



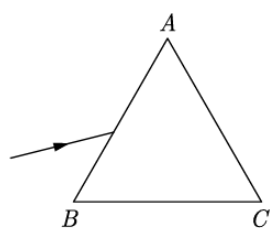
INDIAN SCHOOL AL WADI AL KABIR



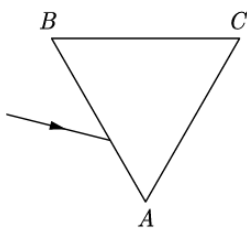
Class: X	DEPARTMENT OF SCIENCE: 2024-25 SUBJECT: PHYSICS	DATE: 13-08-2024
WORKSHEET NO: 3 (WITH ANSWERS)	TOPIC: HUMAN EYE AND THE COLOURFUL WORLD	A4 FILE FORMAT (PORTFOLIO)
CLASS & SEC:	NAME OF THE STUDENT:	ROLL NO.

OBJECTIVE TYPE QUESTIONS (1 MARK)

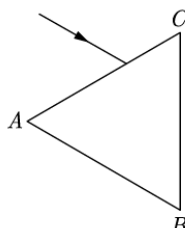
- 1) A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in Figure. In which of the following cases, after dispersion, the third colour from the top corresponds to the colour of the sky?



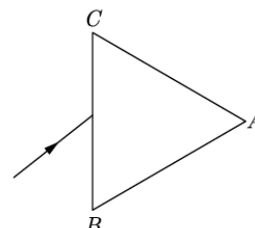
(i)



(ii)



(iii)

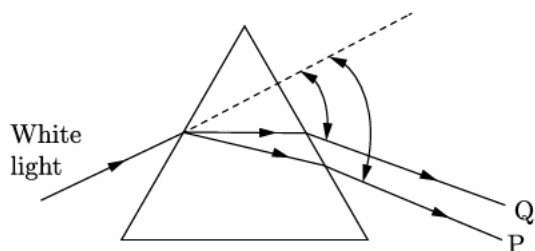


(iv)

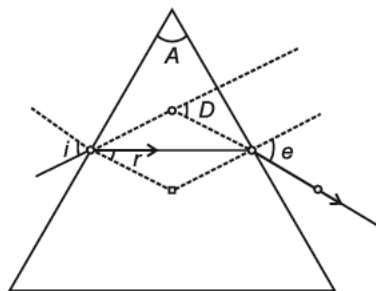
- a) (i)
b) (ii)
c) (iii)
d) (iv)
- 2) The persistence of vision for human eye is
- a) 1/10th of a second
b) 1/16th of a second
c) 1/6th of the second
d) 1/18th of a second

- 3) The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because, among all other colors, the red light
- a) is scattered the most by smoke or fog
 - b) is scattered the least by smoke or fog
 - c) is absorbed the most by smoke or fog
 - d) moves fastest in the air
- 4) In bifocal lenses used for the correction of presbyopia:
- a) the upper portion is of convex lens for the near vision and lower part is of concave lens for the distant vision.
 - b) the upper portion is of convex lens for the distant vision and lower part is of concave lens for the near vision.
 - c) 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.
- 5) A person gets out in the sunlight from a dark room. How does his pupil regulate and control the light entering in the eye?
- a) The size of pupil will decrease, and less light will enter the eye
 - b) The size of pupil will decrease, and more light will enter the eye
 - c) The size of pupil will remain the same, but more light will enter the eye
 - d) The size of pupil will remain the same, but less light will enter the eye
- 6) Which of the following statement is not true for scattering of light?
- a) Color of the scattered light depends on the size of the particles of the atmosphere.
 - b) Red light is least scattered in the atmosphere.
 - c) Scattering of light takes place as various colors of white light travel with different speeding air.
 - d) The fine particles in the atmospheric air scatter the blue light more strongly than red, so the scattered blue light enters our eyes.
- 7) The focal length of the eye lens increases when eye muscles.
- a) are relaxed and lens becomes thinner
 - b) contract and lens becomes thicker

- c) are relaxed and lens becomes thicker
- d) contract and lens becomes thinner.
- 8) In the following diagram showing dispersion of white light by a glass prism, the colours 'P' and 'Q' respectively are

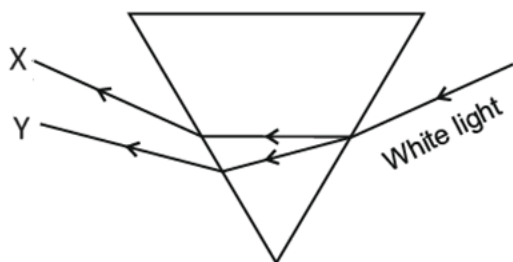


- a) Red and Violet
- b) Violet and Red
- c) Red and Blue
- d) Orange and Green
- 9) In the following Ray diagram, the correctly marked angles are. (CBSE 2016)



