SAMPLE CONTENT

SCIENCE

NCERT

Textbook & Exemplar

Problems - Solutions

Chapterwise & Subtopicwise

LOADED WITH AMAZING FEATURES

Reading between the lines:
To provide additional conceptual info about a particular concept

Caution:
To apprise students of commonly made mistakes while solving mcqs

Connection:
To interlink related concepts from different chapters

Class X

Target Publications® Pvt. Ltd.

Written as per the latest textbook and Exemplar Problems prescribed by the National Council of Educational Research and Training (NCERT).

SCIENCE
NCERT
Textbook & Exemplar
Problems - Solutions
Class X

Salient Features

- Chapter-wise & Subtopic-wise segregation for powerful concept building
- Complete coverage of Intext Questions, Exercise Questions and Exemplar Questions
- Quick Review at the beginning of each chapter to facilitate quick revision
- **Important inclusions**: Reading between the lines, Caution and Connection
- Ⓡ symbol represents Questions that are not part of the rationalized syllabus

Printed at: **Repro India Ltd.,** Mumbai

TEID: 2422

P.O. No. 3508

PREFACE

Target's **"Science NCERT Textbook and Exemplar Problems - Solutions: Class X"** is created as a go-to tool to find solutions to all the Intext questions, Exercise questions and Exemplar problems at one place.

The textbook for subject Science developed by The National Council of Educational Research and Training (NCERT) and Exemplar Problems for Science developed by NCERT and Department of Education in Science & Mathematics (DESM) contain variety of questions in the form of MCQs, Short answers and Long answers. The number of questions designed for a chapter is a blend of theoretical, numerical and graphical questions. These questions not only give ample practice to the students but also challenge them to analyse, evaluate the given data and apply concepts learnt taking a leap in thinking process.

Studying these questions systematically prepares a student for Board examinations and various competitive examinations, as their level of difficulty fosters a strong foundation of the subject.

Each chapter in the book begins with **Quick Review** followed by a table detailing **Subtopic-wise Classification of Questions.** The table enables students to find out the subtopic on which a given NCERT question is based upon. The questions which bank upon two or more concepts are placed at the last in the table as Multi-concepts. The table can be used as a leverage by a student to prepare a chapter subtopic-wise at his own pace.

NCERT Intext Questions are marked with their respective textbook page number so that they can be promptly located by students. NCERT Exercise Questions and NCERT Exemplar Questions are arranged as per their original sequence.

To keep students focused on preparation, topics/subtopics cited in the syllabus of Special Scheme of Assessment 2021-22 questions which are not part of Rationalized syllabus are marked as (R).

In addition to precise solutions, to boost comprehensive understanding of concepts, '**Reading between the lines'** has been provided wherever necessary. The feature is meant to elucidate concept which is not part of answer but vital for the complete understanding of concept or answer. **'Caution'** is added to make students watchful against commonly made mistakes. Also, '**Connections'** are furnished to enable students perceive the interlinking of concepts covered in different chapters and preparing them for possible coalition questions. In the answers, the '**Key Words/Points'** are underlined to highlight the important concepts.

We hope that this book would not only enhance thinking and learning ability of a student but also help building up fundamental knowledge.

- Publisher

Edition: First

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.
Please write to us on: mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

CONTENTS

Note: Ⓡ *symbol represents Questions that are not part of the rationalized syllabus for the Special Evaluation Scheme 2021-22.*

11 The Human Eye and the Colourful World

QUICK REVIEW

- Diameter of eye lens: 2.3 cm
- Distance of distinct vision: 25 cm
- Range of vision: 25 cm to ∞

Human eye

Parts

- Cornea : Thin membrane covering front surface of eyeball.
- Iris : A dark muscular diaphragm
- Pupil : A small central hole in the iris.
- Lens : Biconvex, crystalline body. Provides fine adjustment of focal length
- Retina : A membrane consisting of light sensitive cells.
- Ciliary muscle : A ring of unstriped, involuntary smooth muscle.

