HUMAN EYE VISION NUMERICALS

1. A person with a myopic eye cannot see objects beyond 1.2 m distinctly. What should be the nature of corrective lens to restore proper vision?

2. The near point of a hypermetropic eye is at 75 cm from the eye. What is the power of the lens required to enable him to read clearly a book held at 25 cm from the eye?

3. A myopic person uses specs of power – 0.5 D. What is the distance of far point of his eye?

4. A person wants to read a book placed at 20 cm, whereas near point of his eye is 30 cm. calculate the power of the lens required.

5. The far point distance of a short sighted person is 1.5 meters. find the focal length, power and nature of the remedial lens?

6. A person having a myopic eye uses a concave lens of focal length 10 cm. Find the power of the lens.

7. A person with myopic eye cannot see objects beyond 1.2 m distinctly. What should be the nature of corrective lenses to restore proper vision?

8. 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 to correct the problem.

9. Case Based :
Consider a boy who has a eyeball of diameter 2cm, he is (i) reading a book and (ii) watching a tree.
The book is held at a distance of 30 cm and the tree is at a distance of 3m from the

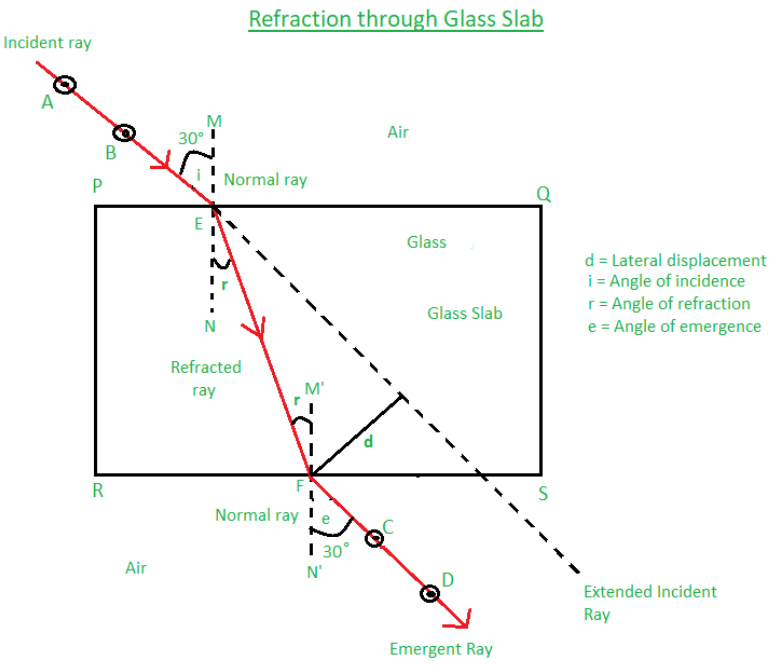
eye. In both the cases, find u,v,f

(i) f_1 = 1.875 cm, P_1 = 53.33 D

(ii) f = 1.98 cm, P_2 = 50.5 D

Refraction by Glass Slab

Short Video to understand dispersion for specifically 10 grade exams.
https://youtu.be/ZTbNDe0yNCQ