- a) $\angle i$ and $\angle e$
- b) $\angle A$ and $\angle D$
- c) $\angle i$, $\angle e$ and $\angle D$
- d) $\angle r$, $\angle A$ and $\angle D$
- 10) The light sensitive cells of retina which are sensitive to the intensity of light are
- a) Cones
- b) Rods
- c) Both rods and cones
- d) None of these

- 11) In the diagram given below X and Y are the end colors of the spectrum of white light. The color of Y represents the. (CBSE 2021)



- a) Color of sky as seen from Earth during the day.
b) Color of the sky, as seen from the moon.
c) Color used to paint the dangerous signals.
d) Color of sun at the time of noon.
- 12) What happens to the pupil of the eye when the light is very bright?
- a) Size of the pupil becomes small.
b) Size of the pupil becomes big.
c) Size of the pupil remains same.
d) Size of the pupil becomes double.
- 13) A student very cautiously traces the path of a ray through a glass lap for different values of the angle of incidence. He then measures the corresponding values of the angle of Refraction and the angle of emergence for every value of the angle of incidence. On analyzing these measurements of angles, his conclusion would be, (CBSE 2017)
- a) $\angle i > \angle r > \angle e$
b) $\angle i = \angle e > \angle r$
c) $\angle i < \angle r < \angle e$
d) $\angle i = \angle e < \angle r$
- 14) The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is due to
- a) Presbyopia
b) Accommodation
c) Near-sightedness
d) Far-sightedness

- 15) The colour that is scattered the least by the tiny particles and the atoms/ molecules of the atmosphere is
- a) Violet
 - b) Green
 - c) yellow
 - d) 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:

- a) Both A and R are true, and R is the correct explanation of A.
 - b) Both A and R are true, and R is not the correct explanation of A.
 - c) A is true but R is false.
 - d) A is false but R is true
- 16) **Assertion:** The light of violet colour deviates the least and the light of red colour the most, while passing through a prism.
Reason: For a prism material, refractive index is highest for red light and lowest for the violet light
- 17) **Assertion:** Sunlight reaches us without dispersion in the form of white light and not as its components.
Reason: Dispersion takes place due to variation of refractive index for different wavelength but in vacuum the speed of light is independent of wavelength and hence vacuum is a non-dispersive medium.
- 18) **Assertion:** Planets do not twinkle.
Reason: Planets do not show the phenomenon of scattering.

VERY SHORT ANSWER TYPE OF QUESTIONS: (1 and 2 MARK)

- 19) What happens to the image distance in the eye when we increase the distance of an object from the eye?
- 20) State one function of iris in human eye.
- 21) Which part of the human eye provides most of the refraction for the light rays entering the eye?
- 22) What is the angle between the two lateral faces of a prism called?
- 23) How would the sky appear in the absence of earth's atmosphere?
- 24) Define the term power of accommodation. Write the modification in the curvature of the eye lens which enables us to see the nearby objects clearly. (CBSE 2019)
- 25) A star at times appears bright and at times fainter. What is the effect called? State the reason for this effect? (CBSE 2012)
- 26) A person with a myopic eye cannot see objects beyond 1.2 m distinctly. What should be the corrective lens used to restore proper vision? (CBSE 2011)

27) Draw a diagram to show dispersion of white light by a glass prism. What is the cause of this dispersion? (CBSE 2011)

SHORT ANSWER TYPE OF QUESTIONS (3 MARK):

28) Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect. (CBSE 2020)

29) Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) monochromatic light, and (ii) white light passes through (a) glass slab and (b) glass prism? (CBSE 2020)

30) What is hypermetropia? State the two causes of hypermetropia. With the help of ray diagrams, show:
(i) the eye defect hypermetropia
(ii) correction of hypermetropia by using a lens. (CBSE 2009)

LONG ANSWER TYPE OF QUESTIONS (5 MARK):

31) (a) Write the function of each of the following parts of human eye:

- i. Cornea
- ii. Iris
- iii. Crystalline lens
- iv. Ciliary muscles

(b) Why does the sun appear reddish early in the morning? Will this phenomenon be observed by an astronaut on the moon? Give reason to justify your answer. (CBSE 2018)

32) (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. (CBSE 2018)

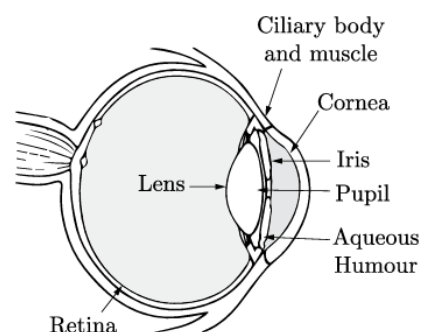
33) (a) A student suffering from myopia is not able to see distinctly the object placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams explain.

