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The Human Eye and the Colourful World — CBSE Class 10 Science Chapter Test

FREE CHAPTER TEST · CLASS X · SCIENCE (086) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	20 (A 10 · B 4 · C 3 · D 1 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 20 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–14 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q15–17 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q18 is a long answer (LA) type question, carrying 5 marks.
7. In Section E, Q19–20 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Science (086) Sample Question Paper 2026-27, at about half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: The Human Eye and the Colourful World · **Topics:** Structure of the human eye · Power of accommodation · Myopia, hypermetropia and presbyopia · Correcting lenses · Refraction through a prism · Dispersion of white light · Rainbow · Scattering of light

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The ability of the eye lens to adjust its focal length to see both near and distant objects clearly is called 1

(A) persistence of vision
(B) near point
(C) power of accommodation
(D) presbyopia

2. For a young adult with normal vision, the near point of the eye is about 1

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

3. Myopia (near-sightedness) is corrected by using spectacles with a 1

(A) convex lens
(B) plane glass sheet
(C) glass prism
(D) concave lens

4. When white light passes through a glass prism, the colour that is deviated the least is 1

(A) red
(B) violet
(C) green
(D) blue

5. Most of the refraction of the light rays entering the eye occurs at the 1

(A) crystalline lens
(B) pupil
(C) retina
(D) outer surface of the cornea

6. The clear sky appears blue because 1

(A) blue light is absorbed by the air
(B) the ocean reflects blue light onto the sky
(C) molecules of air and other fine particles scatter blue light (of shorter wavelength) more strongly than red light
(D) the Sun gives out only blue light

7. A person cannot see objects beyond 2 m clearly. The power of the lens needed to correct the vision is 1

(A) +0.5 D
(B) −0.5 D
(C) −2 D
(D) +2 D

8. A rainbow is formed because of 1

(A) dispersion, refraction and internal reflection of sunlight by tiny water droplets
(B) scattering of sunlight by air molecules only
(C) reflection of sunlight by clouds
(D) absorption of sunlight by water vapour

9. **Assertion (A):** Danger signal lights are red in colour. 1

Reason (R): Red light is scattered the least by fog or smoke, so it can be seen in the same colour from a distance.

(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.

10. **Assertion (A):** A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly. 1

Reason (R): In hypermetropia, light rays from a nearby object are focused in front of the retina.

(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.

SECTION B

This section comprises 4 very short answer (VSA) type questions of 2 marks each.

11. (a) What are the functions of (i) the iris and the pupil, and (ii) the ciliary muscles in the human eye? 2

OR

(b) What is cataract? How can vision be restored in a person with cataract?

12. The near point of a hypermetropic eye is 50 cm. What is the power of the lens needed so that the person can read a book held at 25 cm? 2

13. White light is split into colours by a glass prism but not by a rectangular glass slab, although light is refracted by both. Explain. 2

14. Why does the sky appear dark instead of blue to an astronaut at a very high altitude? 2

SECTION C

This section comprises 3 short answer (SA) type questions of 3 marks each.

15. (a) (i) Give two possible causes of myopia. (ii) How is it corrected? (iii) A student cannot see clearly beyond 40 cm. Find the power of the lens he needs. 3

OR

(b) A ray of light falls obliquely on one face of a triangular glass prism and comes out of another face. (i) How does the ray bend at each of the two faces? (ii) What are the angle of deviation and the angle of the prism? (iii) Why is the emergent ray bent towards the base of the prism?

16. (i) What is the spectrum of white light? Write the order of its colours. (ii) Describe Newton's experiment with two identical prisms. (iii) What did it show? 3

17. (i) What is the Tyndall effect? Give one example. (ii) How does the colour of the scattered light depend on the size of the scattering particles? 3

SECTION D

This section comprises 1 long answer (LA) type questions of 5 marks each.

18. (a) (i) Name the transparent front part of the eye and the light-sensitive screen at the back. 5
(ii) What kind of image does the eye lens form on the retina, and how is it sent to the brain?
(iii) How does the eye focus on a distant tree and then on a book held close?
(iv) Why can we not see an object held 10 cm from the eye clearly?
(v) Why does the size of the pupil change when you come out of a dark room into bright sunlight?

OR

(b) (i) A person's near point is 75 cm. Find the power of the lens needed to read at 25 cm.
(ii) Name the defect and give its two causes.
(iii) Another person cannot see clearly beyond 1.5 m. Find the power of the lens he needs.
(iv) Give two causes of his defect.

