

CBSE CLASS X
Science (086)QUESTION PAPER
AI-generated question paper

Code: UASCAF

Questions: 36

Maximum Marks: 93

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SELECTIONS USED

Subject	Science
Lessons	10 The Human Eye and the Colourful World
Level of understanding	Thorough understanding
Question selection	Curated chapter coverage (~5 questions per section + 8 synthesis)
Model	claude-sonnet-4-6

Composition — Difficulty: 2 straightforward · 20 medium · 14 deep | Types: 27 Short · 3 Long · 3 MCQ · 2 Very short · 1 Assertion–reason

Q1. medium thorough-understanding § Chapter Introduction [3]

The cornea performs most of the refraction of light entering the eye, yet we still need the crystalline lens. What specific function does the crystalline lens serve that the cornea cannot, and what structure in the eye controls the lens's ability to perform this function?

◆ The Human Eye and the Colourful World**Q2.** medium thorough-understanding § 10.1 THE HUMAN EYE [3]

When you shift your gaze from a distant tree to a book held 25 cm away, describe what happens inside your eye to keep the image focused sharply on the retina. In your answer, name the structure responsible and explain the physical change it undergoes.

◆ The Human Eye and the Colourful World**Q3.** deep thorough-understanding § 10.1 THE HUMAN EYE [3]

Most of the refraction of light entering the eye occurs at the cornea, yet it is the lens that allows us to see objects at varying distances clearly. Why can the cornea not perform this focusing adjustment on its own?

◆ The Human Eye and the Colourful World**Q4.** medium thorough-understanding § 10.1.1 Power of Accommodation [3]

When you shift your gaze from a distant tree to a book held 25 cm away, describe what happens to your ciliary muscles and eye lens. How do these changes together bring the image of the nearby text onto the retina?

◆ The Human Eye and the Colourful World**Q5.** deep thorough-understanding § 10.1.1 Power of Accommodation [3]

A person can read a billboard 50 m away with perfect clarity, but finds the text on her phone blurred when held 15 cm from her eyes. Identify the likely reason for this blurring and explain it in terms of the eye's power of accommodation and the near point of vision.

◆ The Human Eye and the Colourful World

Q6. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [3]

A myopic person can see objects clearly only up to 2 m. Which type of lens is used to correct this defect, and how does it restore normal vision?

◆ The Human Eye and the Colourful World

Q7. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [1]

Both myopia and hypermetropia involve the image not forming on the retina. How does the position of the image differ between the two defects?

◆ The Human Eye and the Colourful World

Q8. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [3]

A student can read the school notice board from across the room but struggles to read his textbook unless he holds it at arm's length. (a) Identify the defect of vision he has. (b) State TWO possible structural reasons for this defect. (c) What kind of corrective lens should he use?

◆ The Human Eye and the Colourful World

Q9. deep thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [2]

A person is unable to see distant objects clearly. State TWO possible structural reasons for this defect of vision. What common optical consequence, in terms of image formation, leads to blurred distant vision in both cases?

◆ The Human Eye and the Colourful World

Q10. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [2]

An elderly person finds it difficult to read a newspaper but can see distant objects clearly without glasses. Which defect of vision is this, and what is its underlying physiological cause?

◆ The Human Eye and the Colourful World

Q11. deep thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [3]

How is presbyopia similar to hypermetropia in its symptoms, and yet different in its cause?

◆ The Human Eye and the Colourful World

Q12. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [2]

A person suffers from both myopia and hypermetropia simultaneously. What type of spectacle lenses would be prescribed for such a person, and how are the two corrective components arranged in these lenses?

◆ The Human Eye and the Colourful World

Q13. deep thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [5]

The near point of a normal young adult is 25 cm, but for a hypermetropic person it is much farther. Explain why the hypermetropic eye fails to see nearby objects clearly, even when the eye lens is fully accommodated.

◆ The Human Eye and the Colourful World

Q14. medium thorough-understanding § 10.2 DEFECTS OF VISION AND THEIR CORRECTION [1]

Which of the following correctly describes the cause of myopia?

- (A) The eyeball is too short, causing the image to form behind the retina.
- (B) The ciliary muscles become permanently relaxed, reducing the lens curvature.
- (C) The focal length of the eye lens is too long, so the image of nearby objects falls behind the retina.
- (D) The eyeball is elongated or the eye lens is too curved, causing the image of distant objects to form in front of the retina.