1. What is angle of incidence at the first interface in the above diagram.

2. What is angle of refraction at the first interface in the above diagram.

3. What is angle of incidence at the second interface in the above diagram.

4. What is angle of refraction at the second interface in the above diagram.

5. Why are normals MN and M'N' parallel to each other? Does that make EF a transversal? Are angles NEF and M'FE same?

6. Are FD and ES parallel? If yes, what is the distance between them called?

7. If the refracting index of glass slab = 1.5, write Snell's law (relating angles i and r)

8. If the speed of light in air is c, what is the speed of light in glass.

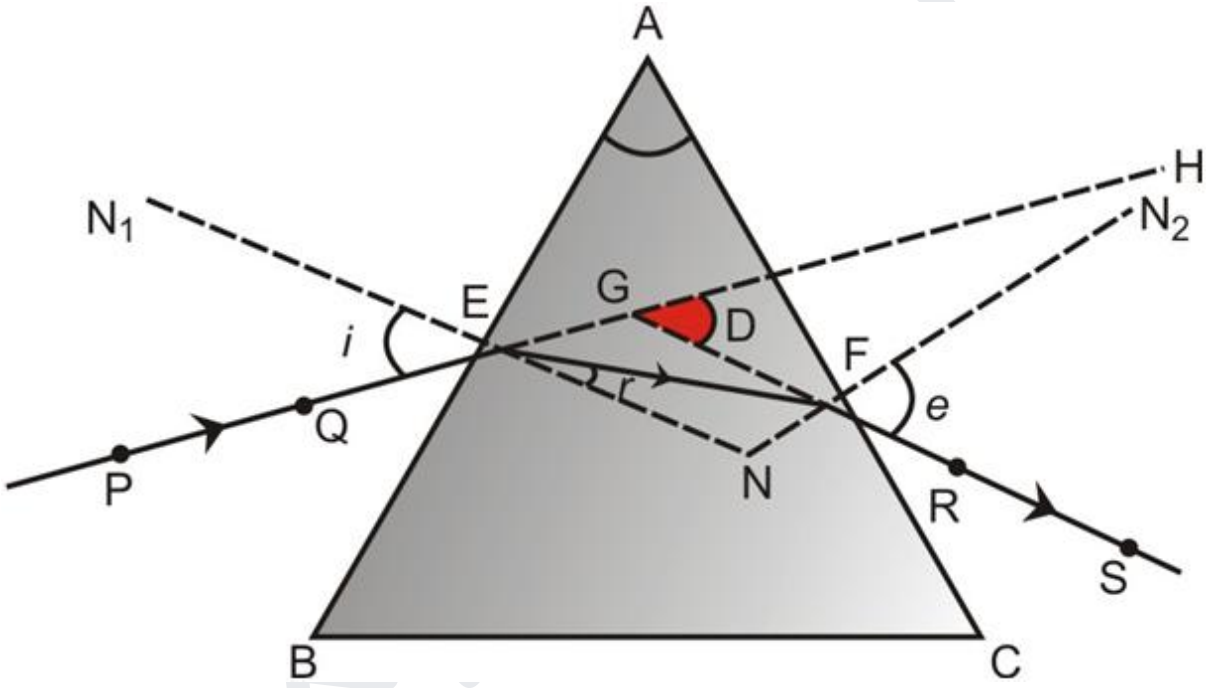
9. If the frequency of light in air is f, what is the frequency of light in glass.

10. If the wavelength of light in air is λ, what is the wavelength of light in glass.

11. When light leaves the glass slab, what is the angle of incidence at the glass side.

12. Show that the angle of emergence e (angle of refraction at second interface) is equal to angle of incidence at the first interface.

Refraction by a Prism



1. What is angle of incidence at the first interface in the above diagram.

2. What is angle of refraction at the first interface in the above diagram.

3. What is angle of incidence at the second interface in the above diagram.

4. What is angle of refraction at the second interface in the above diagram.

5. Why are normals N_1N and NN_2 parallel to each other? Does that make EF a transversal? Are angles NEF and NFE same?

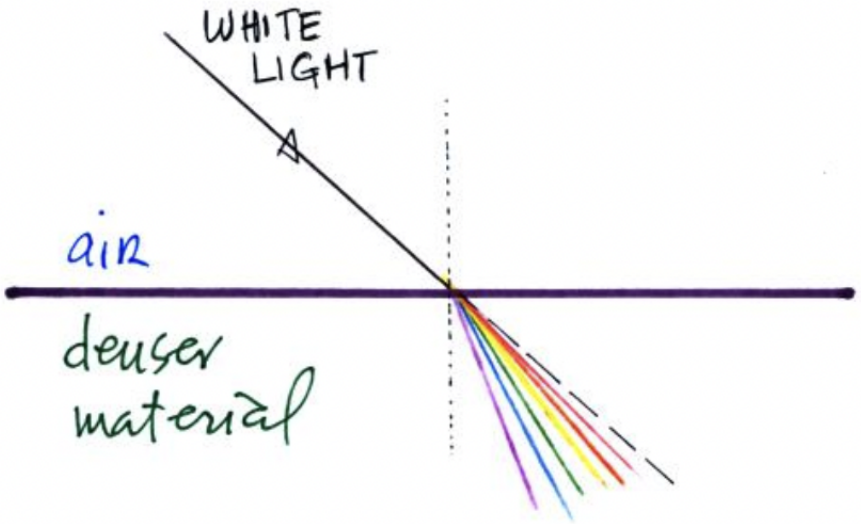
6. Which is the emergent ray?

7. What is the angle between incident ray and emergent ray?

8. If the refracting index of glass slab = 1.5, write Snell's law (relating angles i and r_1) at first interface

9. If the refracting index of glass slab = 1.5, write Snell's law (relating angles r_2 and e)

Dispersion



1. Arrange in the order of increasing wavelength : Red , blue , green, yellow

2. Arrange in the order of increasing refractive index : Red , blue , green, yellow

3. Which has higher speed in vacuum ? Red or Blue light.

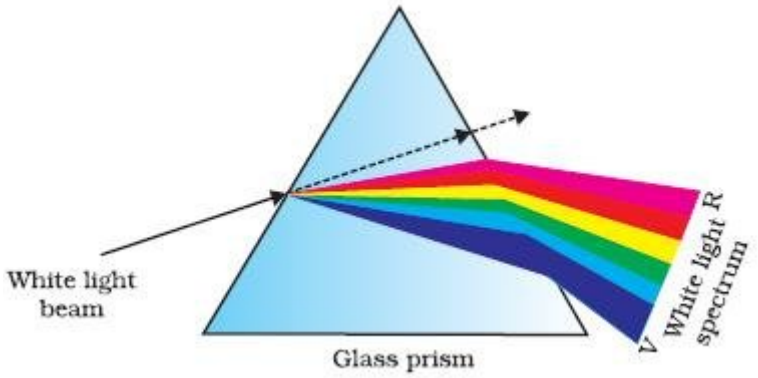
4. Which has higher speed in glass ? Red or Blue light.