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

19. In a school laboratory, a narrow beam of sunlight is passed through a glass prism, and a band of seven colours is seen on a white screen.

(i) Name the phenomenon. [1]

(ii) Which colour bends the most? [1]

(iii) Why does white light split into colours in a prism? How can the colours be recombined into white light? [2]

OR

(iii) A rainbow is a natural spectrum seen in the sky after a shower. How is it formed, and where must the observer's back be facing to see it? [2]

20. Mr Sharma, aged 62, finds it hard to read the newspaper unless he holds it far away. He has also been short-sighted since college, so distant objects look blurred to him.

(i) Name the defect that makes reading difficult for him. [1]

(ii) What causes this defect? [1]

(iii) What type of spectacle lenses would solve both his problems? Describe them. [2]

OR

(iii) Why is the eye's power of accommodation needed? What would happen to a normal eye without it? [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(C)	(B)	(D)	(A)	(D)	(C)	(B)	(A)	(A)	(C)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (C). The ciliary muscles change the curvature, and so the focal length, of the eye lens: this is the power of accommodation.

Q2. Answer (B). The least distance of distinct vision is about 25 cm; the far point of a normal eye is at infinity.

Q3. Answer (D). In myopia the image of a distant object forms in front of the retina; a concave lens of suitable power brings it back onto the retina.

Q4. Answer (A). Red light bends the least and violet the most; the colours of the spectrum are in the order VIBGYOR.

Q5. Answer (D). Most of the refraction occurs at the outer surface of the cornea; the eye lens provides the finer adjustment of focal length.

Q6. Answer (C). The fine particles of the atmosphere are smaller than the wavelength of visible light and scatter the shorter (blue) wavelengths much more than red.

Q7. Answer (B). The lens must make an object at infinity appear at 2 m: f = −2 m, so P = 1/f = −0.5 D (a concave lens).

Q8. Answer (A). Each droplet acts like a small prism: it refracts and disperses the sunlight, reflects it internally and refracts it again as it comes out.

Q9. Answer (A). Both true, and R explains A. Answer (A).

Q10. Answer (C). A is true. R is false: in hypermetropia the rays from a nearby object are focused at a point behind the retina. Answer (C).

Q11. (2 marks) Answer: (a) pupil controls light, iris controls the pupil; ciliary muscles change the focal length; (b) cloudy eye lens; surgery.
(a) (i) The pupil regulates and controls the amount of light entering the eye; the iris, a dark muscular diaphragm, controls the size of the pupil. [1]
(ii) The ciliary muscles change the curvature, and so the focal length, of the eye lens: they relax for distant objects (thin lens, longer focal length) and contract for nearby objects (thicker lens, shorter focal length). [1]
OR (b) The crystalline lens of some older people becomes milky and cloudy; this is cataract, which causes partial or complete loss of vision. [1]
Vision can be restored by cataract surgery. [1]

Q12. (2 marks) Answer: +2 D (convex lens of focal length 50 cm).
The lens must form a virtual image at the near point of an object at 25 cm: u = −25 cm, v = −50 cm. 1/f = 1/v − 1/u = −1/50 + 1/25 = 1/50. [1]
f = 50 cm = 0.5 m, so P = +2 D (a convex lens). [1]

Q13. (2 marks) Answer: Prism faces are inclined, so colours separate; slab faces are parallel, so colours recombine.
In a prism the two refracting faces are inclined to each other, so the different colours, which bend through different angles, come out separated. [1]
In a slab the faces are parallel: the bending at the second face is equal and opposite to that at the first, so the colours come out parallel to one another and recombine into white light. [1]

Q14. (2 marks) Answer: Little or no atmosphere, so no scattering.
The sky looks blue because sunlight is scattered by the molecules and fine particles of the atmosphere. [1]
At very high altitude there is almost no atmosphere, so there is hardly any scattering and the sky appears dark. [1]

Q15. (3 marks) Answer: (a) excessive curvature of the lens, elongated eyeball; concave lens; −2.5 D; (b) towards the normal, then away; angle of deviation; angle of the prism; both bends turn it towards the base.
(a) (i) Excessive curvature of the eye lens, or elongation of the eyeball. [1]
(ii) By a concave lens of suitable power, which brings the image back onto the retina. [1]
(iii) The lens must make an object at infinity appear at the far point, 40 cm: f = −40 cm = −0.4 m, so P = 1/f = −2.5 D. [1]
OR (b) (i) On entering the prism the ray bends towards the normal; on leaving it bends away from the normal. [1]
(ii) The angle between the incident ray produced and the emergent ray is the angle of deviation; the angle between the two refracting faces is the angle of the prism. [1]
(iii) Because the two faces are inclined to each other, both bendings turn the ray the same way, towards the base of the prism. [1]

