

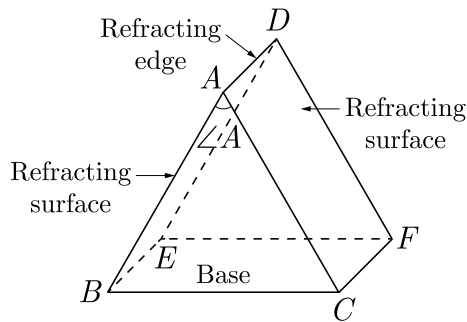
CHAPTER 7

The Human Eye and Colourful World

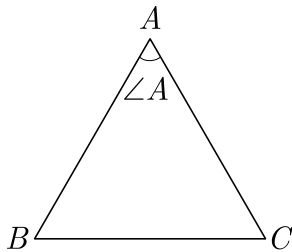
SUMMARY

7.1 ANGLE OF PRISM

A triangular prism is a homogeneous, transparent refracting medium bound by two non-parallel refracting surfaces inclined at some angle ($\angle A$) called the angle of prism. A section of the prism is a triangle ABC as shown in the figure.



(a)

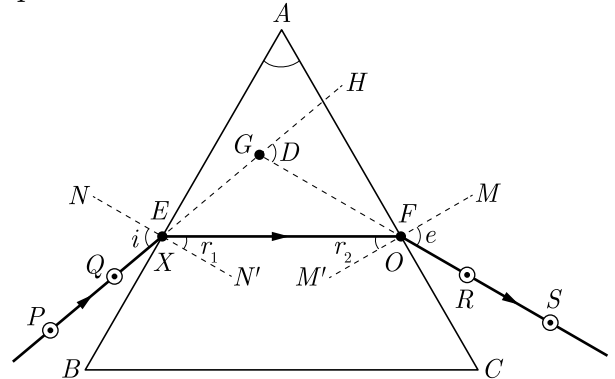


(b)

7.2 INCIDENT, REFRACTED AND EMERGENT RAYS

Refraction through a prism is shown in the given figure. In this figure, PQE is the incident ray, EF the refracted ray and FRS the emergent ray. $\angle i$ is the angle of incidence, $\angle e$ the angle of emergence and $\angle D$ the angle of deviation suffered by light ray due to refraction at the

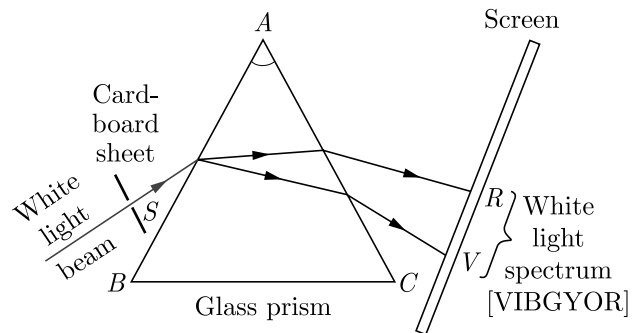
glass prism.



7.3 DISPERSION OF LIGHT

When a narrow beam of white light passes through a prism, it splits up into a band of seven colours. Splitting of white light into its seven constituent (acronym VIBGYOR) colours on passing through a dispersive medium, i.e., the glass prism is called dispersion of light.

Out of seven colours, the violet deviates maximum and red deviates minimum. As a result, the coloured band obtained on the screen is called spectrum.



1. Dispersion is caused by the difference in deviation angles for light rays of different wavelengths. The violet light has minimum wavelength, so, it deviates the maximum.

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The red light has maximum wavelength, so, it deviates the minimum.

2. The seven constituent colours of white light splitted by a glass prism can be recombined to form white light by passing them through another identical prism fixed in an inverted position.
3. Rainbow forms after rains because of dispersion on light and the interval reflection caused by tiny water droplets suspended in air. Thus, the tiny water droplets act as prisms.

A rainbow always forms in a direction opposite to that of the sun. In a rainbow, the innermost arc is violet and the outermost arc is red.

7.4 ATMOSPHERIC REFRACTION

1. In the atmosphere, the layers of cooler air have higher optical density and act as optically denser medium. The layers of warmer air have lower optical density and act as optically rarer medium.
Atmospheric refraction is the refraction of light while passing from one air layer to another air layer of different optical densities (or refractive indices).
2. Stars twinkle in night sky due to atmospheric refraction. The apparent positions of a star appears slightly higher than its actual position.
3. Due to atmospheric refraction, the sun is visible to us 2 minutes before actual sunrise. Again, the sun remains visible for 2 minutes even after actual sunset. So, apparent duration of time from sunrise to sunset is 4 minutes more than the actual duration.
4. Due to atmospheric refraction, the shape of the sun at the time of sunrise or sunset appears to be of oval shape.

7.5 SCATTERING OF LIGHT

The process due to which light gets deflected and diffused all over as a result of its interplay with tiny matter particles is called scattering of

light. The tiny particle which causes scattering of light is called the scatterer particle.

1. The colour of the scattered light is based upon the size a of the scattering particle as compared to wavelength λ of the light. If $a \ll \lambda$, then light of shorter wavelengths is scattered much more than light of longer wavelengths. According to Rayleigh's law of scattering, the intensity I of scattered light is inversely proportional to fourth power of its wavelength, i.e., $I \propto 1/\lambda^4$ (when $a \ll \lambda$).
2. The phenomenon of scattering of light by suspended particles present in the medium (through which a light beam is passing) and making the path of the light beam visible, is called Tyndall effect. The path of a light beam passing through a colloidal solution becomes visible because of scattering of light caused by colloidal particles. When light beam form the headlight of an automobile comes through mist and fog, then particles become visible because of Tyndall effect. The particles scatter the light beam and become visible.
3. Air molecules have a size much smaller than the wavelength of light. Hence, they scatter blue-violet light of smaller wavelengths much more than red-orange light of longer wavelengths. Consequently, clear sky appears to be blue. But when looking the sky from a spaceship, it appears to be dark as there are no air particles in space to cause scattering of light.
4. Danger signals are always red in colour. This is because red colour has the maximum wavelength and hence is scattered the least by atmospheric particles. Thus, red signal is visible from a longer distance.
5. The sun appears reddish at the time of sunrise and sunset. This is because sun is near the horizon and sunlight has to travel a longer distance to reach our eyes. All shorter wavelengths are scattered away by air particles and only red colour reaches our eyes.

□□□□□□

MULTIPLE CHOICE QUESTIONS

1. Consider the following statements about dispersion by glass prism :
1. Splitting of light into its component colours is called dispersion.
 2. Issac Newton was the first to observe dispersion.
- Choose the correct option from the codes given below:
- (a) Only 1
 - (b) Only 2
 - (c) Both 1 and 2
 - (d) Neither 1 nor 2

Sol : www.cbse.site/sc/hm101

2. Which of the following are effects of atmospheric refraction?
1. Twinkling of stars.
 2. Tyndall effect.
 3. Advance sunrise and delayed sunset.
- Choose the correct option from the codes given below:
- (a) 1 and 2
 - (b) 2 and 3
 - (c) 1 and 3
 - (d) 1, 2 and 3

Sol : www.cbse.site/sc/hm102

3. At noon the sun appears white as
- (a) light is least scattered
 - (b) all the colours of the white light are scattered away
 - (c) blue colour is scattered the most
 - (d) red colour is scattered the most

Sol : www.cbse.site/sc/hm103

4. Which of the following phenomena of light

- are involved in the formation of a rainbow?
- (a) Reflection, refraction and dispersion.
 - (b) Reflection, dispersion and total internal reflection.
 - (c) Refraction, dispersion and internal reflection.
 - (d) Dispersion, scattering and total internal reflection.

