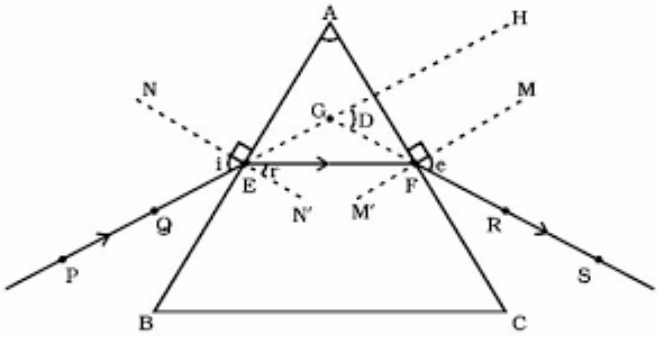
CLASS- X	TOPIC- HUMAN EYE AND THE COLOURFUL WORLD
SUBJECT- PHYSICS	PREPARED BY- MRS.JITENDER V SKARIA

Refraction of Light through Prim:

A triangular glass prism is a transparent object made of glass having two triangular bases and three rectangular lateral surfaces. These surfaces are inclined to each other. The angle between its two lateral faces is called the angle of the prism.

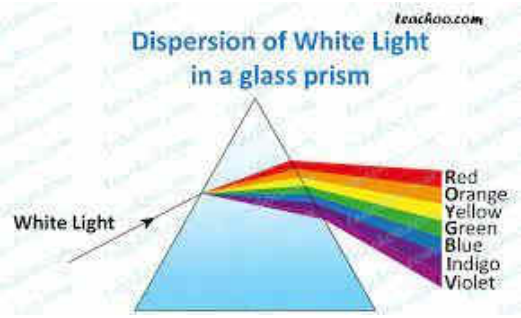
The refraction of light through the rectangular sides of the prism (which are not parallel to each other) is different in behavior then the refraction of the ray through a rectangular slab (where faces are parallel).

- The incident ray PQ is incident is going from air (rarer medium) into glass (denser medium), so it bends towards the normal NN' and goes along the direction EF inside the glass prism. Thus EF is the refracted ray of light which bends towards the base BC of the prism.
- When the ray of light EF travelling in the glass prism comes out into air at point F, refraction takes place again.
- Since the ray EF is going from the glass (denser medium) into air (rarer medium), the ray bends away from the normal MM' and goes along the direction RS in the form of emergent ray.



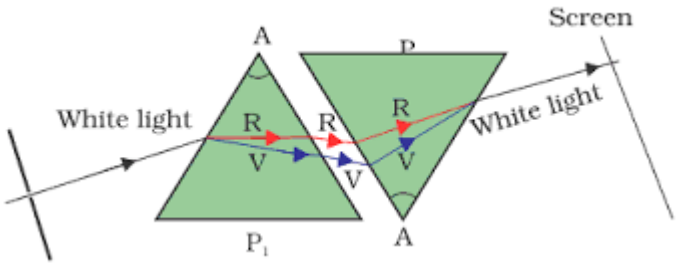
DISPERSION OF WHITE LIGHT BY A GLASS PRISM

The phenomenon of splitting of white light into its seven constituent colours when it passes through a glass prism is called dispersion of white light. The various colours seen are Violet, Indigo, Blue, Green, Yellow, Orange and Red. The sequence of colours remembers as VIBGYOR. The band of seven colours is called the spectrum. The different component colour of light bendsat a different angle with respect to the incident angle. The violet light bends the least while the Red bends the most.



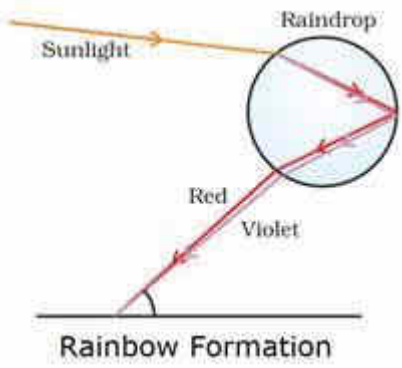
Recombination of white light: Newton found that when an inverted prism is placed in the pathof dispersed light then after passing through the prism, they recombine to form white light.

Issac Newton: He was the first, who obtained spectrum of sunlight by using glass prism. He triedto split the spectrum of white light more by using another similar prism, but he could not get any more colours.
He repeated the experiment using second prism in inverted position with respect to the first prism. It allowed all the colours of spectrum to pass through second prism. He found white lightemerges on the other side of second prism.



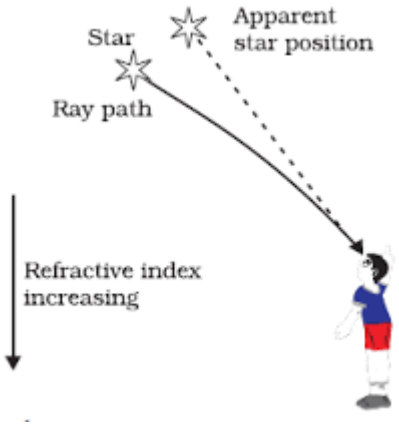
Rainbow: It is the spectrum of sunlight in nature. It is formed due to the dispersion of sunlightby the tiny water droplet, present in the atmosphere.

Formation of the rainbow: The water droplets act like small prism. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out ofthe raindrop. Due to the dispersion of light and internal reflection, different colours reach theobserver's eye.
Red colour appears on top and violet at the bottom of rainbow. A rainbow
is always formed in a direction opposite to that of Sun.



Atmospheric Refraction: The refraction of light caused by the Earth's atmosphere (having airlayers of varying optical densities) is called Atmospheric Refraction.

Appearance of Star Position: It is due to atmospheric refraction of star light. The temperature and density of different layer of atmosphere keeps varying. Hence, we havedifferent medium. Distant star act as point source of light. When the starlight enters the Earth's atmosphere, it undergoes refraction continuously, due to changing refractive index i.e. from Rarer to denser. It bends towards the normal. Due to this, the apparent position of the star is different from actual position. The star appearshigher than its actual position.



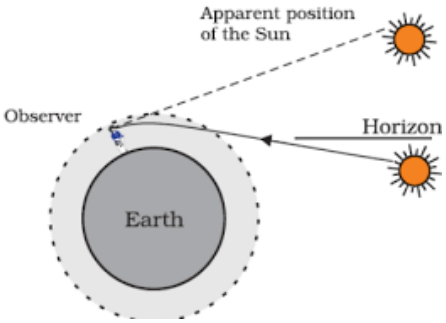
Twinkling of Star: It is also due to atmospheric refraction. Distant star act like a point source of light. As the beam of starlight keeps deviating from itspath, the apparent position of star keeps on changing because physical condition of earth's atmosphere is not stationary. Hence, the amount of light enters our eyes fluctuate sometimes bright and sometime dim. This gives twinkling effect to stars.

Why planets do not twinkle?

Planets are closer to earth and are seen as extended source of light i.e. the collection of largenumber of point sized sources of light. Therefore the total amount of light entering our eyes from all individual point source will nullify the twinkling effect.

ADVANCED SUNRISE AND DELAYED SUNSET

Actual sun rise happens when it is below the horizon in the morning. The rays of light from the sun below the horizon reach our eyes because of refraction of light. Similarly, the sun can be seen about few minutes after the actual sun set. Thus the duration of, day time will increase by4 minutes.
This is due to atmospheric refraction.


Apparent position
of the Sun
Observer
Horizon
Earth

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