Q16. (3 marks) Answer: (i) VIBGYOR; (ii) an inverted second prism recombines the colours; (iii) white light is made of seven colours.
(i) The band of coloured components of a light beam; for white light, violet, indigo, blue, green, yellow, orange and red (VIBGYOR), violet being bent the most. [1]
(ii) A second, identical prism is placed upside down next to the first; the spectrum from the first prism passes through it and a beam of white light comes out. [1]
(iii) White light (sunlight) is made up of the seven colours. [1]

Q17. (3 marks) Answer: (i) scattering by colloid particles makes a beam visible; smoke-filled room or forest; (ii) fine particles scatter blue, large particles scatter longer wavelengths or white.
(i) The scattering of light by the particles of a colloid, which makes the path of a beam of light visible. [1]
Example: a beam of sunlight entering a smoke-filled room through a small hole, or sunlight passing through the canopy of a dense forest (tiny water droplets in the mist scatter it). [1]
(ii) Very fine particles scatter mainly blue light (shorter wavelength); larger particles scatter light of longer wavelengths, and particles that are large enough make the scattered light appear white. [1]

Q18. (5 marks) Answer: (a) cornea, retina; real inverted image, optic nerve; ciliary muscles relax or contract; minimum focal length, near point 25 cm; iris narrows the pupil; (b) +2.67 D; long focal length or small eyeball; −0.67 D; curvature or elongation.
(a) (i) Cornea; retina. [1]
(ii) A real, inverted image; the light-sensitive cells of the retina produce electrical signals, which the optic nerves carry to the brain, which interprets them so that we see the object as it is. [1]
(iii) For the distant tree the ciliary muscles relax, the lens becomes thin and its focal length increases; for the book they contract, the lens becomes thicker and its focal length decreases. [1]
(iv) The focal length of the eye lens cannot be decreased below a certain minimum; the nearest point it can focus is about 25 cm (the near point). [1]
(v) In bright light the iris makes the pupil smaller, letting less light into the eye; in dim light the pupil opens wider. [1]
OR (b) (i) The lens must form a virtual image at 75 cm of an object at 25 cm: 1/f = −1/75 + 1/25 = 2/75, f = 37.5 cm; P = 100/37.5 ≈ +2.67 D (convex). [2]
(ii) Hypermetropia arises because the focal length of the eye lens is too long or the eyeball has become too small. [1]
(iii) The far point is 1.5 m: f = −1.5 m, so P = −1/1.5 ≈ −0.67 D (concave). [1]
(iv) Excessive curvature of the eye lens or elongation of the eyeball. [1]

Q19. (4 marks) Answer: (i) dispersion; (ii) violet; (iii)(a) colours bend through different angles; an inverted prism recombines them; (b) refraction, dispersion and internal reflection in droplets; Sun behind the observer.
(i) Dispersion of light. [1]
(ii) Violet. [1]
(iii)(a) The different colours of light bend through different angles with respect to the incident beam, so they come out separated. [1]
An identical second prism placed upside down recombines them, and white light emerges. [1]
OR (iii)(b) Tiny water droplets act like small prisms: they refract and disperse the sunlight, then reflect it internally, and refract it again as it comes out. [1]
The rainbow is always formed in the direction opposite to the Sun, so the observer must have the Sun behind him. [1]

Q20. (4 marks) Answer: (i) presbyopia; (ii) weak ciliary muscles, less flexible lens; (iii)(a) bifocals: concave above, convex below; (b) focusing at different distances.
(i) Presbyopia. [1]
(ii) The ciliary muscles gradually weaken and the eye lens loses its flexibility with age. [1]
(iii)(a) Bifocal lenses. [1]
The upper portion is a concave lens, for distant vision (myopia); the lower portion is a convex lens, for near vision. [1]
OR (iii)(b) It lets the eye change the focal length of its lens so that both near and distant objects are focused on the retina. [1]
Without it, the eye could focus clearly at only one distance; objects at other distances would look blurred. [1]

All questions are original and © Master Testing Agency. Free to download and use for personal practice; not for resale. Every answer in this paper was checked against the NCERT Class 10 Science textbook, and by computer where possible: every correcting lens found from the lens formula (exact fractions) and its power from P = 1/f.