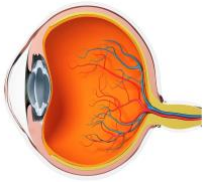
Human Eye and Colourful World



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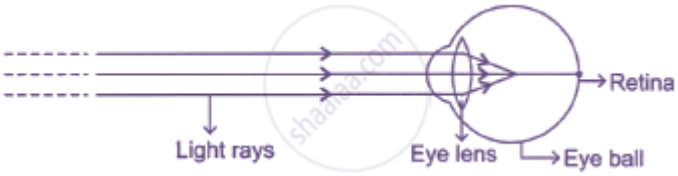
The Human Eye

1. **Write the structure of eye lens and State one role of ciliary muscles in the human eye.[2012 OD,**
2. **What happens to the image distance in the normal human eye when we decrease the distance of an object, say 10 m to 1 m? Justify your answer**
3. **State one function of iris in human eye.**
4. **State one function of pupil in human eye**
5. **What happens to the image distance in the normal human eye when we decrease the distance of an object, say 10 m to 1 m? Justify your answer.**
6. **What is meant by the power of accommodation of an eye?**
7. **What is meant by the far point, near point and the least distance of distinct vision**
8. **Millions of people of the developing countries of the world are suffering from corneal blindness. These persons can be cured by replacing the defective cornea with the cornea of a donated eye. A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact. If you are asked to participate in this mission how would you contribute in this noble cause?**
   - **(i) State the objective of organising such campaigns.**
   - **(ii) List two arguments which you would give to motivate the people to donate their eyes after death.**
9. **Write the function of retina in human eye.**
10. **List the parts of the human eye that control the amount of light entering into it. Explain how they perform this function.**

Defect of Reason and Their Correction

1. **Observe the following diagram and answer the questions following it:**



   - **(i) Identify the defect of vision shown.**
   - **(ii) List its two causes.**
   - **(iii) Name the type of lens used for the correction of this defect.**

2. **A person with a myopic eye cannot see objects beyond 1.2 m directly. What should be the type of the corrective lens used? What would be its power?**
3. **A person is suffering from both myopia and hypermetropia.**
   - **(i) What kind of lenses can correct this defect?**
   - **(ii) How are these lenses prepared?**

   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. What could be his defect of vision? Draw a ray diagram to illustrate this defect of vision.
4. **What eye-defect is myopia? Describe with a neat diagram how this defect of vision can be corrected by using a suitable lens.**

5. **A student cannot see clearly a chart hanging on a wall placed at a distance of 3 m from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length.**
6. **State reasons for Myopia. With the help of ray diagrams, show the**
   (a) image formation by a myopic eye, and
   (b) correction of myopia using an appropriate lens.
7. **What eye defect is hypermetropia? Describe with a ray diagram how this defect of vision can be corrected by using an appropriate lens.**
8.
   (a) What are the values of (i) near point and (ii) far point of vision of a normal adult person?
   (b) A student has difficulty in reading the blackboard while sitting in the last row.

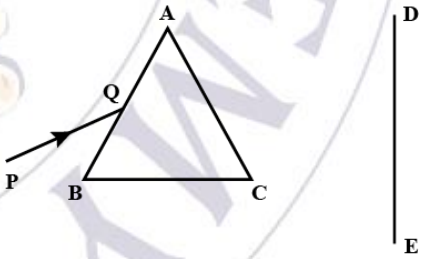
9. **A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate this defect. List its two possible causes. Draw a ray diagram to show how this defect may be corrected using a lens of appropriate focal length**
10. **List two differences in the characteristic properties of the virtual images formed by the two types of spherical lenses (concave and convex). How are these characteristics of the two lenses used in the correction of the two common defects of vision namely myopia and hypermetropia?**
11. **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**
12. **A student is unable to see clearly the words written on the blackboard placed at a distance of approximately 4 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect. Explain the method of correcting this defect. Draw ray diagram for the:**
    (i) defect of vision and also (ii) for its correction,
13. **Write the importance of ciliary muscles in the human eye. Name the defect of vision that arises due to gradual weakening of the ciliary muscles in old age. What type of lenses are required by the persons suffering from this defect to see the objects clearly?**
    Akshay, sitting in the last row in his class, could not see clearly the words written on the blackboard. When the teacher noticed it, he announced if any student sitting in the front row could volunteer to exchange his seat with Akshay. Salman immediately agreed to exchange his seat with Akshay. He could now see the words written on the blackboard clearly. The teacher thought it fit to send the message to Akshay's parents advising them to get his eyesight checked.
    In the context of the above event, answer the following questions:
    Which defect of vision is Akshay suffering from? Which type of lens is used to correct this defect
14. **A student suffering from myopia is not able to see distinctly the objects 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

15. A person is unable to see object distinctly placed within 50 centimetre from his eye
Name the defect of vision the person is suffering from and list its two possible causes.
(b) Draw a ray diagram to show the defect in the above case.
(c) Mention the type of lens used by him for the correction of the defect and calculate its power. Assume that the near point for the normal eye is 25 cm.
(d) Draw a labelled diagram for the correction of the defect in the above case.objects distinctly placed within 50 cm from his eyes.