Sol : www.cbse.site/sc/hm104

5. Twinkling of stars is due to atmospheric
- (a) dispersion of light by water droplets
 - (b) refraction of light by different layers of varying refractive indices
 - (c) scattering of light by dust particles
 - (d) internal reflection of light by clouds

Sol : www.cbse.site/sc/hm105

6. The clear sky appears blue because
- (a) blue light gets absorbed in the atmosphere
 - (b) ultraviolet radiations are absorbed in the atmosphere
 - (c) violet and blue lights get scattered more than lights of all other colours by the atmosphere
 - (d) light of all other colours is scattered more than the violet and blue colour lights by the atmosphere

Sol : www.cbse.site/sc/hm106

7. Which of the following statements is correct regarding the propagation of light of different colours of white light in air?
- (a) Red light moves fastest.
 - (b) Blue light moves faster than green light.
 - (c) All the colours of the white light move with the same speed.

(d) Yellow light moves with the mean speed as that of the red and the violet light.

Sol : www.cbse.site/sc/hm107

8. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light:

- (a) is scattered the most by smoke or fog
- (b) is scattered the least by smoke or fog
- (c) is absorbed the most by smoke or fog
- (d) moves fastest in air.

Sol : www.cbse.site/sc/hm108

9. Which of the following phenomena contributes significantly to the reddish appearance of the sun at sunrise or sunset?

- (a) Dispersion of light
- (b) Scattering of light
- (c) Total internal reflection of light
- (d) Reflection of light from the earth

Sol : www.cbse.site/sc/hm109

10. The bluish colour of water in deep sea is due to

- (a) the presence of algae and other plants found in water
- (b) reflection of sky in water
- (c) scattering of light
- (d) absorption of light by the sea.

Sol : www.cbse.site/sc/hm110

11. Which colour suffers least deviation on passing through a prism?

- (a) Green
- (b) Violet
- (c) Red

(d) Yellow

Sol : www.cbse.site/sc/hm111

12. To an astronaut, the sky appears

- (a) blue
- (b) red
- (c) white
- (d) dark

Sol : www.cbse.site/sc/hm112

13. Which phenomenon is responsible for increasing the apparent length of the day by 4 minutes?

- (a) Refraction of light
- (b) Scattering of light
- (c) Dispersion of light
- (d) Atmospheric refraction

Sol : www.cbse.site/sc/hm113

14. What is the order of shortest visible wavelength?

- (a) 3000 Å
- (b) 4000 Å
- (c) 6500 Å
- (d) 8000 Å

Sol : www.cbse.site/sc/hm114

15. The intensity of scattered light (I) varies with wavelength as, $I \propto \lambda^n$, where n equals

- (a) 4
- (b) 3
- (c) 2
- (d) -4

Sol : www.cbse.site/sc/hm115

16. How many times does a ray of light bend on passing through a prism?
 (a) Once
 (b) Twice
 (c) Thrice
 (d) Four times

Sol : www.cbse.site/sc/hm116

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17. Which phenomenon is not explained on the basis scattering of light?
 (a) White colour of clouds
 (b) Blue colour of clear sky
 (c) Red colour of danger signals
 (d) Advanced sunrise

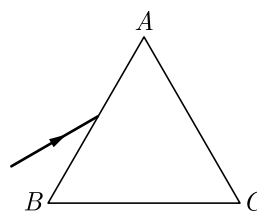
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18. Advanced sunrise and delayed sunset are explained on the basis of
 (a) Tyndall effect
 (b) scattering of light
 (c) dispersion of light
 (d) atmospheric refraction

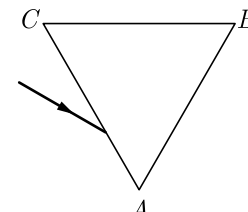
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19. A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the third colour from the top corresponds to the colour of

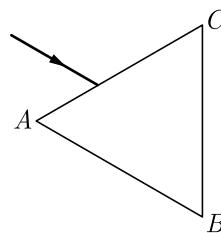
the sky?



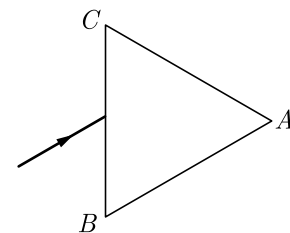
(i)



(ii)



(iii)



(iv)

- (a) (i)
 (b) (ii)
 (c) (iii)
 (d) (iv)

Sol : www.cbse.site/sc/hm119

20. A ray of light falls on one face of an equilateral glass prism at 40° and emerges from the other face at the same angle. The deviation suffered by the ray is
 (a) 20°
 (b) 40°
 (c) 60°
 (d) 80°

Sol : www.cbse.site/sc/hm120

21. Angle of deviation through a prism of angle 60° when angles of incidence and emergence are 40° each is:
 (a) 40°
 (b) 30°
 (c) 60°
 (d) None of these

Sol : www.cbse.site/sc/hm121

22. If angle of deviation through a prism of angle 60° is 40° , angle of incidence (being equal to angle emergence) would be:
- 50°
 - 60°
 - 40°
 - None of these

Sol : www.cbse.site/sc/hm122

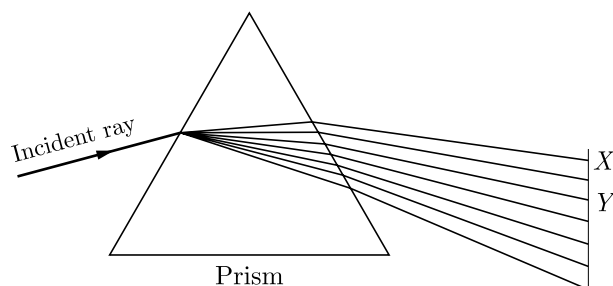
23. A prism is a transparent medium which has triangular bases and rectangular lateral surfaces.
- two, three
 - three, two
 - one, two
 - two, four

Sol : www.cbse.site/sc/hm123

24. Angle of deviation is depends on:
- Angle of prism
 - Nature of material of prism
 - Angle of incidence on the prism
 - All of the above

Sol : www.cbse.site/sc/hm124

25.



Dispersion of light by glass prism is shown in the above figure. Here x and y indicates

..... and colour respectively.

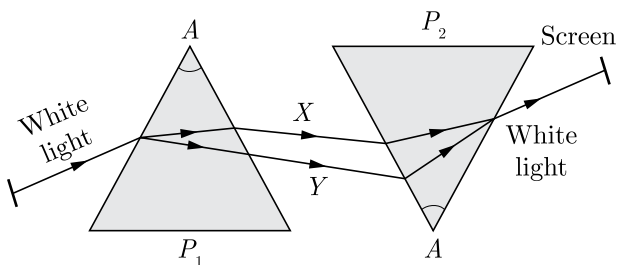
- red, blue
- red, indigo
- red, yellow
- violet, green

Sol : www.cbse.site/sc/hm125

26. The phenomenon of splitting of white light by prism is called
- refraction
 - reflection
 - dispersion
 - Total internal reflection

Sol : www.cbse.site/sc/hm126

27.



Here X and Y indicates:

- Green colour, violet colour
- Red colour, violet colour
- Violet colour, red colour
- Green colour, red colour

Sol : www.cbse.site/sc/hm127

28. Which of the following phenomena contributes significantly to the reddish appearance of sun at sunrise or sunset?
- Dispersion of light
 - Scattering of light
 - Total internal reflection of light
 - Reflection of light from the earth

Sol : www.cbse.site/sc/hm128

29. The relation between intensity of scattered light (I) and wavelength (λ) is:

- (a) $I \propto \frac{1}{\lambda^2}$
 (b) $I \propto \frac{1}{\lambda^3}$
 (c) $I \propto \frac{1}{\lambda}$
 (d) $I \propto \frac{1}{\lambda^4}$

Sol : www.cbse.site/sc/hm129

30. Which of the colours of visible light has minimum frequency?

- (a) violet
 (b) red
 (c) yellow
 (d) green

Sol : www.cbse.site/sc/hm130

31. The optical density of our atmosphere with altitude.

- (a) decreases
 (b) increases
 (c) remain same
 (d) first increase than decrease

Sol : www.cbse.site/sc/hm131

32. The angle between the refracting surfaces of prism is called angle of

- (a) refraction
 (b) prism
 (c) reflection
 (d) both (a) and (b)

Sol : www.cbse.site/sc/hm132

33. Which of the following colour has maximum

frequency?

