

## Home Assignment

- (1) Can a beam of light when passed through a hollow prism give spectrum?

Spectrum is produced by the deviation of different colours by the refraction.

When the white light travels from air into the hollow prism, there is no change of medium, as prism has air inside.

Thus, a beam of light does not give spectrum on passing through hollow prism.

- (2) Why do different components of white light deviate by a different amounts when passed through prism?

It occurs because the light is made up of seven different colours or wavelengths and thus behave differently upon hitting the prism. It is such that the refractive index of each wavelength varies which splits the single white light; causing dispersion.

(3) The angle of prism is 60 degrees. What is the angle of incidence for minimum deviation for the prism with refractive index  $\sqrt{2}$ .

$$\text{Angle of prism} = A = 60^\circ$$

$$\text{Refractive index} = \mu = \sqrt{2} = 1.414$$

$$\mu = \frac{\sin \left( \frac{D + A}{2} \right)}{\sin \left( \frac{A}{2} \right)}$$

$$\Rightarrow \mu = 2 \sin \left( \frac{D + 60}{2} \right)$$

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$$\Rightarrow \frac{1}{\sqrt{2}} = \sin \left( \frac{D + 60}{2} \right)$$

$$\Rightarrow 45 = \frac{D + 60}{2}$$

$$\Rightarrow 90 = D + 60$$

$$\Rightarrow D = 90 - 60 = 30^\circ$$