

$$\text{الف) } \frac{r}{1\lambda_0} = \frac{R\alpha d}{\pi} \rightarrow r \times \frac{\pi}{1\lambda_0} = \frac{r \pi}{\lambda_0}$$

$$\frac{D}{1\lambda_0} = \frac{G}{\lambda_{00}} = \frac{R\alpha d}{\pi}$$

①

$$\text{ب) } \frac{12\lambda}{1\lambda_0} = \frac{R\alpha d}{\pi} \rightarrow \frac{12\lambda}{\lambda_0} \times \frac{\pi}{1\lambda_0} = \frac{12\pi}{\lambda_0}$$

$$\text{ج) } \frac{D}{1\lambda_0} = \frac{\frac{\Delta \pi}{12}}{\pi} \rightarrow \frac{\Delta \pi}{12} \times \frac{1\lambda_0}{1\lambda_0} \times \frac{1}{\pi} = \frac{\Delta \lambda}{12}$$

$$\text{د) } \frac{D}{1\lambda_0} = \frac{\frac{\pi}{9}}{\pi} \rightarrow \frac{\pi}{9} \times \frac{1\lambda_0}{1\lambda_0} \times \frac{1}{\pi} = \frac{1\lambda_0}{9}$$

$$\frac{12\lambda}{9} = \frac{D}{1\lambda_0} \rightarrow \frac{12\lambda}{9} \times \frac{1\lambda_0}{1\lambda_0} \times \frac{1}{\pi} = 12\lambda$$

②

$$\frac{D}{1\lambda_0} = \frac{\frac{\alpha \pi}{\lambda}}{\pi} \rightarrow \frac{\alpha \pi}{\lambda} \times \frac{1\lambda_0}{1\lambda_0} \times \frac{1}{\pi} = \frac{\alpha \lambda_0}{\lambda}$$

$$12\lambda + 12\lambda + 1\lambda = 1\lambda_0 \Rightarrow 25\lambda = 1\lambda_0 \Rightarrow \lambda = \frac{1\lambda_0}{25}$$

③

$$\text{الف) } \left(\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}\right) - \left(\frac{\sqrt{2}}{\sqrt{2}} \times \frac{1}{\sqrt{2}}\right) - (1) + (2 \times 1) = \frac{\sqrt{2}}{\sqrt{2}} - \frac{\sqrt{2}}{\sqrt{2}} + 1 = 1$$

$$\text{ب) } \frac{\left(\frac{1}{\sqrt{2}}\right)^2 + (1)^2 + (\sqrt{2})^2}{\sqrt{2} - \frac{1}{\sqrt{2}}} = \frac{\frac{1}{2} + 1 + 2}{\frac{\sqrt{2}-1}{\sqrt{2}}} = \frac{\frac{5}{2}}{\frac{\sqrt{2}-1}{\sqrt{2}}} = \frac{5}{2} \times \frac{\sqrt{2}}{\sqrt{2}-1} = \frac{5\sqrt{2}}{2}$$

$$-\sin 40^\circ \cos 90^\circ + \cos 40^\circ \sin 90^\circ = \sin \theta$$

④

$$-\frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = -\frac{1}{4} + \frac{3}{4} = \frac{2}{4} = \frac{1}{2}$$

$$\sin \theta = \frac{1}{2} \Rightarrow \sin \theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ \Rightarrow \tan \theta = 1$$

$$\frac{r \tan 10^\circ (1 - \tan^2 10^\circ)}{(1 - \cot^2 40^\circ)^2} = \tan \theta$$

