Y represents the.



- Color of sky as seen from Earth during the day.
 - Color of the sky, as seen from the moon.
 - Color used to paint the dangerous signals.
 - Color of sun at the time of noon.
- 9) What happens to the pupil of the eye when the light is very bright?
- Size of the pupil becomes small.
 - Size of the pupil becomes big.
 - Size of the pupil remains same.
 - Size of the pupil becomes double.
- 10) Hotter air has refractive index: (Choose the most appropriate option)
- Equal to the cooler air
 - Higher than cooler air
 - Lower than cooler air

- d) None of these
- 11) The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is due to
- Presbyopia
 - Accommodation
 - Near-sightedness
 - Far-sightedness
- 12) When a beam of white light passes through a region of very fine dust particles, the colour of light that scatters the most in that region is:
- Orange
 - Blue
 - Yellow
 - Red

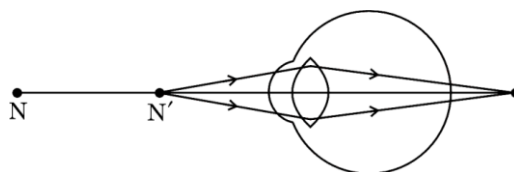
ASSERTION AND REASONING TYPE OF QUESTIONS (1 MARK):

DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- Both A and R are true, and R is the correct explanation of A.
 - Both A and R are true, and R is not the correct explanation of A.
 - A is true but R is false.
 - A is false but R is true
- 13) **Assertion (A):** Hypermetropia is the defect of the eye in which farther objects are seen clearly but not nearer objects.
Reason (R): Hypermetropia is corrected by using converging lens.
- 14) **Assertion (A):** When ciliary muscles contract, the eye lens becomes thin.
Reason (R): Ciliary muscles control the power of the eye lens.
- 15) **Assertion (A):** A rainbow is always formed in the sky after a rain shower and in the same direction as sun.
Reason (R): Water droplets act like tiny prisms.

VERY SHORT ANSWER TYPE OF QUESTIONS: (2 MARK)

- 16) (i) How does the change in curvature of the eye lens helps us in the process of seeing the nearby objects clearly?
 (ii) State the range of the power of accommodation of a normal human eye.
- 17) A person uses convex lens spectacles. What vision defect does he have? Draw a diagram (i) to show the defective eye (ii) to show the correction with the lens.
- 18) Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.
- 19) Study the given diagram and answer the questions that follow: Write the name of the eye defect shown in the diagram. Where is the image formed in this eye defect with respect to the retina of the eye? (b) List two causes of this eye defect. (c) With the help of a diagram, show how this eye defect of vision is corrected.
- 20) A convex lens made of glass forms a sharp image on the screen for a particular position of an object with respect to the lens. A human eye lens is also a convex lens, but it can form sharp images on the retina of eye for different positions of the objects. Explain, why?
- 21) Give reasons:



- (i) The sky appears dark to passengers flying at a very high altitude.
(ii) Danger signals installed at airports and at the top of tall buildings are of red colour.
- 22) What is a rainbow? "We see a rainbow in the sky only after the rainfall." Why?

SHORT ANSWER TYPE OF QUESTIONS (3 MARK):

- 23) Due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens a certain defect of vision arises. Write the name of this defect. Name the type of lens required by such persons to improve the vision. Explain the structure and function of such a lens.
- 24) A person uses lenses of +2.0 D power in his spectacles for the correction of his vision.
(a) Name the defect of vision the person is suffering from.
(b) List two causes of this defect.
(c) Determine the focal length of the lenses used in the spectacles.
- 25) The near point of a hypermetropic person is 75 cm. Calculate the focal length and power of the lens used in his spectacles.