A The eyeball is too short, causing the image to form behind the retina.

B The ciliary muscles become permanently relaxed, reducing the lens curvature.

C The focal length of the eye lens is too long, so the image of nearby objects falls behind the retina.

D The eyeball is elongated or the eye lens is too curved, causing the image of distant objects to form in front of the retina.

◆ The Human Eye and the Colourful World

Q15. medium thorough-understanding § 10.3 REFRACTION OF LIGHT THROUGH A PRISM [3]

A ray of white light enters a triangular glass prism through one refracting surface and exits through the other. Explain why the ray bends at each surface and why the bending is in opposite directions at the two surfaces. How is this behaviour different from what happens when light passes through a rectangular glass slab?

◆ The Human Eye and the Colourful World

Q16. medium thorough-understanding § 10.3 REFRACTION OF LIGHT THROUGH A PRISM [2]

When light passes through a rectangular glass slab, the emergent ray is parallel to the incident ray. When light passes through a triangular glass prism, the emergent ray is NOT parallel to the incident ray. What feature of the prism is responsible for this difference?

◆ The Human Eye and the Colourful World

Q17. straightforward thorough-understanding § 10.3 REFRACTION OF LIGHT THROUGH A PRISM [1]

In the refraction of light through a triangular glass prism, which of the following correctly describes the angle of deviation?

- (A) The angle between the incident ray and the refracted ray inside the prism
- (B) The angle between the emergent ray and the direction of the original incident ray
- (C) The angle between the two refracting surfaces of the prism
- (D) The angle at which the emergent ray meets the base of the prism

A The angle between the incident ray and the refracted ray inside the prism

B The angle between the emergent ray and the direction of the original incident ray

C The angle between the two refracting surfaces of the prism

D The angle at which the emergent ray meets the base of the prism

◆ The Human Eye and the Colourful World

Q18. straightforward thorough-understanding § 10.4 DISPERSION OF WHITE LIGHT BY A GLASS PRISM [2]

When white light passes through a glass prism, different colours deviate by different amounts. Using this observation, explain how a prism is able to separate white light into its constituent colours, and state which colour undergoes the maximum and minimum deviation.

◆ The Human Eye and the Colourful World

Q19. medium thorough-understanding § 10.4 DISPERSION OF WHITE LIGHT BY A GLASS PRISM [3]

A student passes white light through a prism and sees a spectrum on a screen. She then passes just the red band from this spectrum through a second identical prism. What will she observe, and why?

◆ The Human Eye and the Colourful World

Q20. medium thorough-understanding § 10.4 DISPERSION OF WHITE LIGHT BY A GLASS PRISM [3]

Explain with a labelled ray diagram how a rainbow is formed in the sky after a rain shower. Name all the optical phenomena that occur inside a water droplet and describe the role each plays in producing the coloured arc.

◆ The Human Eye and the Colourful World

Q21. deep thorough-understanding § 10.4 DISPERSION OF WHITE LIGHT BY A GLASS PRISM [1]

A rainbow is always seen in the part of the sky that is opposite to the Sun. Which one of the following correctly explains this?

- (A) Sunlight must enter the water droplets from behind the observer so that internal reflection sends dispersed light back towards the observer's eyes.
(B) The atmosphere refracts sunlight downward, and only the region opposite the Sun is free of atmospheric interference.
(C) Water droplets on the side facing the Sun absorb light rather than dispersing it.
(D) Dispersion only occurs when light travels from a denser medium to a rarer medium, which happens only on the far side of the droplets.

◆ The Human Eye and the Colourful World

Q22. deep thorough-understanding § 10.4 DISPERSION OF WHITE LIGHT BY A GLASS PRISM [5]

Dispersion of white light occurs when it passes through a prism but NOT when it passes through a rectangular glass slab (where the emergent beam is white). Using your understanding of refraction at the two surfaces of each, explain why a prism disperses white light while a glass slab does not.

◆ The Human Eye and the Colourful World

Q23. deep thorough-understanding § 10.5 ATMOSPHERIC REFRACTION [3]

A star near the horizon appears to twinkle more vigorously than a star directly overhead. Using your knowledge of atmospheric refraction, explain why this is so.

