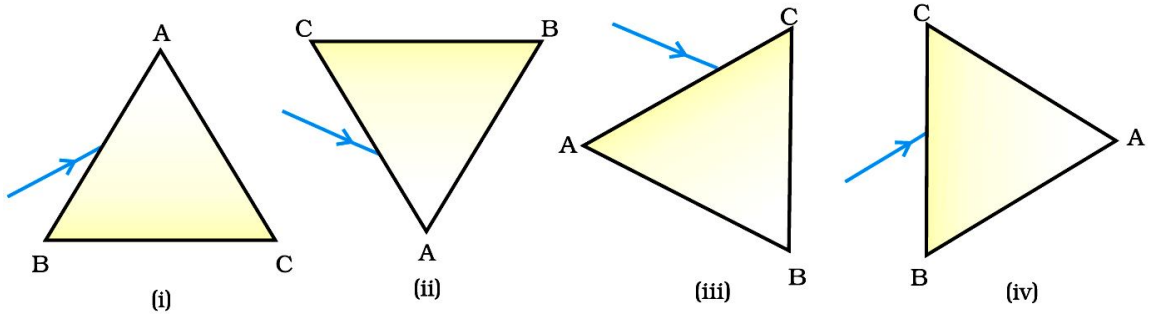
SCIENCE
WORKSHEET_070725
CHAPTER 10 THE HUMAN EYE AND COLOURFUL WORLD

SUBJECT: SCIENCE **MAX. MARKS : 40**
CLASS : X **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

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 below figure. In which of the following diagrams, after dispersion, the third colour from the top of the spectrum corresponds to the colour of the sky?

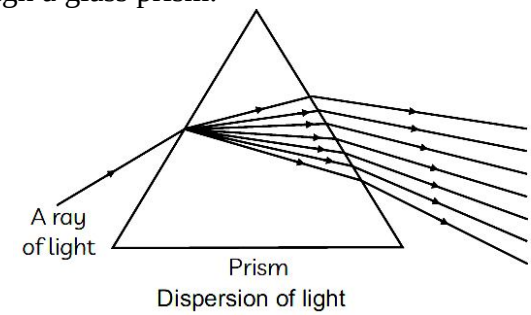


Options:
(a) (i) (b) (ii) (c) (iii) (d) (iv)

2. The sky appears dark to passengers flying at very high altitudes mainly because:
(a) scattering of light is not enough at such heights.
(b) there is no atmosphere at great heights.
(c) the size of molecules is smaller than the wavelength of visible light.
(d) the light gets scattered towards the earth.

3. A student sitting on the last bench can read the letters written on the blackboard but is not able to read the letters written in his text book. Which of the following statements is correct?
(a) The near point of his eyes has receded away.
(b) The near point of his eyes has come closer to him.
(c) The far point of his eyes has come closer to him.
(d) The far point of his eyes has receded away.

4. A ray of light passes through a glass prism.



When do the light rays get refracted?
(I) As the light ray enters the prism from the air.
(II) As the light rays travel inside the prism.
(III) As the light rays move from the prism into the air.
Options:
(a) only (I) (b) only (II) (c) (II) and (III) (d) (I) and (III)

5. Which of the following statements is NOT true for scattering of light?
(a) Colour of the scattered light depends on the size of particles of the atmosphere.
(b) Red light is least scattered in the atmosphere.
(c) Scattering of light takes place as various colours of white light travel with different speed in 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.

6. In an experiment to trace the path of a ray of light through a triangular glass prism, a student would observe that the emergent ray:
(a) is parallel to the incident ray
(b) is along the same direction of incident ray
(c) gets deviated and bends towards the thinner part of the prism
(d) gets deviated and bends towards the thicker part (base) of the prism

7. A person is seeing an object closer to his eyes. What changes in his eyes will take place?
(a) The pupil size will expand
(b) The ciliary muscles will contract
(c) The focal length of eye lens will increase
(d) The light entering in the eye will be more