LONG ANSWER TYPE OF QUESTIONS (5 MARK):

- 26) (a) A student is unable to see clearly the words written on the blackboard placed at a distance of approximately 3 m from him. Name the defect of vision of the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.
(b) Why do stars twinkle? Explain.
- 27) (a) A student suffering from myopia is not able to see distinctly the object placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams explain.
i. Why the student is unable to see distinctly the objects placed beyond five 5 m from his eyes.
ii. The type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.
(b) If in this case the numerical value of the focal length of the corrective lens is 5 m, find the power of the lens as per the new Cartesian sign convention.

CASE STUDY TYPE OF QUESTIONS (4 MARK):

- 28) Aarush is a keen observer and loved the spectacular colours in a rainbow. He also observed the same pattern when he allowed sunlight to pass through a glass prism. He guessed that it is due to the inclined refracting surfaces of a glass prism which is responsible for showing such exciting phenomenon. Whereas, no such phenomenon was observed when light passes through a glass slab.



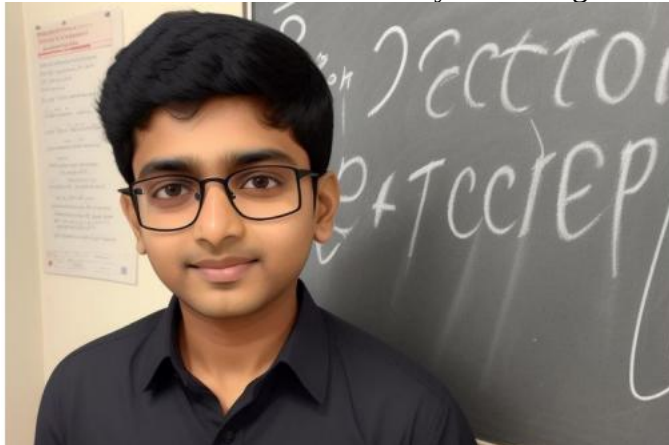
- a) Name the phenomenon which could explain the formation of a rainbow.
b) What is the band of colours known as? Explain the cause of formation of band of colours?

c) Why don't we observe similar band of colours when light passes through a glass slab?

OR

d) Describe the formation of a rainbow in the sky with the help of a diagram.

29) Aditya, who was a backbencher in class, started complaining of frequent headaches. His parents took him to the nearest clinic and the doctor referred him to the eye specialist. The eye specialist tested his vision and asked Aditya whether he was able to read whatever the teacher wrote on the black board clearly or not. He replied in the negative. The doctor told his parents about the defect of vision that Aditya was suffering from and advised corrective glasses. After wearing the glasses, Aditya was now able to read the black board clearly and also got rid of his headache.



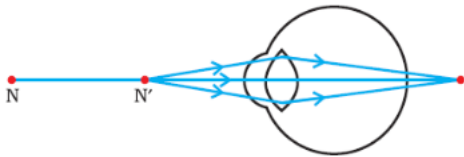
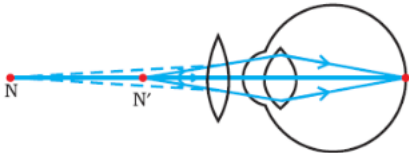
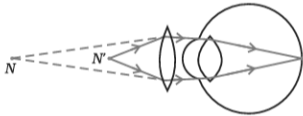
- a) What type of defect is Aditya suffering from? What are the causes of this defect?
b) Where is the image formed in Aditya's eyes? What type of lens is required to correct this defect?
c) Draw the (i) defected eye of Aditya (ii) correction for this defect.

OR

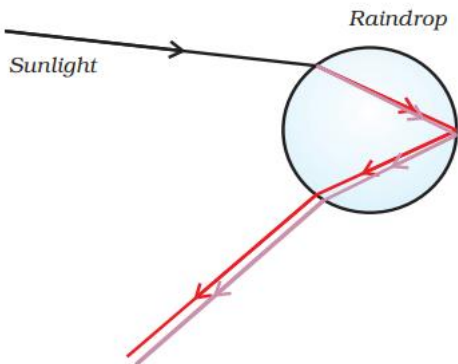
- d) The far point of a myopic person is 50 cm in front of the eyes. What will be the nature and power of the lens required to correct their problem?

