

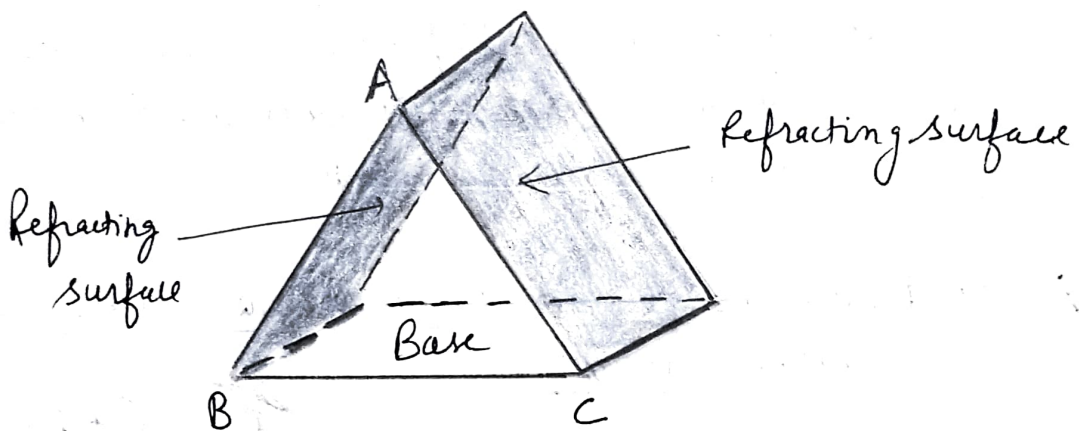
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Subject: PHYSICS

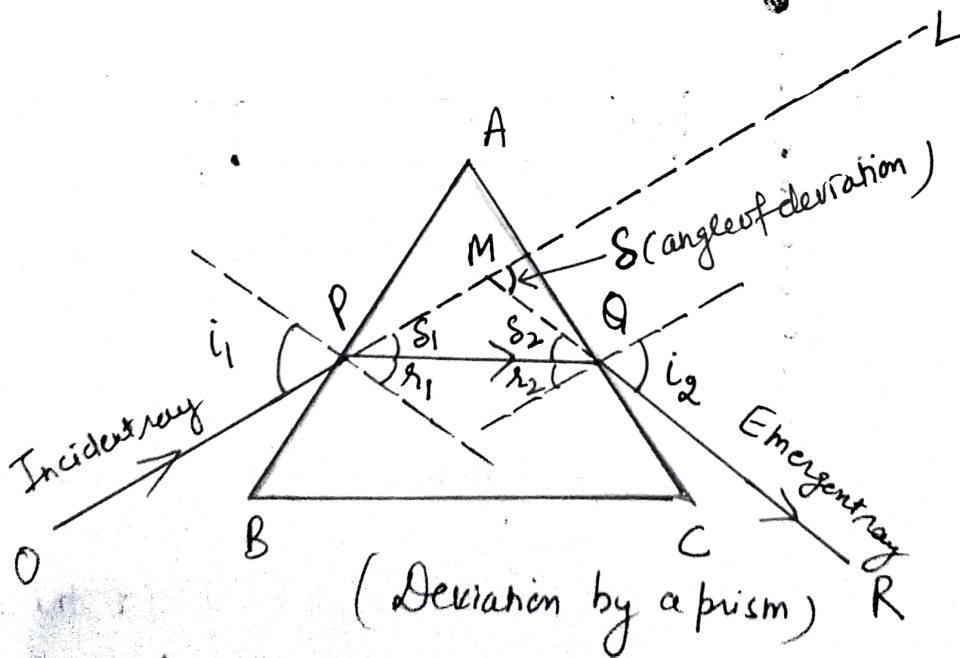
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Chapter 4(b) [Refraction of Light through A Prism]
CLASS-IX

Prism $\rightarrow$ A transparent medium bounded by five plane surfaces with a triangular cross-section.



$\Rightarrow$ Refraction of Light through a Glass prism.



Thus on passing through a prism, a ray of light suffers refraction at two refracting faces AB and AC of the prism.

At the first face AB of the prism, incident ray OP suffers a deviation by angle $\angle MPQ$ equal to δ_1 . At the second face AC, the refracted ray PQ suffers a deviation by an angle $\angle M'QP$ equal to δ_2 . In the absence of prism, the incident ray OP would have travelled along OPML but the prism has deviated it along QR. So, the total deviation in the incident ray & produced by the prism is shown by the angle $\angle LMQ = \delta$ (which is the angle between the direction of incident ray (when produced forward) and the emergent ray (when produced backward); This angle is called angle of deviation (δ).

From the diagram; $\delta_1 + \delta_2 = \delta$ — ①

also $\delta = (i_1 + i_2) - A$ — ②

⇒ Factors Affecting the angle of Deviation: →

① Angle of incidence (i)

② The material of the prism: → (or Refractive index) →

A prism of higher refractive index will produce more deviation than the prism of lower refractive index.

③ Angle of prism (A): → Angle of deviation (δ) increases with the angle of prism.

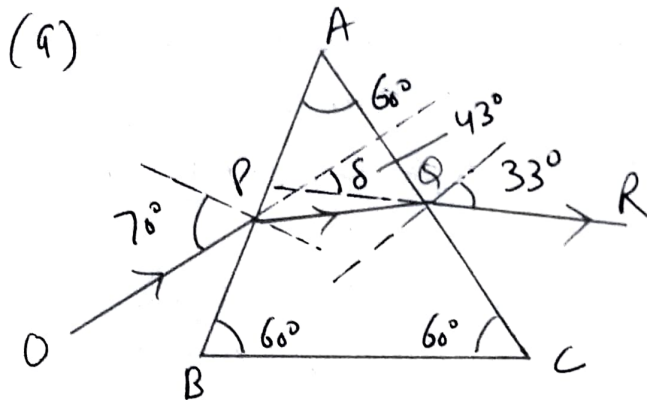
④ wavelength or colour of light used: → Angle of deviation is directly proportional to the refractive index of given medium.

for the visible light; the refractive index of the material of a prism is minimum for Red colour: ($\because \lambda \propto \frac{1}{\mu}$ ($\lambda_R > \lambda_V$)
 $\therefore \mu_R < \mu_V$)

So, Red colour light suffers less deviation than the Violet colour.

OR $\boxed{\delta_R < \delta_V}$

* Deviation at different angles of Incidence $\rightarrow$
for Equilateral Prism $\rightarrow$



When angle of incidence (i_1) = 70°
 angle of emergence (i_2) = 33°

So angle of deviation; $S = (i_1 + i_2) - A = (70^\circ + 33^\circ) - 60^\circ$
 $= 103^\circ - 60^\circ$
 $\boxed{S = 43^\circ}$

(b) $i_2 = 48^\circ, i_1 = 48^\circ$ So $S = (i_1 + i_2) - A = [(48^\circ + 48^\circ) - 60^\circ]$
 $= (96^\circ - 60^\circ)$
 $S = 36^\circ$