- i. Why the student is unable to see distinctly the objects placed beyond 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. (CBSE 2017)

CASE STUDY TYPE OF QUESTIONS (4 MARK):

34) The human eye is like a camera. Its lens system forms an image on a light-sensitive screen called the retina. Light enters the eye through a thin membrane called the cornea. It forms the transparent bulge on the front surface of the eyeball as shown in the figure. The crystalline lens merely provides the finer adjustment of focal length required to focus objects at different distances on the retina. We find a structure called iris behind the cornea. Iris is a dark muscular diaphragm that controls the size of the pupil. The pupil regulates and controls the amount of light entering the eye.



There are mainly three common refractive defects of vision. These are (i) myopia or near-sightedness,

(ii) hypermetropia or far-sightedness, and (iii) Presbyopia. These defects can be corrected by the use of suitable spherical lenses.

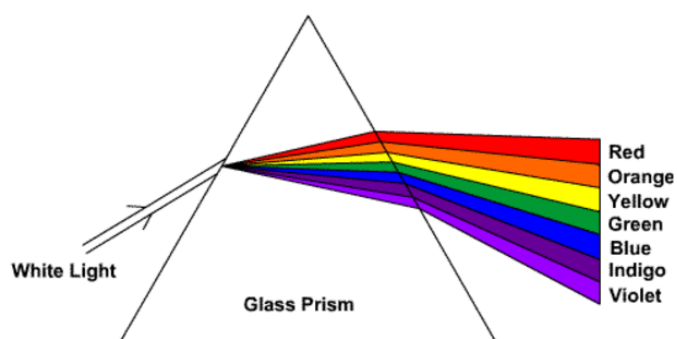
(i) What is the function of pupil in the human eye?

(ii) What is the far point and near point of human eye with normal vision?

(iii) A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from?

(iv) What is the function of iris in human eye?

35) Newton found that when a beam of white light passes through a prism it is spread out by the prism into a band of all the colours of the rainbow from red to violet. The band of colours is called a spectrum and the separation of the colours by the prism is known as dispersion. He concluded that white light is a mixture of light of various colours and identified red, orange, yellow, green, blue, indigo and violet. All colours of light travel at the same speed in a vacuum. When they enter a transparent substance like glass, they all slow down but by different amounts. Because they slow down, they are refracted but because they slow down by different amounts, different colours are refracted through different angles.



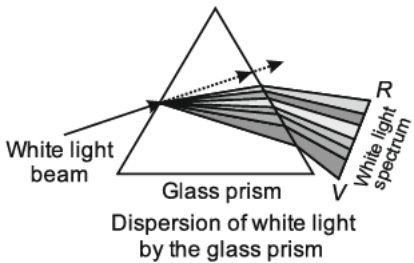
(i) Where in nature can you find evidence that white sunlight may be made of different colours?

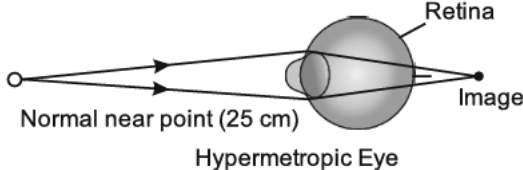
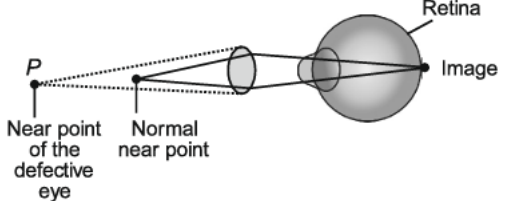
(ii) When a monochromatic light passes through a prism, will it show dispersion?

(iii) What is meant by dispersion of white light? Describe the formation of rainbow in the sky with the help of a diagram.