Refraction / Dispersion Through a Prism

1. **Draw a ray diagram to explain the term angle of deviation.**
   (b) Why do the component colours of incident white light split into a spectrum while passing through a glass prism, explain?
2. **What do you mean by angle of deviation in prism?**
3. **What is rainbow? When and where do we see a rainbow? How is a rainbow formed? Draw a labelled diagram to illustrate the formation of a rainbow.**
4. **What is a spectrum? Why do different coloured rays deviate differently on passing through a glass prism?**
5. **Draw a diagram to show the dispersion of white light by a glass prism. What is the cause of this dispersion?**
   Or, What is meant by the dispersion of white light? State the colour which bends (a) the most (b) the least white passing through a glass prism.[2023
   Or, Draw a labelled ray diagram to illustrate the dispersion of a narrow beam of white light when it passes through a glass prism.
6. **A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram.**
   - **(i) Write the name and cause of the phenomenon observed.**
   - **(ii) Where else in nature is this phenomenon observed?**
   - **(iii) Based on this observation, state the conclusion which can be drawn about the constituents of white light.**



7. **State the cause of dispersion of white light passing through a glass prism. How did Newton show that white light of Sun contains seven colours using two identical glass prisms. Draw a ray diagram to show the path of light when two identical glass prisms are arranged together in inverted position with respect to each other and a narrow beam of white light is allowed to fall obliquely on one of the focus of the first prism**

8. **Nalin and his four friends were sitting on his roof on a pleasant day. All of them were enjoying Ludo. Suddenly Ayush saw seven colours in the sky. He jumped with joy and shouted "Look, there is an Indradhanush in the sky". Then Nalin explained all about the rainbow. After that every one clapped for him.**

(a) What information is given by Nalin to his friends about a rainbow?
(b) Is it possible to obtain rainbow phenomenon on the earth?
(c) Which term is used for the seven colours of the rainbow?
(d) Which colour appears at the top and at the bottom of the rainbow?

9. In the experiment to trace the path of a ray of light through a triangular glass prism,
   (i) if the emergent ray makes an angle of 35° with the second face of prism, then what is the angle of emergence?
   (ii) can the angle of deviation be zero and why?

Ans.(i) The angle of emergence e=90°-35°=55°
(ii) No, because at the second refracting surface of the prism, ray of light moves from denser to rarer medium; it bends away from the normal, i.e., bends towards the base of the prism.

Atmospheric Reflection

1. Explain with the help of a diagram, how we are able to observe the sunrise about two minutes before the Sun gets above the horizon.
2. Explain giving reason why the sky appears blue to an observer from the surface of the earth? What will the colour of the sky be for an astronaut staying in the international space station orbiting the earth? Justify your answer giving reason.
3. Or, The colour of clear sky from the earth appears blue but from the space it appears black. Why?
4. A star appears slightly higher (above) than its actual position in the sky. Illustrate it with the help of a labelled diagram
5. Name the type of particles which act as prisms in the formation of rainbow in the sky
6. What do you mean by dispersion of light?
7. Explain giving reason why the sky appears blue to an observer from the surface of the earth? What will the colour of the sky be for an astronaut staying in the international space station orbiting the earth? Justify your answer giving reason.
8. Or, The colour of clear sky from the earth appears blue but from the space it appears black. Why?
9. What is atmospheric refraction? Use this phenomenon to explain the following natural events.
   (a) Twinkling of stars
   (b) Advanced sun-rise and delayed sun-set Draw diagrams to illustrate your answers.
10. Explain with help of a labelled diagram, the cause of twinkling of stars

Scattering of light

1. Which phenomenon is responsible for making the path of light visible particles of colloid dispersed in air.
2. Give an example of a phenomenon where Tyndall effect can be observed.
3. What is Tyndall effect?
4. What is scattering of light?
5. What is the colour of the clear sky during day- time? Give reason

6. **The sky appears dark instead of blue to an astronaut. State its reason**
7. **Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.**
8. **What will be the colour of the sky when it is observed from a place in the absence of any atmosphere?**
9. **What is the colour of scattered sunlight when the size of the scattering particles is relatively large?**