5. Which bends more when light enters from air to glass. Red or Blue light.

6. Which is slower in glass? Red or Blue light.

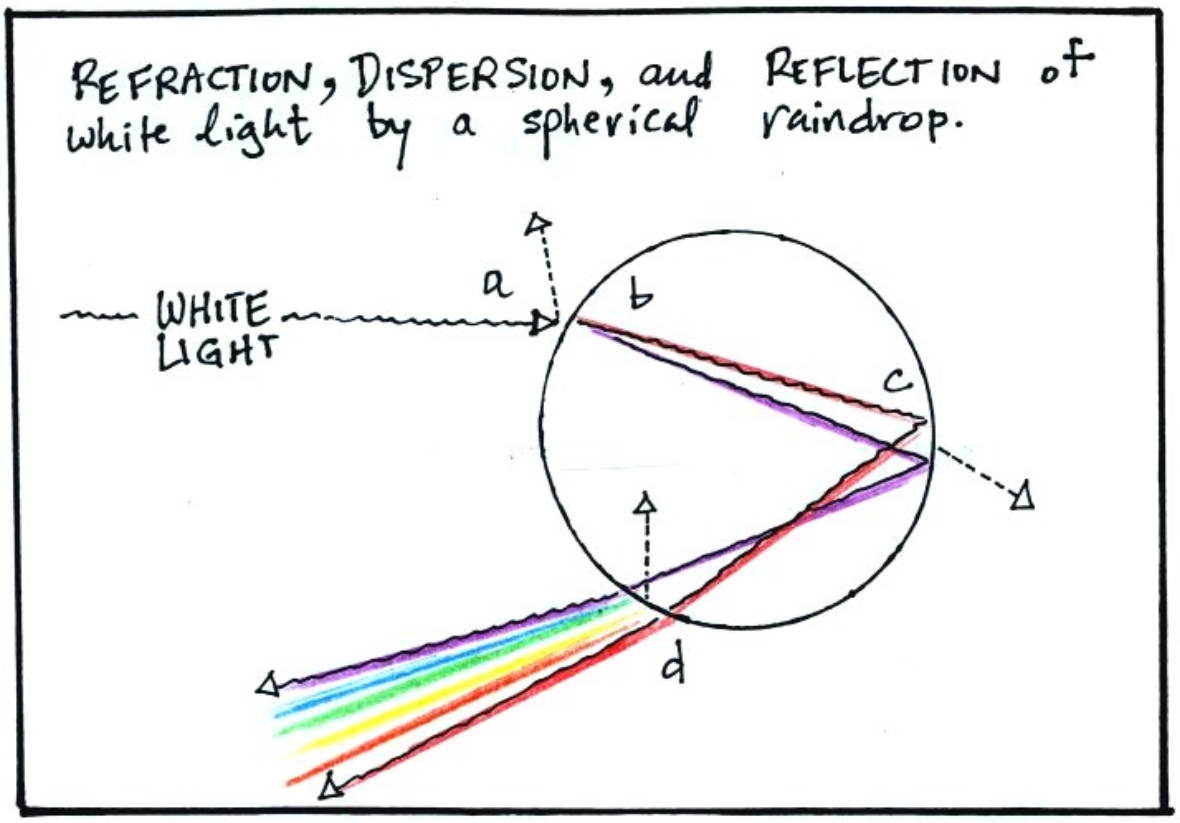
7. Which has lower wavelength in glass? Red or Blue light.

8. Which has lower frequency in glass? Red or Blue light.



9. Explain why Violet light is separated at the bottom of the spring?

Rainbow Formation & other natural phenomena :



1. Rainbow is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. A rainbow is always formed in a direction opposite to that of the Sun

2. Explain the structure and functioning of Human eye. How are we able to see nearby as well as distant objects?

3. When do we consider a person to be myopic or hypermetropic? Explain using diagrams how the defects associated with myopic and hypermetropic eye can be corrected?

4. Explain the refraction of light through a triangular glass prism using a labelled ray diagram. Hence define the angle of deviation

http://www.atmo.arizona.edu/students/courselinks/spring13/atmo170a1s1/1S1P_stuff/atmos_optical_phenomena/optical_phenomena.html

Detailed video of Dispersion in glass slab, prism and other geometries.
Animation of Dispersion.
https://youtu.be/MMBaPweoFaI

TIR & rainbow
https://youtu.be/dDWWV85fyF0