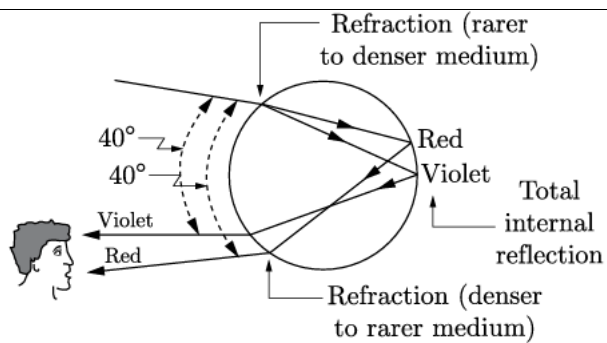
ANSWER KEY

ANSWER KEY	
1	b)(ii)
2	b) 1/16th of a second
3	(b) is scattered the least by smoke or fog
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	c) Scattering of light takes place as various colors of white light travel with different speeding air.
7	e) are relaxed and lens becomes thinner
8	b) Violet and Red
9	d) $\angle r$, $\angle A$ and $\angle D$
10	b) Rods

11	c)Color used to paint the dangerous signals.
12	a)Size of the pupil becomes small.
13	b) $\angle i = \angle e > \angle r$
14	b)Accommodation
15	d)Red
16	d)A is false but R is true
17	e) Both A and R are true, and R is the correct explanation of A.
18	c)A is true but R is false.
19	It remains the same
20	The function of the iris in the human eye is to control the size of the pupil and hence the amount of light entering the eye
21	Cornea and Aqueous humour
22	The angle between the two lateral faces of a prism is called angle of the prism.
23	Scattering by molecules of gases in atmosphere makes sky appear blue. In absence of atmosphere on earth, no scattering occurs. So, the sky appears black.
24	The ability of an eye to see the objects from infinity up to 25 centimeter is called power of accommodation. When we look at objects closer to eye, the ciliary muscles contract, this increases the curvature of eye lens.
25	This effect is called twinkling effect, atmospheric refraction is the reason behind this effect. Since the stars are very far, they can be taken as point-sized objects, as the path of rays coming from the stars keep varying due to atmospheric refraction. The apparent position of the stars fluctuates and the amount of light entering our eyes also varies, resulting in a twinkling effect.
26	A person with a myopic eye should use a concave lens of focal length 1.2 m so as to restore proper vision
27	 Different colors of white light bend through different angles with respect to the incident ray as they pass through the prism. Thus the rays of each color emerge along different paths and become distinct. It is the band of distinct colors that we see in a spectrum.
28	The phenomena of scattering of light by the colloidal particles give rise to tyndall effect.

	i. Tyndall effect can be observed when sunlight passes through a canopy of a dense forest. ii. It can be observed when a fine beam of light enters a smoke-filled room through a small hole. iii. Blue color of eye is due to scattering of light by translucent layer over the iris. iv. Milk is a colloidal solution of globules of fat and protein. When a beam of light is directed at a glass of milk, the light is scattered.
29	A rectangular glass slab is a refracting medium with three parallel refracting surfaces, while a glass prism is a refracting medium with two or more nonparallel refracting surfaces. When a monochromatic light passes through a glass slab, it displaces parallel to itself. and when it passes through a glass prism, it gets deviated. When a white light passes through a glass slab, it displaces parallel to itself only. And when white light passes through a glass prism, it gets dispersed and deviated.
30	Hypermetropia is an eye defect in which distant vision is clear while near vision is blurred. Causes of hypermetropia: Shortening of the eyeball that is the eyeball becomes smaller. Increase in focal length of the eye lens. (i)  Hypermetropic Eye (ii) 
31	(a) (i) Cornea: Its function is to act as a window to the world that is to allow the light to enter the eyeball. (ii) Iris: Its function is to control the amount of light entering in the eye. (iii) Crystalline lens: its function is to focus the images of the objects at different distances, clearly on the retina. (iv) Ciliary muscles: its function is to alter the focal length of the crystalline lens so that the image of the objects at various distances is clearly focused on the retina. (b) At the time of sunrise and sunset, the position of the sun is very far from us. The sunlight travels a longer distance through the atmosphere of the earth before reaching our eyes, scattering of blue light is more than the scattering of red light as a result of this, more red light reaches their eyes than any other color. Therefore, at sunset and sunrise, sun appears red. This phenomenon will not be observed by an astronaut on moon, since there is no atmosphere, so no scattering of light takes place. Thus the sun appears dark.
32	(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.
33	(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
34	(i) The pupil regulates and controls the amount of light. (ii) The far point is infinity and near point is about 25 cm of the normal human eye. (iii) The student is suffering from short-sightedness or myopia. (iv) Iris is a dark muscular diaphragm that controls the size of the pupil.
35	(i) Formation of rainbow in the sky (ii) No, it will not show any dispersion but will show deviation. (iii) Dispersion: The process of splitting of white light into its seven constituent colours is called as dispersion. The band of seven colours formed on a screen due to the dispersion of white light is called spectrum of visible light or spectrum of white light. 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.



Prepared by:
Ms Vivette Shirly Lasrado

Checked by:
HoD Science