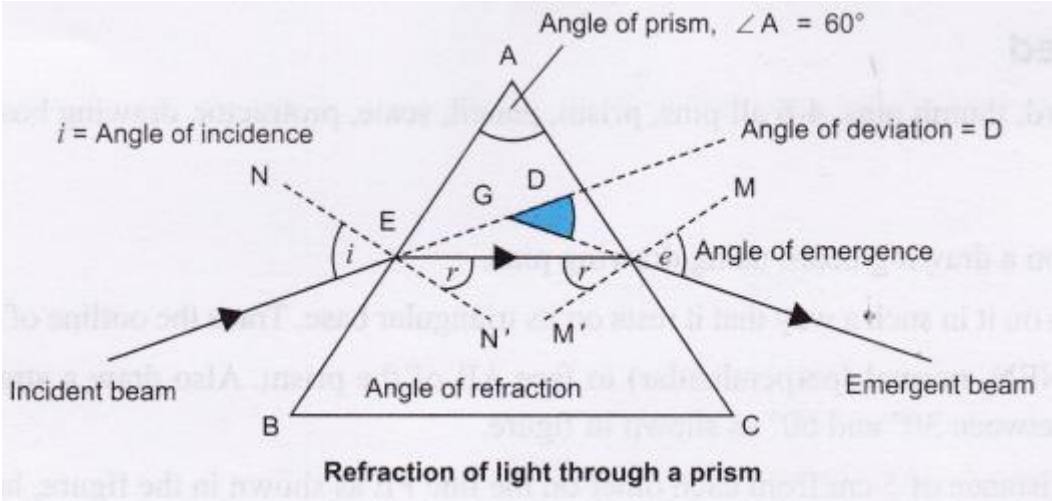
BASIC PROBLEMS RELATED TO PHENOMENON RELATED TO LIGHT

QUESTION1: Explain the refraction of light through a prism.

ANSWER: Refraction of light is the bending of light when it goes from one medium to another so, when a ray of light passes through a glass prism, refraction of light occurs both, when it enters the prism and when it leaves the prism. Thus, the light ray gets deviated.



Refraction of light through a prism

QUESTION: What is dispersion of light? What is scattering of light?

ANSWER: DISPERSION

The splitting of white light into its 7 constituent colours is called dispersion of light.

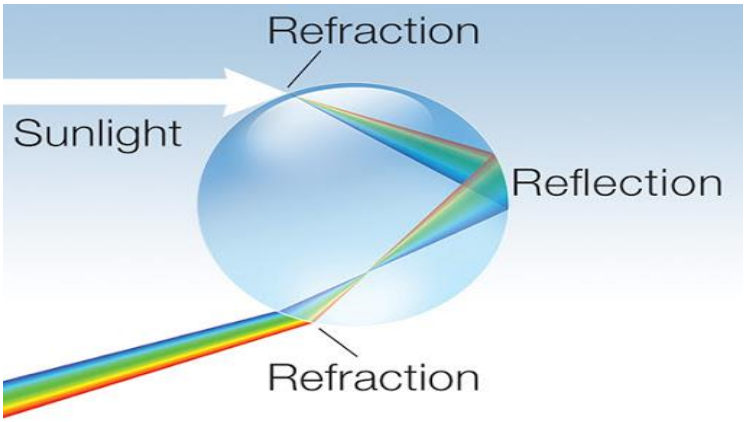
SCATTERING OF LIGHT

Scattering of light is he phenomenon in which light rays get deviated from its straight path on striking an obstacle like dust particles, water vapour, etc.

1) When light strikes a particle whose diameter is greater than the wavelength of light, then white light gets scattered.
2) When light strikes a particle whose diameter is comparable to the wavelength of light, the light breaks into its constituent colours and light with shortest wavelength(violent and blue) gets scattered the most.