Defects of vision

Myopia or near sightedness

A person
- Can see: nearby objects distinctly.
- Unable to see: distant objects clearly.
- Causes:

1. Excessive curvature of lens/ decreased focal length of eye lens.
2. Elongation of the eyeball.

- Remedy: Concave lens

Hypermetropia or long sightedness

A person
- Can see: distant objects distinctly.
- Unable to see: nearby objects clearly.
- Causes:

1. Reduced curvature of lens/ increased focal length of eye lens.
2. Reduction in size of eye ball.

- Remedy: Convex lens

Presbyopia or old age hypermetropia

- Old age people find it difficult to see nearby objects clearly.
- Sometimes they suffer both myopia and hypermetropia.
- Causes:

1. Gradual weakening of ciliary muscles.
2. Reduced flexibility of eye lens.

- Remedy: Bifocal lens

Some natural phenomena of light

Refraction
- Change in the direction of light when it passes from one transparent medium to another.

Effect → **Rainbow**

Effect → Atmospheric refraction Eg.: Twinkling of stars, advanced sunrise, delayed sunset.

Internal Reflection

Effect → **Rainbow**

Dispersion
- Splitting of light into its component colours.

Effect → **Spectrum**

The band of coloured components of a light beam is called its spectrum.

Scattering
- Deflection of light in different directions when it is incident on extremely small particles.

Effect →
- Blue colour of sky
- Reddish or orange colour of sky at sunset or sunrise
- Tyndall effect

SUBTOPIC-WISE CLASSIFICATION OF QUESTIONS

Following table would facilitate students to find out the subtopic on which NCERT questions are based on.

Subtopic No.	Subtopic Name	NCERT Intext Question No.	NCERT Exercise Question No.	NCERT Exemplar Question No.
11.1	The Human Eye	I (1, 3)	2, 3, 4, 5, 8, 9	12, 13, 17, 25
11.2	Defects of Vision and their Correction	I (2, 4)	1, 6, 7	1, 2, 14, 15, 16, 18, 26
11.3	Refraction of Light through a Prism	-	-	27
11.4	Dispersion of White light by a Glass Prism	-	-	3, 5, 8, 19, 20, 22, 29
11.5	Atmospheric Refraction	-	10, 11	6, 21, 30
11.6	Scattering of Light	-	12, 13	4, 7, 9, 10, 11, 23, 24, 28

NCERT INTEXT QUESTIONS

I. Textbook Page. No. 190

R 1. What is meant by power of accommodation of the eye?

Ans: The ability of the eye to form the image of distant as well as nearby objects on the retina by changing the focal length of the eye lens is called power of accommodation.

R 2. 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?

Ans: The person should use concave lens of adequate power.

R 3. What is the far point and near point of the human eye with normal vision?

Ans: For the human eye with normal vision:

i. Far point is infinity (∞).

ii. Near point is 25 cm.

R 4. A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How can it be corrected?

Ans: The child is suffering from myopia. It can be corrected by using a concave lens of suitable power.

Reading between the lines – Q.4.

In myopia, one cannot see distant objects clearly.

NCERT EXERCISE QUESTIONS

R 1. 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.

R 2. The human eye forms the image of an object at its

(A) cornea. (B) iris.
(C) pupil. (D) retina.

R 3. The least distance of distinct vision for a young adult with normal vision is about

(A) 25 m (B) 2.5 cm
(C) 25 cm (D) 2.5 m

R 4. The change in focal length of an eye lens is caused by the action of the

(A) pupil. (B) retina.
(C) ciliary muscles. (D) iris.

Answers:
1. (B) 2. (D) 3. (C) 4. (C)

R 5. A person needs a lens of power – 5.5 dioptre for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting (i) distant vision, and (ii) near vision?

Ans: Given: $P_d = -5.5$ D, $P_n = +1.5$ D

As, $P = \frac{1}{f}$

Focal length of lens required to correct distant vision,

$f_d = \frac{1}{-5.5} = -0.18$ **m**

Focal length of lens required to correct near vision,

$f_n = \frac{1}{1.5} = +0.67$ **m**

Reading between the lines – Q.5.