- (a) Indigo
 (b) Orange
 (c) Red
 (d) Violet

Sol : www.cbse.site/sc/hm133

34. Which of following gives monochromatic light?

- (a) Sodium lamp
 (b) Mercury lamp
 (c) Spark lamp
 (d) All of the above

Sol : www.cbse.site/sc/hm134

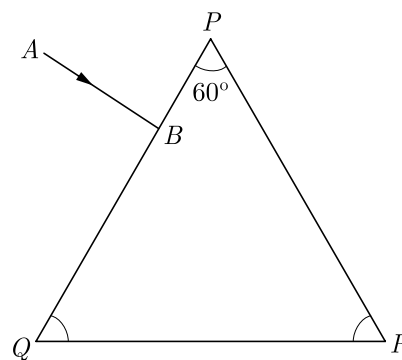
35. is a natural spectrum appearing in sky after a rain shower.

- (a) Twinkling of stars
 (b) Advance sunrise and delay sunset
 (c) Colour of the sun at sunrise and sunset
 (d) Rainbow

Sol : www.cbse.site/sc/hm135

36. In given figure, a light ray AB is incident normally on one face PQ of an equilateral glass prism.

The angles at faces PR is:

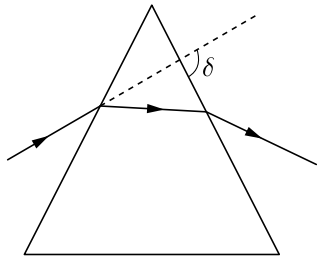


- (a) 60°

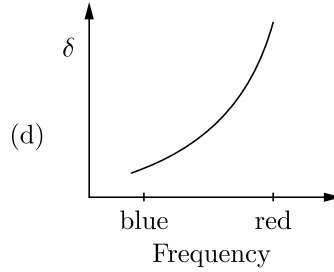
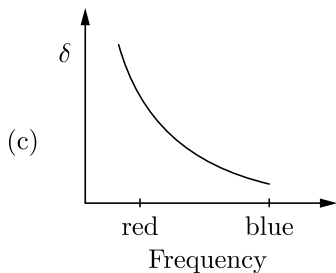
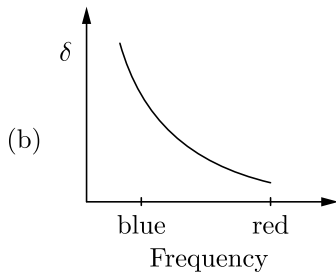
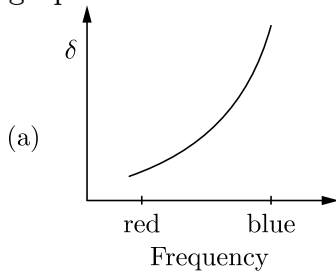
- (b) 30°
- (c) 45°
- (d) 90°

Sol : www.cbse.site/sc/hm136

37. Light rays are deviated by a prism as shown in the figure.

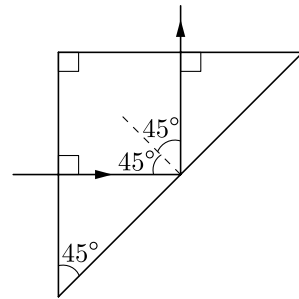


The deviation angle δ is measured for light rays of different frequency, including blue light and red light. Which of the following graph is correct?



Sol : www.cbse.site/sc/hm137

38. A light ray is incident perpendicularly to one face of a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45° , we conclude that the refractive index



- (a) $n > \frac{1}{\sqrt{2}}$
- (b) $n > \sqrt{2}$
- (c) $n < \frac{1}{\sqrt{2}}$
- (d) $n < \sqrt{2}$

Sol : www.cbse.site/sc/hm138

39. A student traces the path of a ray of light through a glass prism for different angles of incidence. He analysis each diagram and draws the following conclusion:

- I. On entering prism, the light ray bends towards its base.
- II. Light ray suffers refraction at the point of incidence and point of emergence while passing through the prism.

III. Emergent ray bends at certain angle to the direction of the incident ray.

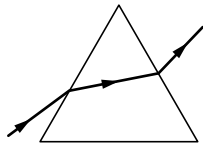
IV. While emerging from the prism, the light ray bends towards the vertex of the prism.

Out of the above inferences, the correct ones are:

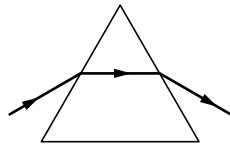
- (a) I, II and III
- (b) I, III and IV
- (c) II, III and IV
- (d) I and IV

Sol : www.cbse.site/sc/hm139

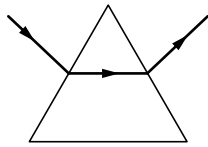
40. In which of the following diagrams is the path of a ray of light passing through a glass prism shown correctly?



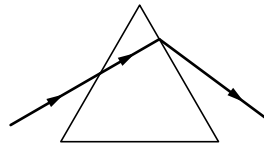
(I)



(II)



(III)

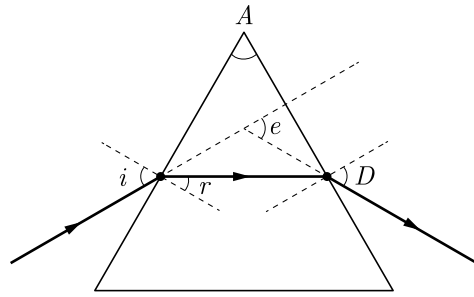


(IV)

- (a) I
- (b) II
- (c) III
- (d) IV

Sol : www.cbse.site/sc/hm140

41.

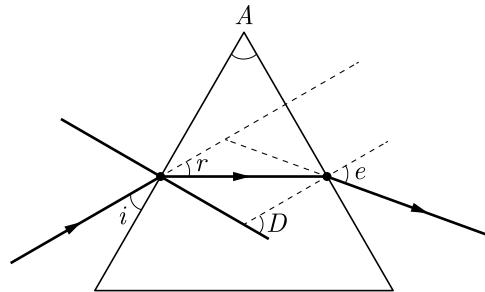


Which of the following angles are correctly marked in the above ray diagram?

- (a) $\angle i$, $\angle A$ and $\angle D$
- (b) Only $\angle i$ and $\angle A$
- (c) $\angle i$, $\angle r$ and $\angle A$
- (d) All of the angles

Sol : www.cbse.site/sc/hm141

42.



Which of the following angles are correctly marked in the above diagram?

- (a) $\angle A$, $\angle r$ and $\angle D$
- (b) $\angle A$ and $\angle e$
- (c) $\angle i$, $\angle A$ and $\angle D$
- (d) $\angle A$, $\angle r$ and $\angle e$

Sol : www.cbse.site/sc/hm142

43. During the experiment, to trace the path of ray of light through the glass prism, students reported at the following observations:

1. The ray of light from air to glass at the first refracting surface bends away from the normal after refraction.

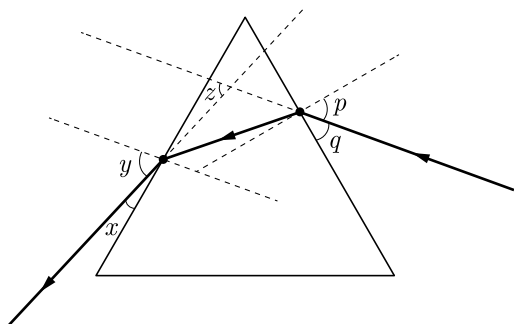
2. At the second refracting surface, light rays entered from air to glass.
3. Light ray suffers two refractions on passing through a prism and in each refraction it bends towards the base of the prism.
4. Light ray suffers two refractions on passing through a prism. In first refraction it bends away from the normal while in the second refraction it bends towards the normal.