8. A student traces the path of a ray of light through a glass prism for different angles of incidence. He analyses each diagram and draws the following conclusion:
(I) On entering prism, the light ray bends towards its base.
(II) Light ray suffers refraction at the point of incidence and point of emergence while passing through the prism.
(III) Emergent ray bends at certain angle to the direction of the incident ray.
(IV) While emerging from the prism, the light ray bends towards the vertex of the prism.
Out of the above inferences, the correct ones are:
(a) (I), (II) and (III) (b) (I), (III) and (IV)
(c) (II), (III) and (IV) (d) (I) and (IV)

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** Hypermetropia is the defect of the eye in which only farther objects are seen.
Reason (R): Hypermetropia is corrected by using converging lens.

10. **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.

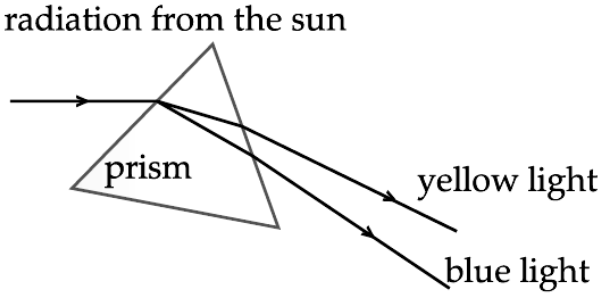
SECTION – B

Questions 11 to 14 carry 2 marks each.

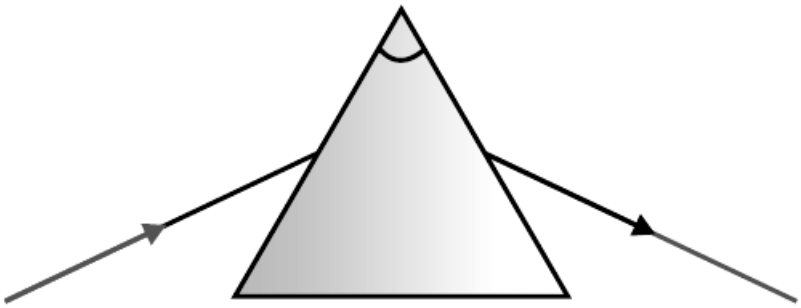
11. Varun instead of copying from the black board used to copy regularly from the notebook of his friend, Sudhir with whom he sat on the same desk. Sudhir told the teacher about it. The teacher asked Varun to get his eyes checked by a doctor and explained to the whole class the reason why Varun copied from Sudhir's notebook.
(a) What in your view, is wrong with Varun's eyes and how can it be corrected?
(b) If the doctor prescribes Varun to use lenses of power – 0.5 D, what is the type of the lenses?

12. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.

13. State the phenomena observed in the given diagram. Explain with reference to the diagram, which of the two lights mentioned above will have the higher wavelength?



14. A student traces the path of a ray of light through a glass prism as shown in the diagram, but leaves it incomplete and unlabelled. Redraw and complete the diagram. Also label on it ∠i, ∠e, ∠r and ∠D.



SECTION – C

Questions 15 to 17 carry 3 marks each.

15. (a) What is visible spectrum?
(b) Why is red used as the stopping light at traffic signals?
(c) Two triangular glass prisms are kept together connected through their rectangular side. A light beam is passed through one side of the combination. Will there be any dispersion? Justify your answer.

OR

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.

16. (i) A person is suffering from both myopia and hypermetropia.
(a) What kind of lenses can correct this defect?
(b) How are these lenses prepared?

(ii) A person needs a lens of power +3D for correcting his near vision and –3D for correcting his distant vision. Calculate the focal lengths of the lenses required to correct these defects.

17. What is scattering of light? Why is the colour of the clear sky blue? Explain.

OR

Tiny droplets of water are responsible for the natural spectrum formed in the sky after a rain shower. What is that spectrum known as? Draw a labelled diagram to show the formation of a rainbow.