Negative sign indicates that the lens is concave and positive sign indicates that the lens is convex.

R 6. 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?

Ans: Given: v = – 80 cm, for myopic eye,

$u = -\infty$

Using lens equation,

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

$\frac{1}{-80} - \frac{1}{-\infty} = \frac{1}{f}$

$\therefore \quad f = -80 \text{ cm} = -0.8 \text{ m}$

Negative sign indicates lens is **concave** in nature.

As, $P = \frac{1}{f}$

$P = \frac{1}{-0.8} = -1.25$ **D**

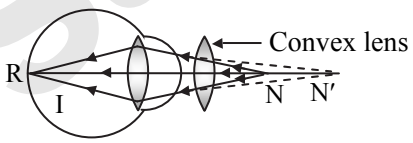
Thus, to correct the problem, lens of power **–1.25 D** should be used.

Connections – Q.6.

In Chapter 10, you have studied lens formula which will help to calculate the focal length and power of the lens.

R 7. Make a diagram to show how hypermetropia is corrected. The near point of a hypermetropic eye is 1 m. What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm.

Ans:



Remedy of hypermetropia

Given: u = – 25 cm,

v = –1 m = –100 cm.

Using lens equation,

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

$\frac{1}{-100} - \frac{1}{(-25)} = \frac{1}{f}$

$\therefore \quad \frac{3}{100} = \frac{1}{f}$

$\therefore \quad f = \frac{100}{3} \text{ cm} = \frac{1}{3} \text{ m}$

Positive value indicates nature of lens is convex.

As, $P = \frac{1}{f}$

$P = \frac{1}{1/3} = +3$ **D**

Thus, to correct this defect, **convex** lens of power **+3 D** should be used.

R 8. Why is a normal eye not able to see clearly the objects placed closer than 25 cm?

Ans:

i. Far and near objects are seen clearly by adjusting curvature of eye lens with the help of ciliary muscles.

ii. Contraction of ciliary muscle decreases focal length of eye lens and allows to see near objects.

iii. At a distance of 25 cm, for a normal eye, maximum accommodation is reached, i.e., ciliary muscle cannot contract further and focal length of eye lens cannot be decreased further.

iv. Thus, placing an object closer than 25 cm causes strain on eyes and it cannot be seen clearly due to limitations of power of accommodation.

R 9. What happens to the image distance in the eye when we increase the distance of an object from the eye?

Ans: The distance between the eye lens and retina is termed as image distance. It is fixed for a given eye. Hence, changing distance of an object from the eye does not produce any change in image distance.

R 10. Why do stars twinkle?

OR

Why do stars appear to twinkle? Explain. ***[CBSE 2015]***

OR

Why do stars twinkle? Explain. ***[CBSE 2018]***

Ans:

i. Stars are point sources of light as they are very far away.

ii. As starlight enters from vacuum into atmosphere, it bends towards the normal due to refraction.

iii. Due to mobility of air and change in the temperature, the atmosphere is not steady.

iv. Hence, the refractive index of air in a given region varies continuously and randomly.

v. When the atmosphere refracts more light towards us, the star is seen bright.

vi. When the atmosphere refracts less light towards us, the star is seen dim.

Thus, due to change in refractive index of atmosphere, stars appear to be twinkling at night.

11. Explain why the planets do not twinkle. ***[CBSE 2015]***

Ans:

i. The planets are much closer to the earth as compared to stars. Hence, planets can be considered as extended sources of light.

ii. Planets being collection of countless point-sized sources of light, at given instant of time, effective variation in intensity of light entering our eye from individual point size source averages out to zero. Hence, twinkling is not observed for planets.

12. Why does the sun appear reddish early in the morning?

Ans:

i. During sunrise, when the sun is very close to the horizon, the sunlight has to travel a longer path through atmosphere to reach the observer.

ii. The thickness of the atmosphere is more between the horizon and the observer.

iii. Therefore, at the time of sunrise, the blue and violet colours are scattered away from the path of sunlight and the light that reaches the observer is mostly red.