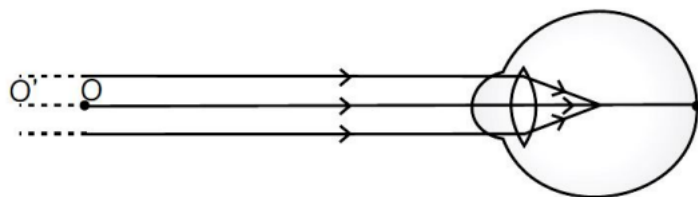
ANSWER KEY

1	(c) Presbyopia and hypermetropia
2	(b) Red, Yellow, Green, Blue, Violet
3	(c) Red Violet
4	d) the upper portion is of concave lens for the distant vision and lower part is of convex lens for the near vision.
5	a) The size of pupil will decrease, and less light will enter the eye
6	(A) Iris and pupil
7	a) Myopia
8	a) Iris
9	c) Color used to paint the dangerous signals.
10	a) Size of the pupil becomes small.
11	c) Lower than cooler air
12	b) Accommodation
13	b) Blue
14	a) Both A and R are true, and R is the correct explanation of A.
15	d) A is false but R is true
16	d) A is false but R is true

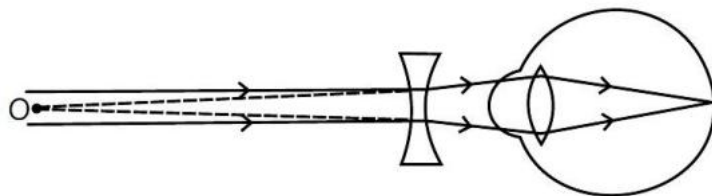
17	(i) While looking at objects nearer to eye, the curvature of the eye lens increases. Consequently, the focal length of the eye lens decreases. (ii) From 25cm (near point) to infinity (far point)
18	Hypermetropia (farsightedness) occurs when a person has difficulty seeing nearby objects clearly, while distant objects are clear. This happens because the light entering the eye focuses behind the retina. (i)  (ii) 
19	Tyndall effect is shown by colloidal particles because the colloidal particles size are roughly equal to the wavelength of the light. Four instances of observing tyndall effect are: (i) In fog. (ii) When light passes through canopy in forest. (iii) Blue colour of the sky. (iv) When light passes through the milk.
20	(a) Hypermetropia/ Far -Sightedness Behind the retina. (b) Focal length of the eye lens is too long. The eye ball has become too small.  (c)
21	The human eye lens can form sharp images at different distances by changing its focal length through accommodation, allowing it to focus on both near and far objects. The glass convex lens has a fixed focal length, and it can form sharp images only at specific distances. It cannot accommodate like the human eye.
22	(i) Scattering of light takes place because of the particles present in the atmosphere. At high altitude, the atmospheric medium is rarer so the scattering of light taking place is very low. Hence, the sky appears dark to passengers flying at high altitudes. (ii) Red colour has the longest wavelength and it deviates the least, hence, danger signals installed at airports and at the top of tall buildings are of red colour so that they can be easily seen from a distance.
23	A rainbow is a natural spectrum of light appearing in the sky when sunlight passes through raindrops. A rainbow forms when sunlight is refracted, internally reflected, and dispersed by water droplets in the air. Rainwater droplets act as prisms, breaking white light into its spectrum of colors.
24	The defect of vision that arises due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens is presbyopia. Most people find it difficult to see