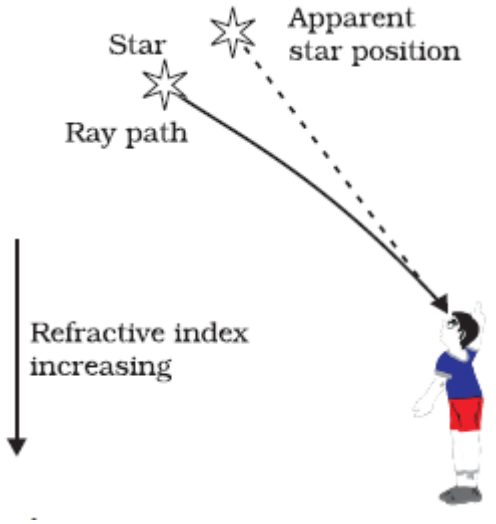
QUESTION: How is a rainbow formed?

ANSWER: White light enters the water droplet (suspended in the air) which acts as a prism. Refraction , total internal reflection and then refraction of light occurs.



QUESTION: What is meant by the apparent position of stars?

ANSWER: Due to the turbulence and temperature difference, the atmosphere is assumed to consist of different layers. These layers have different refractive index due to which the light coming from the stars bend while travelling through the atmosphere. This bending causes the image of the star to be formed above the actual position of the star. Hence, the stars appear to be at a different position than where they actually are.

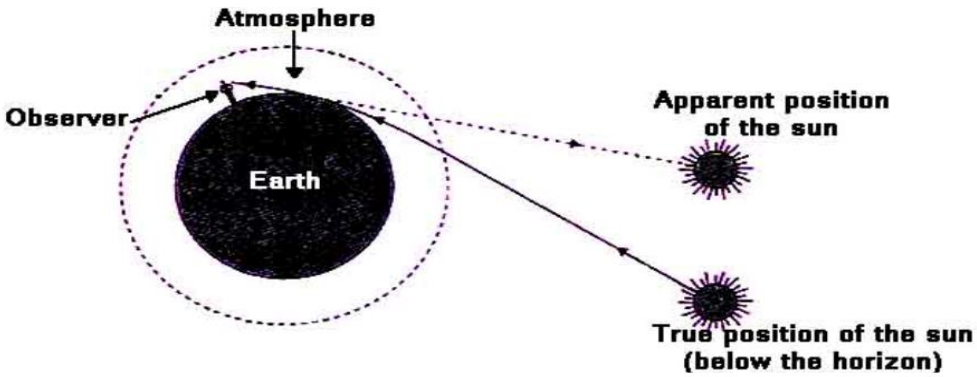


QUESTION: Why do stars twinkle?

ANSWER: Due to change in the temperature of different layers in atmosphere of the Earth. The light coming from the star deviates from the observer and fluctuating amount of light is received by the observer. This causes the star to twinkle.

QUESTION: Why there is early sunrise and delayed sunset?

ANSWER: When the sun is actually below the horizon. The light coming from the sun refracts and is received by the observer. Thus the sun appears to be above the horizon. This causes early sunrise and delayed sunset, net 4 minutes are increased in the day time (2 min during sunrise and 2 min during sunset).



QUESTION: Why does the sky appears blue?

ANSWER: When sunlight (White light) enters the atmosphere, it strikes the particles in the atmosphere which are comparable to the wavelength of light. Thus light breaks into its spectrum of seven colours (VIBGYOR) and light with shortest wavelength (violet and blue) gets scattered the most. The observer on ground receives this scattered light. Our eyes are sensitive towards blue colour. Hence, the Sky appears blue.

QUESTION: Why does sun appears red during sunrise and sunset?

ANSWER: When sun is near horizon, the white light from the sun has to travel larger distance as compared when sun is during daytime (because of the shape of the earth). Thus, colour having shortest wavelength (blue and violet) gets scattered the most. The longest wavelength light (orange and red) is left, which is received by the observer on ground. Hence, the sun appears red during sunrise and sunset.