Hence, the sun appears reddish early in the morning.

13. Why does the sky appear dark instead of blue to an astronaut?

Ans:

i. The sky looks blue from the surface of the earth due to scattering of light through fine particles present in the atmosphere.

ii. At high altitude (i.e., space), there is no atmosphere. Hence, scattering of light does not take place. As a result, sky appears dark instead of blue to an astronaut.

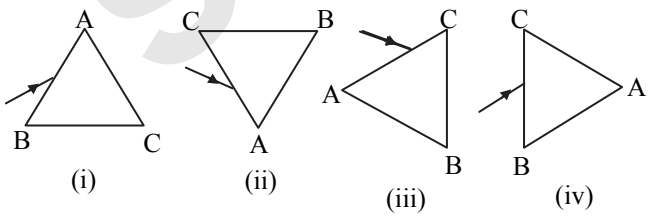
NCERT EXEMPLAR QUESTIONS

Multiple Choice Questions

1. A person cannot see distinct objects kept beyond 2 m. This defect can be corrected by using a lens of power
   (A) + 0.5 D (B) – 0.5 D
   (C) + 0.2 D (D) – 0.2 D

2. 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.

3. 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 below. In which of the following cases, after dispersion, the third colour from the top corresponds to the colour of the sky?



   (A) (i) (B) (ii)
   (C) (iii) (D) (iv)

4. At noon the sun appears white as
   (A) light is least scattered.
   (B) all the colours of the white light are scattered away.
   (C) blue colour is scattered the most.
   (D) red colour is scattered the most.

5. Which of the following phenomena of light are involved in the formation of a rainbow?
   (A) Reflection, refraction and dispersion.
   (B) Refraction, dispersion and total internal reflection.
   (C) Refraction, dispersion and internal reflection.
   (D) Dispersion, scattering and total internal reflection.

6. Twinkling of stars is due to atmospheric
   (A) dispersion of light by water droplets.
   (B) refraction of light by different layers of varying refractive indices.
   (C) scattering of light by dust particles.
   (D) internal reflection of light by clouds.

7. The clear sky appears blue because
   (A) blue light gets absorbed in the atmosphere.
   (B) ultraviolet radiations are absorbed in the atmosphere.
   (C) violet and blue lights get scattered more than lights of all other colours by the atmosphere.
   (D) light of all other colours is scattered more than the violet and blue colour lights by the atmosphere.

8. Which of the following statements is correct regarding the propagation of light of different colours of white light in air?
   (A) Red light moves fastest.
   (B) Blue light moves faster than green light.
   (C) All the colours of the white light move with the same speed.
   (D) Yellow light moves with the mean speed as that of the red and the violet light.

9. 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 colours, 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 air.

10. Which of the following phenomena contributes significantly to the reddish appearance of the sun at sunrise or sunset?
(A) Dispersion of light.
(B) Scattering of light.
(C) Total internal reflection of light.
(D) Reflection of light from the earth.

11. The bluish colour of water in deep sea is due to
(A) the presence of algae and other plants found in water.
(B) reflection of sky in water.
(C) scattering of light.
(D) absorption of light by the sea.

R 12. When light rays enter the eye, most of the refraction occurs at the
(A) crystalline lens.
(B) outer surface of the cornea.
(C) iris.
(D) pupil.

R 13. 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.

R 14. Which of the following statement is correct?
(A) A person with myopia can see distant objects clearly.
(B) A person with hypermetropia can see nearby objects clearly.
(C) A person with myopia can see nearby objects clearly.
(D) A person with hypermetropia cannot see distant objects clearly.