The correct observation(s) is/are:

- (a) 1 and 2 only
- (b) 3 only
- (c) 2 and 4 only
- (d) 1 and 4 only

Sol : www.cbse.site/sc/hm143

44. Study the following ray diagram:



In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

- (a) y, p, z
- (b) x, q, z
- (c) p, y, z
- (d) p, z, y

Sol : www.cbse.site/sc/hm144

45. When white light passes through the achromatic combination of prisms, then what is observed ?
- (a) Deviation
 - (b) Dispersion

- (c) Both deviation and dispersion
- (d) Atmospheric refraction

Sol : www.cbse.site/sc/hm145

46. A student traces the path of a ray of light through a triangular glass prism for different values of angle of incidence. On analyzing the ray diagrams, which one of the following conclusions is he likely to draw?

- (a) The emergent ray is not parallel to the incident ray.
- (b) The emergent ray bends at an angle to the direction of the incident ray.
- (c) The emergent ray and the refracted ray are at right angles to each other.
- (d) The emergent ray is perpendicular to the incident ray.

Sol : www.cbse.site/sc/hm146

47. Which one of the following statements is correct?

- (a) The rainbow is produced by the reflection of white sun light by water drops in the atmosphere.
- (b) The blue colour of the sky is due to scattering of light.
- (c) The stars appear higher in the sky than actually are, due to scattering of light.
- (d) The planets twinkle at night due to atmospheric refraction of light.

Sol : www.cbse.site/sc/hm147

48. Rainbow is observed when the Sun is

- (a) Vertically above the observer
- (b) Behind the observer
- (c) In front of the observer
- (d) Position is not defined

Sol : www.cbse.site/sc/hm148

49. Which phenomenon does not play a role in the formation of rainbow ?

- (a) Absorption
- (b) Reflection
- (c) Refraction
- (d) Dispersion

Sol : www.cbse.site/sc/hm149

50. The phenomenon of dispersion proves that:

- (a) light does not pass through an opaque medium and absence of the light causes shadow.
- (b) light moves in the straight line.
- (c) light passes through a transparent medium.
- (d) white light is made up of seven constituent colours.

Sol : www.cbse.site/sc/hm150

51. How will you use two identical prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light?

- (a) One placed inverted with respect to the other.
- (b) One placed on top of the other.
- (c) Just put them side by side.
- (d) Parallel to each other.

Sol : www.cbse.site/sc/hm151

52. A light ray of a single wavelength is incident on the prism. The emergent light is best described by a

- (a) Light ray of same wavelength deviated by an angle.
- (b) Laterally shifted ray of same

wavelength.

- (c) Spectrum of component colours.
- (d) Light ray of different wavelength deviated by an angle.

Sol : www.cbse.site/sc/hm152

53. When white light is passed through two consecutive prisms, the resultant will be

- (a) Seven colour
- (b) White beam
- (c) Yellow light
- (d) Green light

Sol : www.cbse.site/sc/hm153

54. **Assertion :** Colour of sun is red at the time of sunset and sunrise.

Reason : Colour of blue end of spectrum get scattered due to their smaller wavelengths and light reaching earth's surface from sun is rich in red colour end.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm154

55. **Assertion :** Planets do not twinkle.

Reason : Planets do not show the phenomenon of scattering.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.

(d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm155

56. Assertion : When a light ray is refracted through a glass prism, emergent ray is parallel to incident ray.

Reason : Two sides of prism doing refraction are parallel to each other.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm156

57. Assertion : A rainbow is a natural spectrum appearing in the sky after a rain shower.

Reason : It is caused by reflection of sunlight by tiny water droplets present in the atmosphere.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm157

58. Assertion : Different colour of light bends through different angles with respect to the incident ray when they pass through a prism. The red light bends the least while violet the most.

Reason : Different colour of light bends through different angles with respect to

the incident ray when they pass through a prism. The red light bends the least while violet the most.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm158

59. Assertion : A prism deviates a ray of light towards its base.

Reason : Both refracting sides scatter the light.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm159

60. Assertion : Sun is visible to us 2 minutes after the actual sunrise and about 2 minutes before the actual sunset.

Reason : It is caused due to rotation and revolution of earth.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

Sol : www.cbse.site/sc/hm160

61. Assertion : The stars twinkle while the planet do not.

Reason : The stars are much lesser in size than the planets.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm161

62. Assertion : Blue colour of sky appears due to scattering of blue colour.

Reason : Blue colour has longest wave length in visible spectrum.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm162

63. Assertion : The light of violet colour deviates the least and the light of red colour the most, while passing through a prism.

Reason : For a prism material, refractive index is highest for red light and lowest for the violet light.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.

(d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm163

64. Assertion : Sunlight reaches us without dispersion in the form of white light and not as its components.

Reason : Dispersion takes place due to variation of refractive index for different wavelength but in vacuum the speed of light is independent of wavelength and hence vacuum is a non-dispersive medium.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm164

65. Assertion : In case of rainbow, light at the inner surface of the water drop gets internally reflected.

Reason : The angle between the refracted ray and normal to the drop surface is greater than the critical angle.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm165

66. Assertion : Secondary rainbow is fainter than primary rainbow.

Reason : Secondary rainbow formation is

three step process and hence, the intensity of light is reduced at the second reflection inside the rain drop.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Sol : www.cbse.site/sc/hm166

wondered how this happen so. Suddenly, they saw two hunters. They immediately went to the nearest police station to complain about them. Police immediately with their force went to the forest to arrest those people. The effect they observed in the canopy of the dense forest is:

- (a) Reflection
- (b) Refraction
- (c) Total internal reflection
- (d) Tyndall effect

Sol : www.cbse.site/sc/hm168

COMPETENCY BASED QUESTIONS

67. Four friends went to a picnic. The weather was pleasant. They played various games and then had snacks. Suddenly, Shyam, one of them, noticed seven colours in the sky. He said to others, “Wow, what a rainbow!” Then Ram, one of them, asked him “What is Rainbow”? He then explained to all about its formation. After that everyone in the group thanked him for the knowledge, he had given to them.

The device can be used to obtain such phenomenon is:

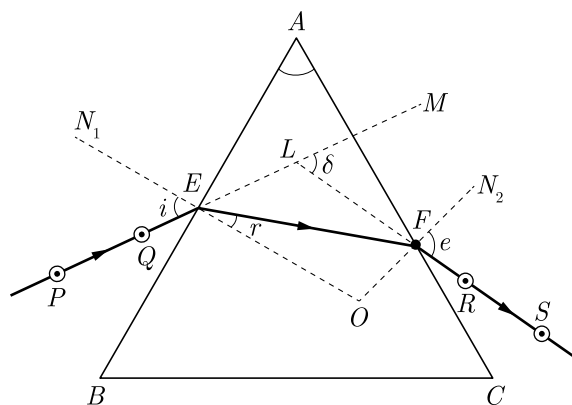
- (a) Lens
- (b) Mirror
- (c) Prism
- (d) Glass plate

Sol : www.cbse.site/sc/hm167

68. Four friends went to a forest for a picnic. When they were moving around the forest, they saw that the light was filtering from the leaves of the trees. The path of the light beam becomes visible to all of them. They

Direction For Questions (60-74)

Refer to the path of rays of light through a glass prism. Now answer the following questions.



69. A glass prism has
- (a) six rectangular surfaces
 - (b) four rectangular surfaces
 - (c) two triangular bases and three rectangular surfaces
 - (d) none of the above.

