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

Answer:
The power of accommodation is the ability of the eye lens to change its focal length so that we can see both nearby and distant objects clearly on the retina.

2. A person with a myopic eye cannot see objects beyond 1.2 m distinctly. What type of lens should be used to correct this defect?

Answer:
A person with myopia should use a **concave lens** of focal length 1.2 m to correct their vision and see distant objects clearly.

3. What is the far point and near point of a normal human eye?

Answer:
The **near point** of a normal human eye is **25 cm**, which is the closest distance an object can be seen clearly.
The **far point** is **infinity**, which means a normal eye can see distant objects clearly up to infinity.

4. A student cannot see the blackboard clearly from the last row. What defect does the child have and how can it be corrected?

Answer:
The child is suffering from **myopia (short-sightedness)**.
It can be corrected using a **concave lens** of proper focal length.

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1. The human eye can focus objects at different distances by adjusting the focal length of the lens. This is due to:

(a) Presbyopia (b) Accommodation (c) Near-sightedness (d) Far-sightedness

Answer:
(b) Accommodation
Because of accommodation, the eye lens can adjust its focal length to see objects at different distances clearly.

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

(a) Cornea (b) Iris (c) Pupil (d) Retina

Answer:

(d) Retina

The retina is the light-sensitive layer at the back of the eye that receives the image and sends signals to the brain for vision.

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

(a) 25 m (b) 2.5 cm (c) 25 cm (d) 2.5 m

Answer:

(c) 25 cm

For a normal young adult, the minimum clear viewing distance without strain is 25 cm.

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

(a) Pupil (b) Retina (c) Ciliary muscles (d) Iris

Answer:

(c) Ciliary muscles

Ciliary muscles change the shape of the lens, helping it to adjust the focal length for clear vision.

5. A person needs a lens of power –5.5 D for distance and +1.5 D for near vision. Find the focal lengths of both lenses.

Answer:

Formula: $P = 1/f$

(i) For distance vision:

$$P = -5.5D$$
$$f = 1/P = 1/-5.5 = -0.181\ m$$

So, focal length = **–0.181 m**

(ii) For near vision:

$$P = +1.5D$$
$$f = 1/P = 1/1.5 = +0.667\ m$$

So, focal length = **+0.667 m**

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?

Answer:
Since the person has **myopia**, a **concave lens** is used for correction.
Using the lens formula:

$$f = -80\,cm = -0.8\,m$$
$$P = 1/f = 1/-0.8 = -1.25D$$

So, the lens needed is **concave with power –1.25 D**.

7. Draw a diagram to show how hypermetropia is corrected. The near point is 1 m. What power of lens is required?

Answer:
A **hypermetropic eye** cannot see nearby objects clearly because the image forms behind the retina.
It is corrected using a **convex lens** that converges light rays on the retina.

Using the formula:
Object distance $u = -25cm$, Image distance $v = -100cm$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{-100} - \frac{1}{-25} = \frac{3}{100}$$
$$f = 33.3cm = 0.33m$$
$$P = 1/f = 1/0.33 = +3.0D$$

So, a **convex lens of +3.0 D** is required.

8. Why can't a normal eye see clearly objects placed closer than 25 cm?

Answer:
Because the **ciliary muscles** cannot contract beyond a certain limit, the eye cannot reduce its focal length enough to focus on objects closer than 25 cm.

9. What happens to the image distance in the eye when an object moves farther away?

Answer:
The **image still forms on the retina**. The eye lens becomes thinner and its focal length increases to keep the image focused.

10. Why do stars twinkle?

Answer:
Stars twinkle due to **atmospheric refraction**. Their light bends many times while passing through different air layers, causing the light intensity to change, making them appear to twinkle.

11. Why do planets not twinkle?

Answer:
Planets do not twinkle because they are **closer to Earth** and appear as discs, not points of light. The light from them comes from many points, so refraction effects cancel out.

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

Answer:
During sunrise or sunset, sunlight travels a longer distance through the atmosphere. Most colours scatter away, but **red light**, being least scattered, reaches our eyes, making the Sun look reddish.

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

Answer:
In space, there is **no atmosphere** to scatter sunlight, so the sky looks **dark or black** to an astronaut.