Answers:

1.	(B)	2.	(A)	3.	(B)	4.	(A)
5.	(C)	6.	(B)	7.	(C)	8.	(C)
9.	(B)	10.	(B)	11.	(C)	12.	(B)
13.	(A)	14.	(C)				

Solution:

1. Here, the person is suffering from myopia. Hence, focal length of required concave lens is

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

$$\therefore \quad \frac{1}{-2}-\frac{1}{-\infty}=\frac{1}{f}$$

$\Rightarrow$ f = –2 m (Negative sign arises as lens is concave)

$$\therefore \quad \text{Power } P=\frac{1}{f}=\frac{1}{-2}=-0.5 \text{ D}$$

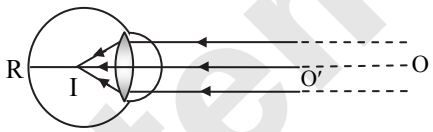
Connections – Q.1.
In Chapter 10, you have studied lens formula which will help to calculate the focal length and power of the convex lens.

Short Answer Questions

R **15. Draw ray diagrams each showing (i) myopic eye and (ii) hypermetropic eye.**

Ans:

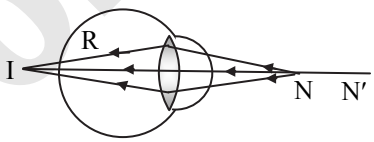
i.



I : Image
O′ : Far point of defective eye
O : Far point of normal eye (∞)

Myopic eye

ii.



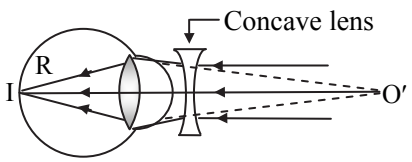
I : Image
N : Normal near point (25 cm)
N′: Near point of defective eye

Hypermetropic eye

R **16. A student sitting at the back of the classroom cannot read clearly the letters written on the blackboard. What advice will a doctor give to her? Draw ray diagram for the correction of this defect.**

Ans:

i. The student is suffering from myopia.
ii. The doctor will advise her to use spectacles made of concave lens of suitable power.
iii. For correction of the defect:



Remedy of myopia

R **17. How are we able to see nearby and also the distant objects clearly?**

Ans: We are able to see nearby and distant objects clearly due to accommodation of eye.

R **18. A person needs a lens of power – 4.5 D for correction of her vision.**

i. What kind of defect in vision is she suffering from?

ii. What is the focal length of the corrective lens?
iii. What is the nature of the corrective lens?

Ans: Given:
Power of lens P = – 4.5 D
∴ Focal length of corrective lens,

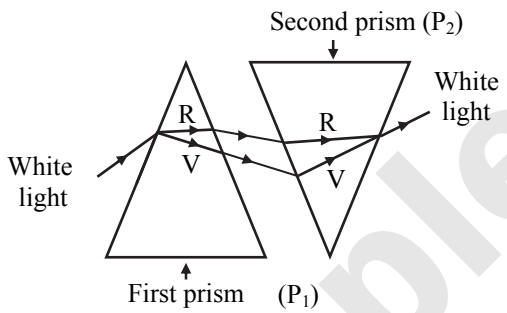
$$f = \frac{1}{P} = \frac{1}{-4.5} = -0.22 \text{ m} = \mathbf{-22 \text{ cm}}$$

Negative sign indicates the lens used is of concave type. Concave lenses are used to correct myopia. Hence, she is suffering from myopia.

Connections – Q.18.
In Chapter 10, you have studied lens formula which will help to calculate the focal length of the lens.

19. How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw the diagram.

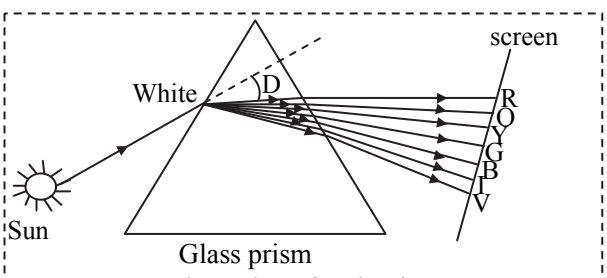
Ans: Second prism should be placed parallel to the first prism but in an inverted position as shown in the figure below, to get a narrow beam of white light as emergent beam.



Connections – Q.19.
In Chapter 10, you have studied how light ray changes its path when passed through a glass slab.