Sol : www.cbse.site/sc/hm169

70. In passing through a glass prism, a ray of light undergoes how many refractions?
- (a) One

- (b) Two
(c) Three
(d) Four

Sol : www.cbse.site/sc/hm169

71. Two refractions on passing through the prism occur at
(a) E and A
(b) E and B
(c) A and B
(d) E and F

Sol : www.cbse.site/sc/hm169

72. Angle of deviation is
(a) $\angle MLF$
(b) $\angle FEO$
(c) $\angle LEF$
(d) none of these

Sol : www.cbse.site/sc/hm169

73. The ray FRS is
(a) emergent ray
(b) refracted ray
(c) incident ray
(d) none of these

Sol : www.cbse.site/sc/hm169

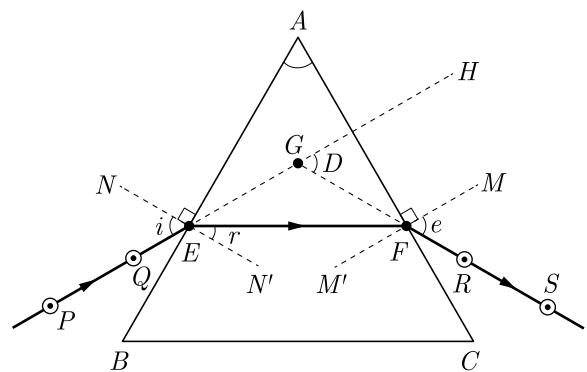
74. If A is angle of prism, D is angle of deviation; i is angle of incidence and e is angle of emergence through a prism, then the correct relation between them is:
(a) $A + i = D + e$
(b) $A + D = i + e$
(c) $A + e = D + i$
(d) $A + i + e = D$

Sol : www.cbse.site/sc/hm169

Direction For Questions (75-76)

A student done the following steps :

1. Fix a sheet of white paper on a drawing board using drawing pins.
2. Place a glass prism on it in such a way that it rests on its triangular base. Trace the outline of the prism using a pencil.
3. Draw a straight line PE inclined to one of the refracting surfaces say AB , of the prism.
4. Fix two pins say at points P and Q , on the line PE as shown in Figure.
5. Look for the images of the pins, fixed at P and Q , through the other face AC .
6. Fix two more pins, at points R and S , such that the pins at R and S and the images of the pins at P and Q lie on the same straight line.
7. Remove the pins and the glass prism.
8. The line PE meets the boundary of the prism at point E (see figure below) Similarly, join and produce the points R and S . Let these line meet the boundary of the prism at E and F , respectively. Join E and F .
9. Draw perpendiculars to the refracting surfaces AB and AC of the prism at points E and F , respectively.
10. Mark the angle of incidence $\angle i$, the angle of refraction $\angle r$ and the angle of emergence $\angle e$ as shown in Figure.



75. If the emergent ray makes an angle of 30° with the second face of prism. The angle of

emergence is:

- (a) 50°
- (b) 60°
- (c) 30°
- (d) 90°

Sol : www.cbse.site/sc/hm170

76. What is angle of deviation in the case of parallel glass slab?

- (a) 0°
- (b) 90°
- (c) 45°
- (d) 60°

Sol : www.cbse.site/sc/hm170

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Direction For Questions (77-81)

The hotter air is lighter (less dense) than the cooler air above it and has a refractive index slightly less than that of the cooler air. Since the physical condition of the refracting medium (air) are not stationary, therefore, the light goes from rarer medium to denser medium in atmosphere. This phenomenon is called atmospheric refraction.

The twinkling of stars and advanced sunrise and delayed sunset are common examples of atmospheric refraction.

77. Stars appear to twinkle because of

- (a) movement of air
- (b) atmospheric refraction
- (c) both (a) and (b)
- (d) none of these

Sol : www.cbse.site/sc/hm171

78. Which of the following is not caused because of atmospheric refraction?

- (a) Apparent image of Sun is formed closer to the Earth.
- (b) Dawn or dusk are formed
- (c) Sun can be seen 2 minutes before actual sunrise and 2 minutes after actual sunset.
- (d) Clouds look white

Sol : www.cbse.site/sc/hm171

79. During sunset or sunrise the Sun appears reddish because

- (a) due to longer passage in atmosphere, even red light in the sunlight scatters
- (b) Sun produces red light at this time
- (c) at this time Sun is not very hot
- (d) none of these

Sol : www.cbse.site/sc/hm171

80. When sunlight enters the atmosphere the colours which scatter first are

- (a) only red
- (b) red, orange and yellow
- (c) blue and green
- (d) violet, indigo and blue

Sol : www.cbse.site/sc/hm171

81. The order of wavelength of seven colours in atmosphere is

- (a) $V < I < B < G < Y < O < R$
- (b) $V > I > B > G > Y > O > R$
- (c) $V < B < I < G < Y < O < R$
- (d) $V > I > B > G > O > R > Y$

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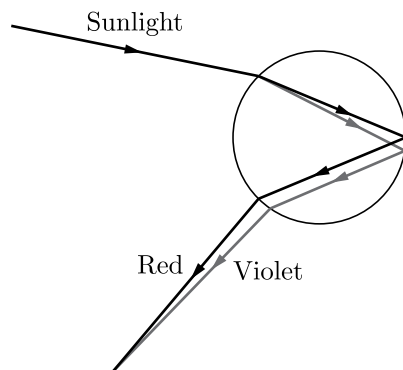
Direction For Questions (82-86)

A beautiful atmospheric phenomenon commonly seen after rain is the rainbow. The colourful arc of a rainbow across the sky is the result of several optical effects: refraction, internal reflection and dispersion. But the conditions must be just right. As we all know, a rainbow is seen after a rain but not after every rain.

Following a rain, there are many tiny water droplets in the air. Sunlight incident on the droplets in air produces a rainbow. But whether a rainbow is seen depends on the relative positions of the Sun and the observer. As you may have noticed, the Sun is generally behind you when you see a rainbow.

To understand the formation and observation of a rainbow, consider what happens when sunlight is incident on a water droplet. On entering the droplet, the light is first refracted and then dispersed into component colours as it travels in the water.

These seven colours strike the inner surface of the water drop and get internally reflected. The reflected light is refracted again as it comes out of the drop as shown in figure.



82. Which of the following phenomena of light are involved in the formation of a rainbow?
- Reflection, refraction and dispersion
 - Refraction, dispersion and total internal reflection

- Refraction, dispersion and internal reflection
- Dispersion, scattering and total internal reflection

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83. Which phenomenon does not occur during rainbow formation?
- Refraction
 - Induction
 - Dispersion
 - Reflection

Sol : www.cbse.site/sc/hm172

84. The order of wavelength of red, yellow and orange is
- yellow < orange < red
 - yellow > orange > red
 - orange > red > yellow
 - none of these

Sol : www.cbse.site/sc/hm172

85. The order of frequency of the seven colours of rainbow is
- $V = I = B = G = Y = O = R$
 - $V > I > B > G > Y > O > R$
 - $I < B < Y < G < O < R < V$
 - none of the above

Sol : www.cbse.site/sc/hm172

86. Which of the seven colours travels fastest in a medium?
- Red
 - Yellow
 - Green
 - Orange

Sol : www.cbse.site/sc/hm172

Direction For Questions (87-91)

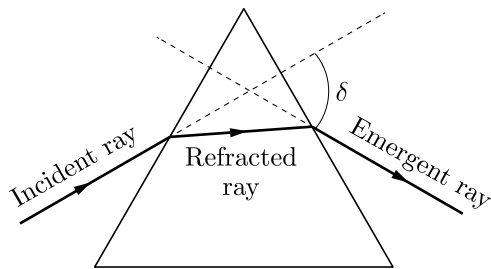
Newton found that when a beam of white light passes through a prism it is spread out by the prism into a band of all the colours of the rainbow from red to violet. The band of colours is called a spectrum and the separation of the colours by the prism is known as dispersion. He concluded that white light is a mixture of light of various colours and identified red, orange, yellow, green, blue, indigo and violet.