◆ The Human Eye and the Colourful World

Q24. medium thorough-understanding § 10.5 ATMOSPHERIC REFRACTION [2]

Why does the Sun appear to rise about 2 minutes before it actually crosses the horizon?

◆ The Human Eye and the Colourful World

Q25. medium thorough-understanding § 10.5 ATMOSPHERIC REFRACTION [2]

Planets, unlike stars, do not appear to twinkle even though they are also very far away. Give a scientific reason for this difference in behaviour.

◆ The Human Eye and the Colourful World

Q26. deep thorough-understanding § 10.5 ATMOSPHERIC REFRACTION [3]

A star near the horizon appears to be at a position slightly higher than its actual position in the sky. Using the concept of atmospheric refraction, explain why this happens.

◆ The Human Eye and the Colourful World

Q27. medium thorough-understanding § 10.6 SCATTERING OF LIGHT [3]

Why does the sky appear blue during the day, but an astronaut at very high altitude sees a dark sky instead?

◆ The Human Eye and the Colourful World

- Q28.** deep thorough-understanding § 10.6 SCATTERING OF LIGHT [3]
A beam of white light passes through a colloidal suspension containing very fine particles. A second colloidal suspension contains much larger particles. How would the colour of the scattered light differ between the two suspensions, and why?
♦ The Human Eye and the Colourful World
- Q29.** medium thorough-understanding § 10.6 SCATTERING OF LIGHT [1]
When sunlight filters through a dense forest canopy containing mist, bright shafts of light become visible. Explain the optical phenomenon responsible for this observation and state what the visibility of these shafts tells us about the size of the particles present in the mist.
♦ The Human Eye and the Colourful World
- Q30.** deep thorough-understanding § (whole-chapter synthesis) [3]
A glass prism disperses white light into a spectrum of colours, but the eye's lens system does not produce rainbow-coloured vision even though both involve refraction. Explain why the eye's lens does not disperse light into colours the way a glass prism does.
♦ The Human Eye and the Colourful World
- Q31.** medium thorough-understanding § (whole-chapter synthesis) [1]
Assertion (A): A person with presbyopia may need bi-focal lenses that combine both a concave and a convex portion.
Reason (R): Presbyopia can involve simultaneous difficulty in seeing both distant and nearby objects clearly.
A Both A and R are true, and R is the correct explanation of A.
B Both A and R are true, but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.
♦ The Human Eye and the Colourful World
- Q32.** medium thorough-understanding § (whole-chapter synthesis) [2]
Stars twinkle when observed from Earth, but the Sun does not appear to twinkle even though it is also a star. Explain why the Sun does not produce a twinkling effect, referring to the relevant physical property that distinguishes it from distant stars as seen from Earth.
♦ The Human Eye and the Colourful World
- Q33.** deep thorough-understanding § (whole-chapter synthesis) [3]
Both the twinkling of stars and the advance sunrise are caused by atmospheric refraction, yet they are observed as very different phenomena. Compare the two, explaining what specific property of the atmosphere is responsible in each case and why the effects differ.
♦ The Human Eye and the Colourful World
- Q34.** deep thorough-understanding § (whole-chapter synthesis) [3]
White light entering a glass prism emerges as a spectrum of colours. Using your knowledge of how different colours of light behave when passing through a medium, predict which colour of light would be most scattered by fine atmospheric particles, and explain how this determines the colour of the sky we see during the day.
♦ The Human Eye and the Colourful World
- Q35.** medium thorough-understanding § (whole-chapter synthesis) [2]
At sunset, the Sun appears red, yet the sky around it may still appear slightly bluish. Briefly explain why these two colours appear simultaneously in the sky at that moment.
♦ The Human Eye and the Colourful World

Q36. deep thorough-understanding § (whole-chapter synthesis)

[5]

A student makes the following argument: 'The defects of vision — myopia, hypermetropia, and presbyopia — are all essentially the same problem: the image does not fall on the retina. So they should all be correctable with the same type of lens.' Evaluate this argument. Identify what is correct in it and where the reasoning breaks down, referring to the causes and corrections of each defect.

◆ The Human Eye and the Colourful World

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