20. Draw a ray diagram showing the dispersion through a prism when a narrow beam of white light is incident on one of its refracting surfaces. Also indicate the order of the colours of the spectrum obtained.

Ans:

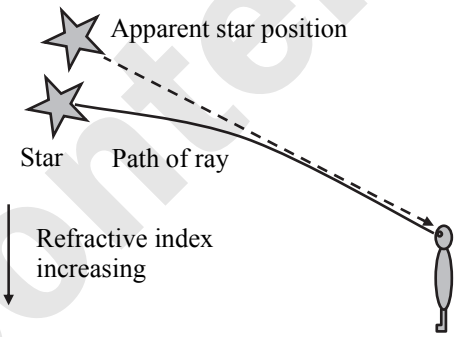


Dispersion of white light

The order of the colours of spectrum with increasing wavelength is VIBGYOR i.e., violet, indigo, blue, green, yellow, orange and red respectively.

R 21. Is the position of a star as seen by us its true position? Justify your answer.
OR
"Stars appear higher than actually are."
Give reason. ***[CBSE 2014]***

Ans:
i. As light rays enter the atmosphere from space, due to higher refractive index of atmosphere, they bend towards normal.
ii. Due to bending, an observer sees the apparent position of the star which is different than its actual position as shown in the figure below.



As a result, stars appear higher than they actually are.

22. Why do we see a rainbow in the sky only after rainfall?

Ans:
i. After rainfall, there are large number of small water droplets present in the atmosphere.
ii. When the sunlight enters these water droplets, water droplets act like small prisms.
iii. They refract and disperse incident sunlight. Then, they reflect it internally inside the droplet and finally again refract it so that the rays come out of the water drop. As a collective effect, rainbow is seen.

Hence, we see rainbow in the sky only after the rainfall.

23. Why is the colour of the clear sky blue?
OR
Why did the clear sky appear blue?
[CBSE 2011, 2012]

Ans:
i. The atmosphere contains molecules of air and other particles having very fine size as compared to the wavelength of visible light.
ii. As red light has wavelength nearly 1.8 times greater than blue light, scattering of light is more effective towards blue end than red end.
iii. As a result, blue light is scattered more and enters our eyes, giving an impression of sky of blue colour of sky.

24. What is the difference in colours of the Sun observed during sunrise/sunset and noon? Give explanation for each. ***[CBSE 2013]***

Ans:

i. At the time of the sunrise and sunset, the sun is very close to the horizon. So sunlight has to travel a longer distance (larger thickness) in the atmosphere than the distance it covers from other positions, to reach the observer.

ii. Due to this, blue and violet colours are scattered away. Hence, these colours do not reach the observer.

iii. The red, orange and yellow colours from the sun reach the observer. Hence, the sun appears reddish-orange at the sunrise and sunset.

iv. In the noon, the sun is overhead and sunlight travels minimum distance. Thus, the light rays pass through relatively smaller thickness of atmosphere causing only small amount of blue light and shorter wavelengths to scatter. Hence, the sun appears white and not reddish orange.

Long Answer Questions

25. Explain the structure and functioning of human eye. How are we able to see nearby as well as distant objects?

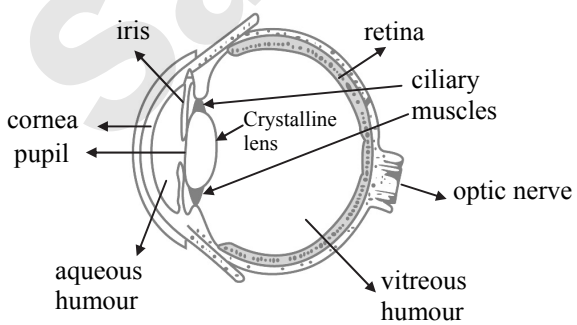
Ans: Structure of human eye:

i. Human eye is basically a lens system which forms an image on light sensitive screen i.e., retina using crystalline lens of convex type.

ii. The human eye is almost spherical in shape with a diameter of about 2.3 cm. This shape is maintained by the pressure of the fluid inside.

iii. The front portion of the bulged eye is covered by a transparent curved tissue (i.e., membrane) called cornea, which refracts most of the light rays entering the eye.

iv. The space behind the cornea is filled with a liquid called aqueous humour.