All colours of light travel at the same speed in a vacuum. When they enter a transparent substance like glass, they all slow down but by different amounts. Because they slow down, they are refracted but because they slow down by different amounts, different colours are refracted through different angles.

87. Which of the following statements is correct regarding the propagation of light of different colours of white light in air?
- (a) Red light moves fastest.
 - (b) Blue light travels faster than green light.
 - (c) All colours of white light move with the same speed.
 - (d) Yellow light moves with the mean speed as that of red and violet lights.

Sol : www.cbse.site/sc/hm173

88. A ray of light passes through a prism as shown in figure



The angle δ is known as

- (a) angle of emergence
- (b) angle of dispersion
- (c) angle of prism
- (d) angle of deviation

Sol : www.cbse.site/sc/hm173

89. Splitting of white light into seven colours on passing through a glass prism is called
- (a) scattering
 - (b) refraction
 - (c) dispersion
 - (d) reflection

Sol : www.cbse.site/sc/hm173

90. Rainbow is formed due to
- (a) diffraction and dispersion
 - (b) reflection only
 - (c) scattering and refraction
 - (d) total internal reflection and dispersion

Sol : www.cbse.site/sc/hm173

91. The rectangular surface of a prism is known as:
- (a) reflecting surface
 - (b) dispersing surface
 - (c) refracting surface
 - (d) none of these

Sol : www.cbse.site/sc/hm173

Direction For Questions (92-95)

When light is passed through a prism it split into. Its spectrum of colours (in order violet, indigo, blue, green, yellow, orange and red) and this process of white light. Splitting into its constituent colours in-termed as dispersion of light.

This splitting of the light ray occurs because

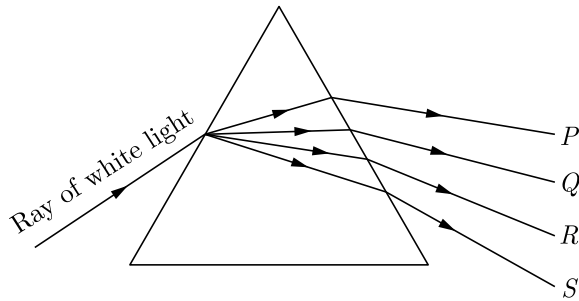
of the different angles of bending for each colour. Hence, each colour while passing through the prism bends at different angles with respect to the incident beam. This gives rise to the formation of the coloured spectrum.

92. Which of the following colour of white light suffers least deviation?

- (a) Red
- (b) Blue
- (c) Violet
- (d) Green

Sol : www.cbse.site/sc/hm174

93. Which of the following colours viz., P , Q , R and S has more speed in the prism?



- (a) P
- (b) Q
- (c) R
- (d) S

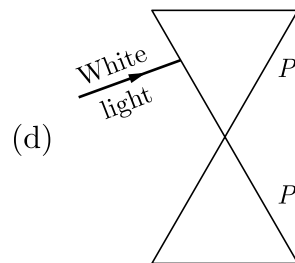
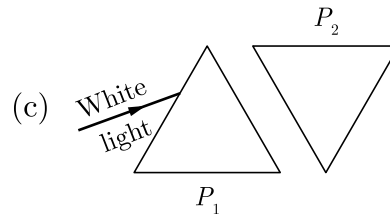
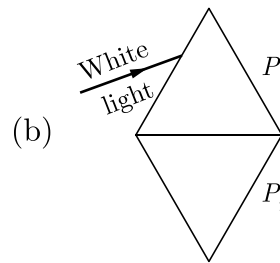
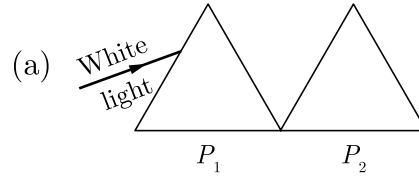
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94. Among the seven colours visible due to splitting of white light through prism which colour has shortest wavelength?

- (a) Red
- (b) Violet
- (c) Yellow
- (d) Blue

Sol : www.cbse.site/sc/hm174

95. How will you use two identical prisms P_1 and P_2 so that a narrow beam of white light incident on one prism emerges out of the second prism as white light?



Sol : www.cbse.site/sc/hm174

Direction For Questions (96-99)

The earth's atmosphere is a heterogeneous mixture of minute particles. These particles include smoke, tiny water droplets, suspended particles of dust and molecules of air.

When a beam of light strikes such fine particles, the path of the beam becomes visible. The light reaches us after being

reflected diffusely by these particles. The phenomenon of scattering of light by the colloidal particle is known as Tyndall effect. Tyndall effect can also be observed when sunlight passes through a canopy of dense forest. The colour of the scattered particle's light depend upon size of scattering particles.

96. The phenomenon of scattering of light by colloidal particles is called
- Corona effect
 - Tyndall effect
 - dispersion effect
 - none of these

Sol : www.cbse.site/sc/hm175

97. The colour of scattering light depends upon
- volume of particles
 - nature of particles
 - size of particles
 - none of these

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98. The colour of scattered light depends upon
- frequency of the scattered particles
 - wavelength of the scattered particles
 - velocity of the scattered particles
 - all of the above

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99. If the size of the scattering particles is large enough then
- the scattered light may appear red
 - the scattered light may appear white
 - the scattered light may appear blue
 - none of these

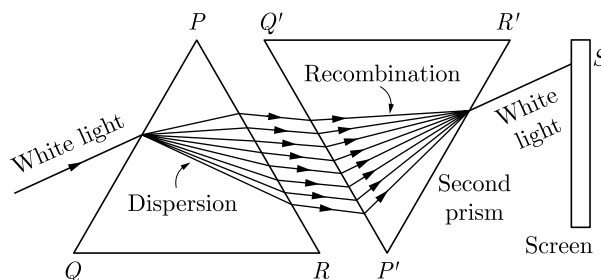
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Direction For Questions (100-104)

Light spectrum is the many different wavelengths of energy produced by light source. Light is measured in nanometres (nm). Each nanometre represents a wavelength of light or band of light energy. Visible light is the part of spectrum from 380 nm to 780 nm.

Isaac Newton was the first to use a glass prism to obtain the spectrum of sunlight. He tried to split the colours of the spectrum of white light further by using another similar prism. He then placed a second identical prism in an inverted position with respect to the first prism. This allowed all the colours of the spectrum to pass through second prism. He found a beam of white light emerging from the other side of the second prism. This observation gave Newton the idea that the sunlight is made up of seven colours.

A rainbow is a natural spectrum appearing in the sky after rain.



100. The range of wavelength of visible light spectrum is
- 500 nm to 780 nm
 - 450 nm to 750 nm
 - 380 nm to 780 nm
 - 300 nm to 700 nm

Sol : www.cbse.site/sc/hm176

101. The many different wavelength of energy produced by light source through prism is called

- (a) hydrogen spectrum
- (b) light spectrum
- (c) corona discharge
- (d) frequency modulation

Sol : www.cbse.site/sc/hm176

102. The critical angle between an equilateral prism and air is 45° , if the incident ray is perpendicular to the refracting surface, then

- (a) it is reflected totally from the second surface and emerge perpendicular to the third surface.
- (b) it gets reflected from second surface and third surface and emerges from the third surface.
- (c) it keeps reflecting from all the three sides of the prism and never emerges out.
- (d) after deviation, it gets refracted from the second surface.

Sol : www.cbse.site/sc/hm176

103. The dispersive power of prism depends upon

- (a) the shape of the prism
- (b) the angle of the prism
- (c) height of the prism
- (d) the material of the prism

Sol : www.cbse.site/sc/hm176

104. When white light is passed through a hollow prism then there is

- (a) no dispersion and no deviation

- (b) only dispersion
- (c) only deviation
- (d) both dispersion and deviation

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Direction For Questions (105-107)

White light is a mixture of seven colours i.e., violet, indigo, blue, green, yellow, orange and red. Every colour has its own characteristic wavelength. Different colours with their wavelengths are given below in the table.