	nearby objects comfortably and clearly without using corrective lenses. This is corrected by using convex lens of appropriate power. However, sometimes people may suffer from both myopia and hypermetropia. This can be corrected by using a bifocal lens. A bifocal lens consists of two parts – the upper part is concave lens and lower part is convex lens. The upper part is for viewing distant objects and the lower part facilitates near vision.
25	a) The person is suffering from hypermetropia (farsightedness), a condition where nearby objects appear blurry while distant objects are clear. b) Shortening of the eyeball, increase in the focal length of the eye lens. c) $P = \frac{1}{f}$ $f = \frac{1}{P} = \frac{1}{2.0} = 0.5 \text{ m}$
26	$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ $\frac{1}{f} = \frac{1}{-0.75} - \frac{1}{-0.25}$ $\frac{1}{f} = -\frac{1}{0.75} + \frac{1}{0.25}$ $\frac{1}{f} = -\frac{4}{3} + 4$ $\frac{1}{f} = \frac{12}{3} - \frac{4}{3} = \frac{8}{3}$ $f = \frac{3}{8} = 0.375 \text{ m}$ $P = \frac{1}{f}$ $P = \frac{1}{0.375} = +2.67 \text{ D}$
27	(a) His eye is suffering from myopia. Causes of myopia: The two possible causes of this defect are. Increasing the length of the eye ball, as if distance of retina from the eye lens has increased. Decrease in focal length of the eye lens when the eye is fully relaxed. This is as if the ciliary muscles holding the eye lens do not relax a fully and have some tension. This defect can be corrected by using a concave lens of suitable focal length. (b) Twinkling of stars Due to refraction of light, the apparent position of the star is different from the actual position of the star. The different layers of the atmosphere are mobile, and the temperature and the density of layers of atmosphere changes continuously. Hence the apparent position of the star changes continuously. The change in apparent deposition of the star continuously leads to the twinkling of star.
28	(a) This defect may arise due to excessive curvature of the eye lens or elongation of the eye

	ball. (i) A person with this defect has the far point nearer than infinity. Such a person may see clearly up to a distance of a few meters. In a myopic eye, the images of a distant object is formed in front of the retina and not at the retina itself. (ii) This defect can be corrected by using a concave lens of suitable power, a concave lens of suitable power will bring the image back onto the retina, and thus the defect is corrected. (b) Given: focal length, $f = -5 \text{ m}$ $P = 1/f = 1/-0.5 = -0.2 \text{ D}$ The negative sign indicates that it is a diverging lens or concave lens.
29	a) The phenomenon which could explain the formation of rainbow is dispersion or splitting of light into its component colours. b) The band of coloured components of white light is known as spectrum of light. The cause for formation of spectrum of light is that different colours of light bend through different angles with respect to the incident ray as light passes through a prism. c) We don't observe splitting of white light into its component colours when light passes through a glass slab because the refracting surfaces in a glass slab are parallel to each other whereas they are inclined at an angle in a glass prism. OR d) Rainbow: The rainbow is the spectrum of sun light in nature. When the atmosphere is moisture laden heavily (at time of rain), spherical water droplets act as prism and refract the sunlight to lead to the formation of rainbow. Parallel beams of light coming from sun get dispersed at the first surface of water droplet, suffer total internal reflection at the second surface to produce a cone of rays at the observer's eye. The rainbow therefore appears as an arc of circle for an observer on earth. 
30	a) Aditya is suffering from myopia. Myopia is also known as near-sightedness. Aditya can see nearby objects clearly but cannot see distant objects clearly. Causes of Myopia: (i) Elongation of the eye ball (ii) Excessive curvature of eye lens. b) The image of a distant object is formed in front of the retina in case of a myopic person. A concave lens or diverging lens of suitable power is required to bring back the image back on to the retina and hence the defect is corrected. c)



(i) Myopic eye



(ii) Correction for myopia

OR

- d) The far point on myopic person is 50 cm, As the focal length is always negative in concave lens. focal length (f) = $-50 \text{ cm} = -0.5 \text{ m}$ Power = $1/\text{focal length (in m)}$
 $\Rightarrow P = 1/(-0.5) \Rightarrow P = -2 \text{ D}$ Therefore, concave lens of power (2D) is required to correct the problem.

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