Parts of human eye

v. The circular, dark diaphragm is called the iris. It decides the colour of eyes. It has a central hole called pupil. Iris controls the size of the pupil.

vi. The pupil regulates the amount of light entering the eye. When light is bright, pupil contracts reducing the amount of light entering the eye. When intensity of light is less, pupil enlarges allowing more light to enter the eye.

vii. Behind the iris, there is a crystalline convex lens held at its place by ciliary muscle. It forms an inverted real image of the object on the retina.

viii. The delicate light sensitive membrane of the eye is called retina, located at the interior wall of the eyeball. Retina is composed of nerves and two types of light sensitive cells, namely rods and cones.

ix. In the retina, rods are more sensitive to light intensity. Cones are more sensitive to colours and distinguish frequency ranges of light. These cells get activated upon illumination and generate electrical signals.

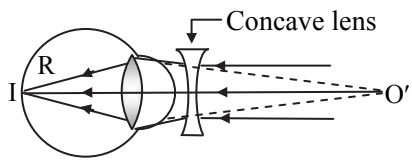
x. Optic nerve carries light signals from retina to brain. The brain interprets signals and processes them such that objects are perceived as they are.

We are able to see nearby and distant objects clearly due to power of accommodation of the eye.

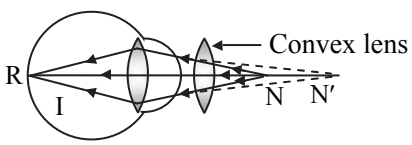
26. When do we consider a person to be myopic or hypermetropic? Explain using diagrams how the defects associated with myopic and hypermetropic eye can be corrected?

Ans: When eye loses its power of accommodation, the person is unable to see the objects distinctly and comfortably. The vision becomes blurry. A person suffering from such a condition is considered as myopic or hypermetropic.

For diagrams:



Remedy of myopia



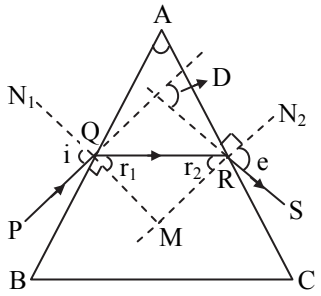
Remedy of hypermetropia

Myopia and hypermetropia can be corrected using concave and convex lens of appropriate power respectively.

27. Explain the refraction of light through a triangular glass prism using a labelled ray diagram. Hence, define the angle of deviation.

Ans:

i. Consider a monochromatic ray of light PQ incident on the refracting face AB of the prism ABC as shown in the figure below.



Glass prism

A = Angle of prism
i = Angle of incidence
r_1 = Angle of refraction at the first surface (AB)
r_2 = Angle of incidence at the second surface (AC)
e = Angle of emergence from the second surface
D = Angle of deviation

ii. When the ray enters the prism, it gets refracted. As it enters from rarer medium (air) to denser medium (prism), it bends towards normal N_1M forming angle of refraction r_1 such that $\angle r_1 < \angle i$.

iii. It travels along path QR through the prism and gets refracted for the second time from the surface AC.

iv. As ray enters from denser medium (prism) to rarer medium (air), it bends away from normal MN_2 forming angle of emergence such that $\angle r_2 < \angle e$.

v. It emerges along RS indicating the incident ray PQ is deviated through an $\angle$ D by the prism.

vi. The angle between the directions of the incident ray and the emergent ray is called angle of deviation.