S. No.	Colour	Wavelength
1.	Red	7900 Å
2.	Orange	6000 Å
3.	Yellow	5800 Å
4.	Green	5400 Å
5.	Blue	4800 Å
6.	Indigo	4500 Å
7.	Violet	4000 Å

The phenomenon of splitting white light into seven colours when it passes through a glass prism is called dispersion of white light.

105. The speed of light depends upon :

- (a) frequency
- (b) wavelength

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- (c) density
- (d) none of these

Sol : www.cbse.site/sc/hm177

106. Which one of the following statement is correct?

- (a) Each colour of light travels with same speeds in a given medium.
- (b) Each colour of light travels with different speeds in a given medium.
- (c) Only red colour of light travels with fast speed in a given medium.
- (d) All of the above

Sol : www.cbse.site/sc/hm177

107. Light of two colours P and Q pass through a glass prism. P deviates more than Q from its path of incidence. Which colour has a higher speed in the prism?

- (a) P
- (b) Q
- (c) Neither P nor Q
- (d) Both P and Q

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SELF ASSESSMENT TEST

1. Which of the following are effects of atmospheric refraction?
 1. Twinkling of stars.
 2. Tyndall effect.
 3. Advance sunrise and delayed sunset.
 Choose the correct option from the codes given below:
 - (a) 1 and 2
 - (b) 2 and 3
 - (c) 1 and 3
 - (d) 1, 2 and 3

2. Which of the following phenomena of light are involved in the formation of a rainbow?
 - (a) Reflection, refraction and dispersion.
 - (b) Reflection, dispersion and total internal reflection.
 - (c) Refraction, dispersion and internal reflection.
 - (d) Dispersion, scattering and total internal reflection.

3. The clear sky appears blue because
 - (a) blue light gets absorbed in the atmosphere
 - (b) ultraviolet radiations are absorbed in the atmosphere
 - (c) violet and blue lights get scattered more than lights of all other colours by the atmosphere
 - (d) light of all other colours is scattered more than the violet and blue colour lights by the atmosphere

4. The danger signals installed at the top of tall buildings are red in colour. These can be easily seen from a distance because among all other colours, the red light
 - (a) is scattered the most by smoke or fog
 - (b) is scattered the least by smoke or fog
 - (c) is absorbed the most by smoke or fog
 - (d) moves fastest in air.

5. The bluish colour of water in deep sea is due to
 - (a) the presence of algae and other plants found in water
 - (b) reflection of sky in water
 - (c) scattering of light
 - (d) absorption of light by the sea.

6. To an astronaut, the sky appears
 - (a) blue
 - (b) red
 - (c) white
 - (d) dark

7. What is the order of shortest visible wavelength?
 - (a) 3000 \AA
 - (b) 4000 \AA
 - (c) 6500 \AA
 - (d) 8000 \AA

8. The intensity of scattered light (I) varies with wavelength as, $I \propto \lambda^n$, where n equals
 - (a) 4
 - (b) 3
 - (c) 2
 - (d) -4

9. The refractive index of glass is $3/2$. The velocity of light in glass is
 - (a) $3 \times 10^8 \text{ m/s}$
 - (b) $2 \times 10^8 \text{ m/s}$
 - (c) 10^8 m/s
 - (d) $1.33 \times 10^8 \text{ m/s}$

10. Which phenomenon is not explained on the basis scattering of light?
 (a) White colour of clouds
 (b) Blue colour of clear sky
 (c) Red colour of danger signals
 (d) Advanced sunrise
11. A ray of light falls on one face of an equilateral glass prism at 40° and emerges from the other face at the same angle. The deviation suffered by the ray is
 (a) 20°
 (b) 40°
 (c) 60°
 (d) 80°
12. Two refractions on passing through the prism occur at
 (a) E and A
 (b) E and B
 (c) A and B
 (d) E and F
13. The ray FRS is
 (a) emergent ray
 (b) refracted ray
 (c) incident ray
 (d) none of these
14. Angle of deviation through a prism of angle 60° when angles of incidence and emergence are 40° each is:
 (a) 40°
 (b) 30°
 (c) 60°
 (d) None of these
15. Four friends went to a picnic. The weather was pleasant. They played various games and then had snacks. Suddenly, Shyam, one of them, noticed seven colours in the sky. He said to others, “Wow, what a rainbow!”

Then Ram, one of them, asked him “What is Rainbow”? He then explained to all about its formation. After that everyone in the group thanked him for the knowledge, he had given to them.

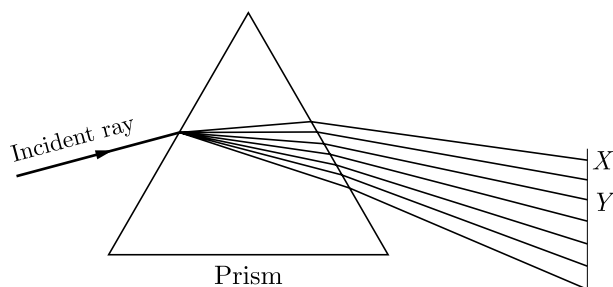
The device can be used to obtain such phenomenon is:

- (a) Lens
 (b) Mirror
 (c) Prism
 (d) Glass plate

16. A prism is a transparent medium which has triangular bases and rectangular lateral surfaces.
 (a) two, three
 (b) three, two
 (c) one, two
 (d) two, four

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17.

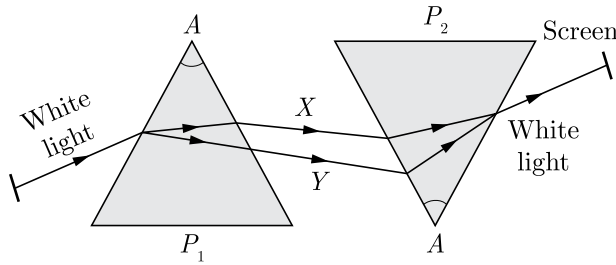


Dispersion of light by glass prism is shown in the above figure. Here x and y indicates and colour respectively.

- (a) red, blue
 (b) red, indigo
 (c) red, yellow

(d) violet, green

18.



Here X and Y indicates:

- (a) Green colour, violet colour
- (b) Red colour, violet colour
- (c) Violet colour, red colour
- (d) Green colour, red colour

19. The relation between intensity of scattered light (I) and wavelength (λ) is:

- (a) $I \propto \frac{1}{\lambda^2}$
- (b) $I \propto \frac{1}{\lambda^3}$
- (c) $I \propto \frac{1}{\lambda}$
- (d) $I \propto \frac{1}{\lambda^4}$

20. Which of following suffers least division on passing through a prism?

- (a) red
- (b) green
- (c) yellow
- (d) violet

21. The angle between the refracting surfaces of prism is called angle of

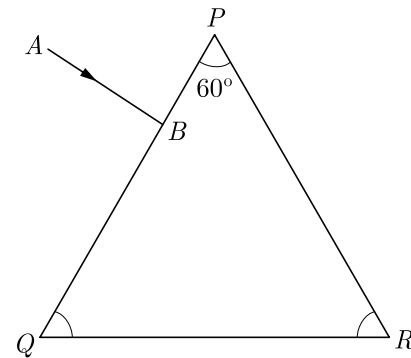
- (a) refraction
- (b) prism
- (c) reflection
- (d) both (a) and (b)

22. Which of following gives monochromatic

light?

