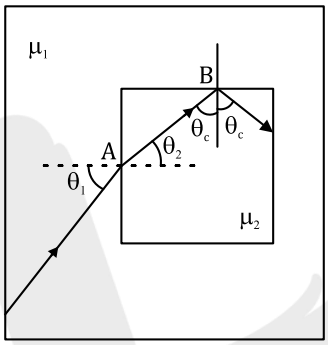
DPP 04

1. A light ray incident from glass $\left(\mu = \frac{3}{2}\right)$ to air interface. Find the angle of incidence at which deviation angle of light will becomes 90°.

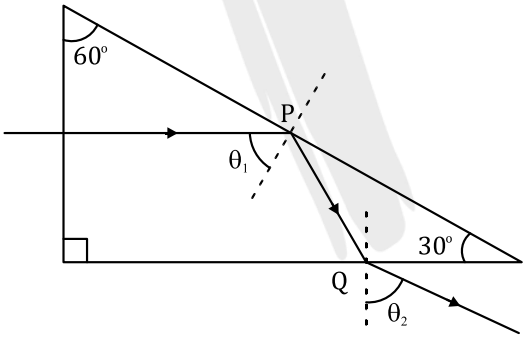
2. A ray of light is incident on the left vertical face of a glass cube of refractive index μ_2, as shown in figure. The plane of incident is the plane of the page, and the cube is surrounded by liquid of refractive index μ_1. What is the largest angle of incidence θ_1 for which total internal reflection occurs at the top surface?



(A) $\sin 1 = \sqrt{\left(\frac{\mu_2}{\mu_1}\right)^2}$ (B) $\sin 1 = \sqrt{\left(\frac{\mu_2}{\mu_1}\right)^2 + 1}$

(C) $\sin 1 = \sqrt{\left(\frac{\mu_1}{\mu_2}\right)^2 + 1}$ (D) $\sin 1 = \sqrt{\left(\frac{\mu_1}{\mu_2}\right)^2 + 1}$

3. A ray of light is incident normally on one face of $30° - 60° - 90°$ prism of refractive index $\frac{5}{3}$, immersed in water of refractive index $\frac{4}{3}$ as shown in the figure.



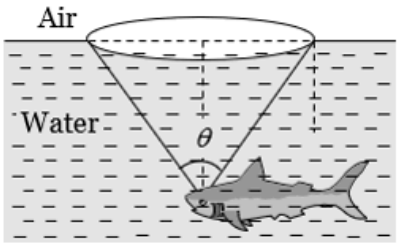
(A) The exit angle θ_2 of the ray is $\sin^{-1}\left(\frac{5}{8}\right)$

(B) The exit angle θ_2 of the ray is $\sin^{-1}\left(\frac{5}{4\sqrt{3}}\right)$

(C) Total internal reflection at point ceases if the refractive index of water in increased to $\frac{5}{2\sqrt{3}}$ by dissolving some substance

(D) Total internal reflection at point P ceases if the refractive index of water is increased to $\frac{5}{6}$ by dissolving some substance

4. A fish is a little away below the surface of a lake. If the critical angle is 49°, then the fish could see things above the water surface within an angular range of θ° where

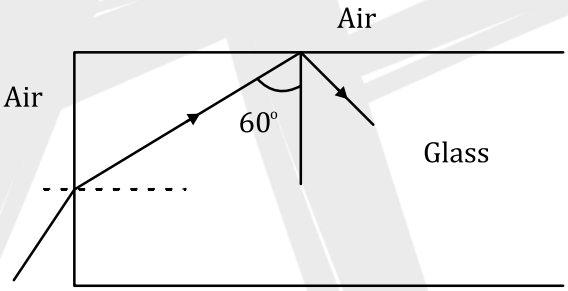


(A) $\theta = 49°$ (B) $\theta = 90°$ (C) $\theta = 98°$ (D) $\theta = 24\frac{1^\circ}{2}$

5. Glass has refractive index μ with respect to air and the critical angle for a ray of light going from glass to air is θ. If a ray of light is incident from air on the glass with angle of incidence θ, the corresponding angle of refraction is

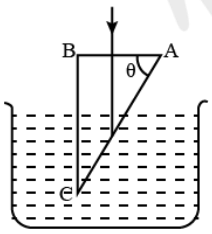
(A) $\sin^{-1}\left(\frac{1}{\sqrt{\mu}}\right)$ (B) 90° (C) $\sin^{-1}\left(\frac{1}{\mu^2}\right)$ (D) $\sin^{-1}\left(\frac{1}{\mu}\right)$

6. A light ray from air is incident (as shown in figure) at one end of a glass fiber (refractive index $\mu = 1.5$) makry an incidence angle of 60° on the lateral surface, so the it undergoes a total internal reflection. How much fine would it take to traverse the straight fiber of length 1 km



(A) 3.33μsec (B) 6.67μsec (C) 5.77μsec (D) 3.85μsec

7. A glass prism ($\mu = 1.5$) is dipped in water ($\mu = 43$ as shown in figure. A light ray is incident normally on the surface AB. It reaches the surface BC after totally reflected, if



(A) $\sin\theta \geq 8/9$ (B) $2/3 < \sin\theta < 8/9$

(C) $\sin\theta \leq 2/3$ (D) It is not possible

ANSWER KEY

1. 45° **2.** (A) **3.** (A,C) **4.** (C) **5.** (C) **6.** (D) **7.** (A)