28. How can we explain the reddish appearance of sun at sunrise or sunset? Why does it not appear red at noon?

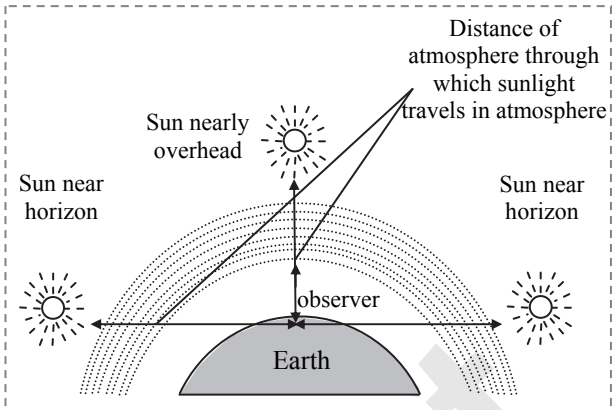
Ans:

i. At the time of the sunrise and sunset, the sun is very close to the horizon. So sunlight has to travel a longer distance (larger thickness) in the atmosphere than the distance it covers from other positions, to reach the observer.

ii. Due to this, blue and violet colours are scattered away. Hence, these colours do not reach the observer.

iii. The red, orange and yellow colours from the sun reach the observer. Hence, the sun appears reddish-orange at the sunrise and sunset.

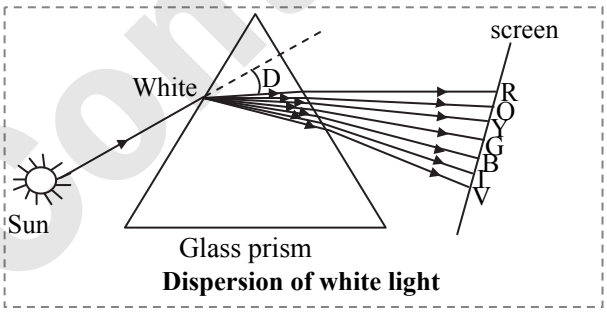
iv. In the noon, the sun is overhead and sunlight travels minimum distance. Thus, the light rays pass through relatively smaller thickness of atmosphere causing only small amount of blue light and shorter wavelengths to scatter. Hence, the sun appears white and not reddish orange.



Sunlight travels through a longer distance in the atmosphere at sunset and sunrise

29. Explain the phenomenon of dispersion of white light through a glass prism, using suitable ray diagram.

Ans:



Glass prism
Dispersion of white light

i. When white light is passed through a prism, it splits up into its constituent colours.

ii. Each colour bends through different angles with respect to incident ray.

iii. Hence, white light disperses into seven colours showing different colours of light.

iv. Out of these seven colours, red colour bends the least and hence, it is at the top of the spectrum.

v. Violet colour bends the most and hence, it is at the bottom of the spectrum.

vi. Each colour emerges out along different paths and becomes distinct.

vii. Thus, a spectrum of seven different colours is obtained.

30. How does refraction take place in the atmosphere? Why do stars twinkle but not the planets?

Ans:

i. Light rays enter from the space into the atmosphere of the earth i.e., from rarer medium to denser medium. Due to higher refractive index of the atmosphere they bend towards the normal and refraction takes place in the atmosphere.

ii. *Refer NCERT Exercise Questions Q.10 and Q.11*

Our Other Interesting Offerrings

X CBSE

- English Grammar
- Mathematics
- Science
- Mathematics MCQ's
- Science MCQ's

Scan the QR code to buy e-book version of Target's Notes on Quill - The Padhai App

NEET & JEE

- Absolute Series
- Challenger Series
- NVT (Numerical Value Type Questions for JEE)
- PSP Series (Previously Solved Question Papers)
- 10 Model Papers (for NEET - UG)
- Previous 9 years NEET Solved Papers

Online Test Series
For a simulated experience of the examination

Visit Our Website

Target Publications® Pvt. Ltd.
Transforming lives through learning.

Address:
2nd floor, Aroto Industrial Premises CHS,
Above Surya Eye Hospital, 63-A, P. K. Road,
Mulund (W), Mumbai 400 080
Tel: 88799 39712 / 13 / 14 / 15
Website: www.targetpublications.org
Email: mail@targetpublications.org

Explore our range of STATIONERY