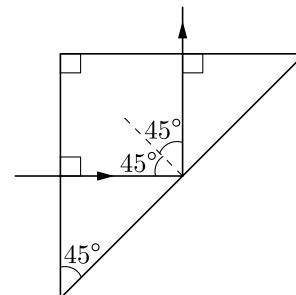
- (a) Sodium lamp
- (b) Mercury lamp
- (c) Spark lamp
- (d) All of the above

23. In given figure, a light ray AB is incident normally on one face PQ of an equilateral glass prism. The angles at faces PR is:



- (a) 60°
- (b) 30°
- (c) 45°
- (d) 90°

24. A light ray is incident perpendicularly to one face of a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45° , we conclude that the refractive index

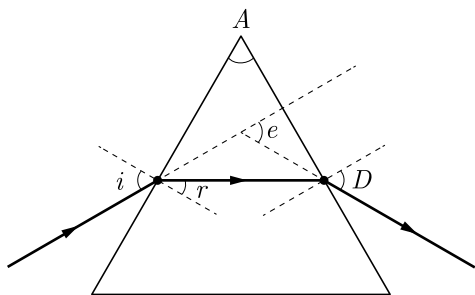


- (a) $n > \frac{1}{\sqrt{2}}$

- (b) $n > \sqrt{2}$
- (c) $n < \frac{1}{\sqrt{2}}$
- (d) $n < \sqrt{2}$

25. Which of the following statements is correct regarding the propagation of light of different colours of white light in air?
- (a) Red light moves the fastest.
 - (b) Blue light moves faster than green light.
 - (c) All the colours of the white light travel with the same speed.
 - (d) Yellow light moves with the mean speed as that of red and the violet light.

26. In the following diagram, the correctly marked angles are



- (a) All
 - (b) Only $\angle i$ and $\angle A$
 - (c) $\angle i$, $\angle r$ and $\angle A$
 - (d) $\angle i$, $\angle A$ and $\angle D$
27. During the experiment, to trace the path of ray of light through the glass prism, students reported at the following observations:
1. The ray of light from air to glass at the first refracting surface bends away from the normal after refraction.
 2. At the second refracting surface, light rays entered from air to glass.
 3. Light ray suffers two refractions on passing through a prism and in each refraction it

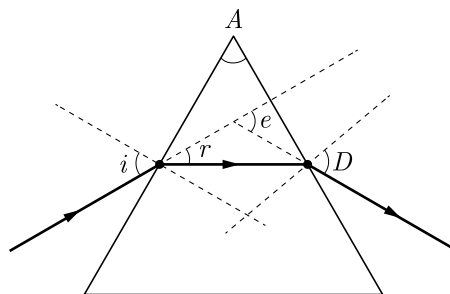
- bends towards the base of the prism.
4. Light ray suffers two refractions on passing through a prism. In first refraction it bends away from the normal while in the second refraction it bends towards the normal.

The correct observation(s) is/are:

- (a) 1 and 2 only
- (b) 3 only
- (c) 2 and 4 only
- (d) 1 and 4 only

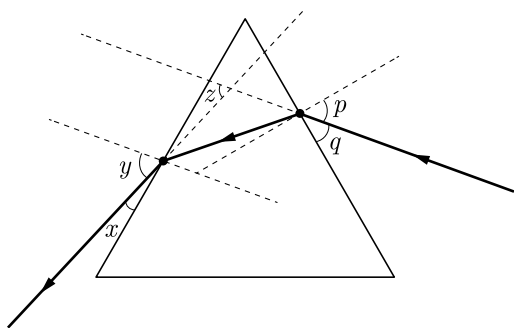
28. In an experiment to trace the path of a ray of light through a triangular glass prism, a student would observe that the emergent ray
- (a) is parallel to the incident ray.
 - (b) is along the same direction of incident ray.
 - (c) gets deviated and bends towards the thinner part of the prism.
 - (d) gets deviated and bends towards the thicker part (base) of the prism.

29. Study the following figure in which a student has marked the angle of incidence $\angle i$, angle of refraction $\angle r$, angle of emergence $\angle e$, angle of prism $\angle A$ and the angle of deviation $\angle D$. The correctly marked angles are:



- (a) $\angle A$ and $\angle i$
- (b) $\angle A$, $\angle i$ and $\angle r$
- (c) $\angle A$, $\angle i$, $\angle e$ and $\angle D$
- (d) $\angle A$, $\angle i$, $\angle r$ and $\angle D$

30. Study the following ray diagram:



In this diagram, the angle of incidence, the angle of emergence and the angle of deviation respectively have been represented by

- (a) y, p, z
- (b) x, q, z
- (c) p, y, z
- (d) p, z, y

31. **Assertion :** Planets do not twinkle.

Reason : Planets do not show the phenomenon of scattering.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

32. **Assertion :** A rainbow is a natural spectrum appearing in the sky after a rain shower.

Reason : It is caused by reflection of sunlight by tiny water droplets present in the atmosphere.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

33. **Assertion :** A prism deviates a ray of light towards its base.

Reason : Both refracting sides scatter the light.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

34. **Assertion :** Blue colour of sky appears due to scattering of blue colour.

Reason : Blue colour has longest wave length in visible spectrum.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Both Assertion and Reason are false.

35. **Assertion :** In case of rainbow, light at the inner surface of the water drop gets internally reflected.

Reason : The angle between the refracted ray and normal to the drop surface is greater than the critical angle.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Direction For Questions (36-40)

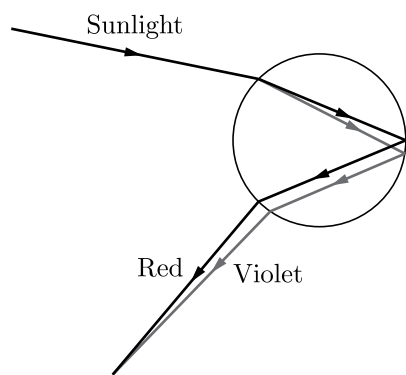
A beautiful atmospheric phenomenon

commonly seen after rain is the rainbow. The colourful arc of a rainbow across the sky is the result of several optical effects: refraction, internal reflection and dispersion. But the conditions must be just right. As we all know, a rainbow is seen after a rain but not after every rain.

Following a rain, there are many tiny water droplets in the air. Sunlight incident on the droplets in air produces a rainbow. But whether a rainbow is seen depends on the relative positions of the Sun and the observer. As you may have noticed, the Sun is generally behind you when you see a rainbow.

To understand the formation and observation of a rainbow, consider what happens when sunlight is incident on a water droplet. On entering the droplet, the light is first refracted and then dispersed into component colours as it travels in the water.

These seven colours strike the inner surface of the water drop and get internally reflected. The reflected light is refracted again as it comes out of the drop as shown in figure.



36. Which of the following phenomena of light are involved in the formation of a rainbow?
- (a) Reflection, refraction and dispersion
 - (b) Refraction, dispersion and total internal reflection
 - (c) Refraction, dispersion and internal reflection

- (d) Dispersion, scattering and total internal reflection

37. Which phenomenon does not occur during rainbow formation?
- (a) Refraction
 - (b) Induction
 - (c) Dispersion
 - (d) Reflection
38. The order of wavelength of red, yellow and orange is
- (a) $\text{yellow} < \text{orange} < \text{red}$
 - (b) $\text{yellow} > \text{orange} > \text{red}$
 - (c) $\text{orange} > \text{red} > \text{yellow}$
 - (d) none of these
39. The order of frequency of the seven colours of rainbow is
- (a) $V = I = B = G = Y = O = R$
 - (b) $V > I > B > G > Y > O > R$
 - (c) $I < B < Y < G < O < R < V$
 - (d) none of the above
40. Which of the seven colours travels fastest in a medium?
- (a) Red
 - (b) Yellow
 - (c) Green
 - (d) Orange

Answer Key

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
(c)	(b)	(c)	(b)	(c)	(d)	(b)	(d)	(b)	(d)
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
(a)	(d)	(a)	(d)	(c)	(a)	(c)	(b)	(d)	(a)
21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
(b)	(d)	(a)	(b)	(c)	(c)	(b)	(d)	(a)	(c)
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
(c)	(c)	(c)	(c)	(a)	(c)	(b)	(a)	(a)	(a)

□□□□□□□□

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