Practice set 2

Answers

Human Eye and Colourful World

Questions

Answer the following 1 x 5 = 5

1. One cannot see through fog because
   (a) Refractive index of fog is very high
   (b) Light suffers dispersion through fog
   (c) Fog absorbs light
   (d) Light is scattered by the droplets.
2. Which colour has the maximum speed in glass?
   (a) Violet
   (b) Red
   (c) Green
   (d) Yellow
3. The scattering of light involves
   (a) Bouncing of light from the surface
   (b) Bending of light through a medium
   (c) Breaking down in its component colours.
   (d) Change in the direction of light.

   In the following questions, the assertion and reason have been put forward. Read the statements carefully and choose correct alternative form the following:

   (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion
   (b) The Assertion and the Reason are correct and the Reason is not the correct explanation of the Assertion
   (c) Assertion is true but Reason is false
   (d) Assertion is false but Reason is true
4. Assertion: The near point of hypermetropic eye is more than 25cm away.
   Reason: Hypermetropia is corrected using concave lens of suitable focal length.
   Ans: option (c)
5. Assertion: Reddening of the sun at the sunrise and sunset is due to the reflection of sunlight.
   Reason: Scattering of light results in the reddening of sun at sunrise and sunset.
   Ans: option (d)

Answer the following 2 x 4 =8

6. Why do stars twinkle?
   Ans: Due to atmospheric refraction. Far away from earth. The light bends towards the normal as it enters the earth's atmosphere. The path of light changes continuously due to changes in atmospheric condition.
7. Sun appears to rise 2 minutes before and set 2 minutes later. Give reason.

Ans: Due to atmospheric refraction. The light from the sun has to travel a longer distance through the atmosphere when the sun is near the horizon before it reaches the observers eyes. The human eye cannot follow the bended path and hence sees an image of the sun above the actual position of the sun.

8. How does the angle of deviation vary if the incident violet light is replaced by red light?
   Ans: The wavelength of red colour is greater than that of violet. Hence the speed is more. So the deviation of red is less than the violet light.
9. Does dispersion occur if light passes through a plane glass slab. Explain.
   Ans: Yes. But we are unable to perceive it because during refraction from the second surface of the glass slab all the component colours come out at the same time and reaches the observers eyes together.

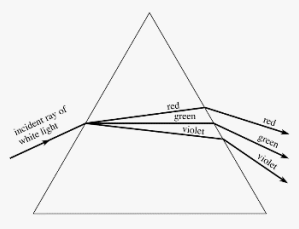
Answer the following 3 x 4 =12

10. A person can see objects if they are placed at 1.5m. What kind of lens would be required to read a book at a distance of 25cm? What kind of eye defect it is? What will be the power of the lens used?
    Ans: convex lens.
    Hypermetropia
    According to the question the near point of the person is 150cm.

    According to the problem u= -25cm and v = - 150cm

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

    Putting the values we get f = + 30cm and power P = +3.3 D.
11. Draw a ray diagram for dispersion of white light passing through a glass prism. Can we get the same phenomenon if the white light is replaced by yellow light?
    Ans:
    If white light is replaced by yellow light then dispersion will not occur.



12. Explain with reason what will be the colour of sky to an observer on the surface of the earth. What will be the colour of sky for an astronaut staying inside the international space station orbiting around the earth? Give reason.
    Ans: For an observer on the surface of the earth the sky will appear blue. As blue light is scattered most. The other colours are not scattered much. Blue reaches our eyes.
    For an astronaut the sky will appear black as there is not atmosphere and no scattering will occur.
13. What is a spectrum? How can we recombine the components of white light after a glass prism has separated them? Illustrate your answer with a diagram.
    Ans: The band of seven component colours formed due to dispersion is known as spectrum.

We can recombine the seven component colours by placing an identical prism in an inverted position with respect to the first prism. After refraction through the second prism the component colours will recombine to form white light.