(2)

$$\tan 10^\circ = \frac{\sin 10^\circ}{\cos 10^\circ} = \frac{\frac{1}{\sqrt{10}}}{\frac{\sqrt{10}}{r}} = \frac{1}{\sqrt{10}}$$

$$\cot 40^\circ = \frac{\cos 40^\circ}{\sin 40^\circ} = \frac{\frac{1}{r}}{\frac{\sqrt{10}}{r}} = \frac{1}{\sqrt{10}}$$

$$\frac{r \left(\frac{1}{\sqrt{10}}\right) \left(1 - \left(\frac{1}{\sqrt{10}}\right)^2\right)}{\left(1 - \left(\frac{1}{\sqrt{10}}\right)^2\right)^2} = \frac{\frac{r}{\sqrt{10}} \times \left(1 - \frac{1}{10}\right)}{\left(1 - \frac{1}{10}\right)^2} = \frac{\frac{r}{\sqrt{10}} \times \frac{9}{10}}{\left(\frac{9}{10}\right)^2} = \frac{r}{\sqrt{10}} \times \frac{10}{9} = \frac{r}{\sqrt{10}} \times \frac{\sqrt{10}}{3} = \frac{r}{3}$$

$$\Rightarrow \tan \theta = \sqrt{3} \Rightarrow \theta = 40^\circ$$

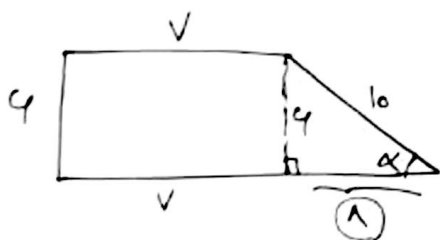
$$\frac{1}{r} \frac{40^\circ}{180^\circ} = \frac{\text{Rad}}{\pi} \Rightarrow \text{Rad} = \frac{\pi}{r}$$

$$\frac{D}{180^\circ} = \frac{\text{Rad}}{\pi}$$

$$\tan \theta = a \Rightarrow \frac{\sin \theta}{\cos \theta} = a \Rightarrow \sin \theta = a \cos \theta$$

(3)

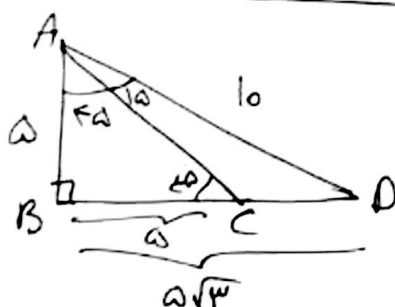
$$\frac{a \cos \theta - \cos \theta}{a \cos \theta - \cos \theta} = \frac{1 \cos \theta}{\cos \theta} = 1$$



$$1^2 - 4^2 = \Delta^2$$

$$V + \frac{4+10}{14} + \frac{V+1}{14} = 13 \Rightarrow$$

(4)



$$\sin 40^\circ = \frac{\text{opp}}{\text{hyp}} = \frac{BD}{10} = \frac{\sqrt{3}}{2} \Rightarrow \frac{10\sqrt{3}}{2} = 5\sqrt{3}$$

$$AB \Rightarrow 10^2 - (a\sqrt{3})^2 = 100 - 3a^2 = 2a^2 \Rightarrow AB = a$$

$$\tan 40^\circ = \frac{\text{opp}}{\text{adj}} = \frac{BC}{a} = 1 \Rightarrow BC = a$$

بجواب مسأله السابق است

$$CD = a\sqrt{3} - a = 1.44$$

(5)

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الف بافتراض زاویه θ مقدار $\sin \theta$ و مقدار $\cos \theta$ افتادگی یابید

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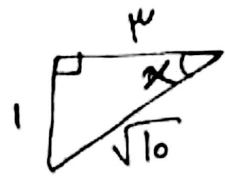


ب با افتادگی زاویه θ مقدار $\sin \theta$ و $\cos \theta$ افتادگی یابید

الف ← ۲ ~~مطلوبه~~



10



$$1^2 + 3^2 = 1 + 9 = 10 \rightarrow \sqrt{10}$$

$\sin \alpha < 0 \leftarrow$ ~~مطلوبه~~

$$\sin \alpha = \frac{\text{مقابل}}{\text{وتر}} = - \frac{1}{\sqrt{10}}$$