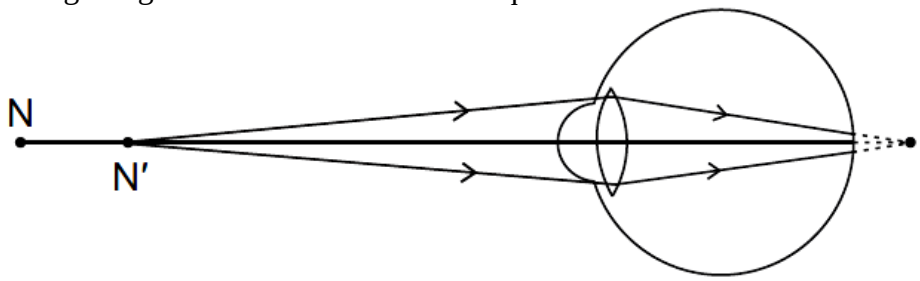
SECTION – D

Questions 18 carry 5 marks.

18. What is atmospheric refraction? Use this phenomenon to explain the following natural events.
(a) Twinkling of stars
(b) Advanced sunrise and delayed sunset.
Draw diagrams to illustrate your answers.

OR

(i) Write the functions of each of the following parts of the human eye:
(a) Cornea (b) Iris (c) Crystalline (Eye) lens
(d) Ciliary muscles (e) Retina
(ii) Study the diagram given below and answer the questions that follow:



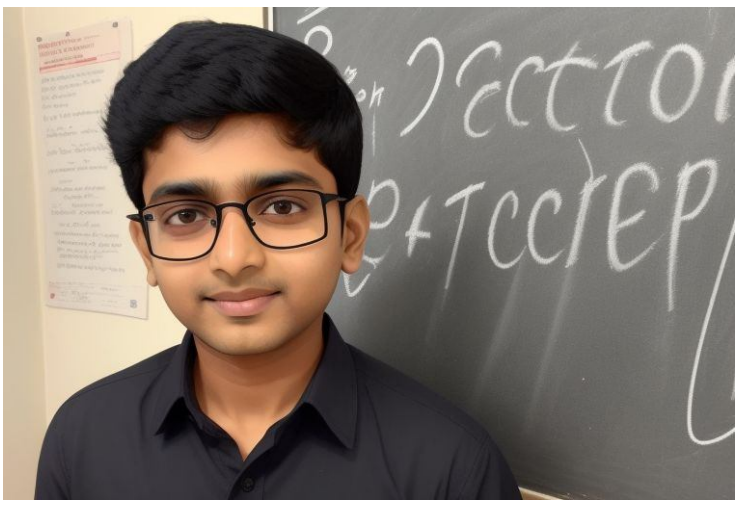
(a) Name the defect of vision represented in the diagram. Give reason for your answer.
(b) With the help of a diagram show how this defect of vision is corrected.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. Read the given passage and answer the questions based on passage and related studied concepts.

Aditya, who was a back bencher 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.

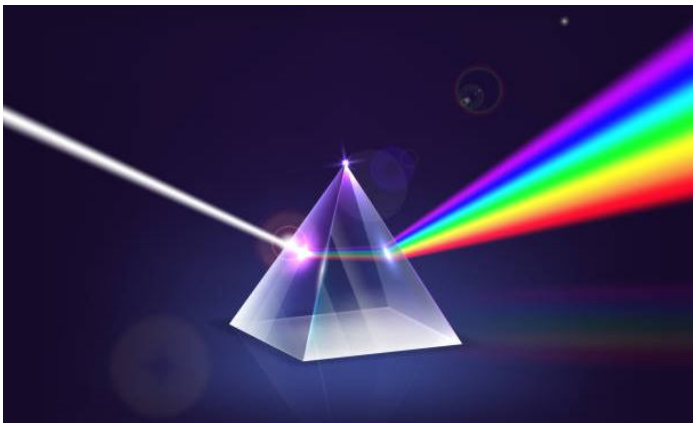
(a) What type of defect is Aditya suffering from? What are the causes of this defect? (2)

(b) Where is image formed in Aditya's eyes? What type of lens is required to correct this defect? Draw the (i) defected eye of Aditya (ii) correction for this defect. (2)

OR

(b) 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? (2)

20. 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 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?