

$$\text{الف) } (\sin 135^\circ + \sin 225^\circ)(\cos 135^\circ - \cos 225^\circ) = \left(\frac{\sqrt{2}}{2} + \left(-\frac{\sqrt{2}}{2}\right)\right)\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}\right)$$

$$\rightarrow \frac{\sqrt{2}-\sqrt{2}}{2} \times \frac{\sqrt{2}+\sqrt{2}}{2} \xrightarrow{\text{مربع}} \frac{2-2}{4} = \frac{0}{4} = 0 \rightarrow \text{جواب الف}$$

$$\text{ب) } \frac{1 + 2\cos 110^\circ}{\cos 110^\circ + \cos 220^\circ} = \frac{1 + 2\left(\frac{\sqrt{3}}{2}\right)^2}{\frac{1}{2}\left(\frac{\sqrt{3}}{2}\right)^2 + 2\left(-\frac{\sqrt{3}}{2}\right)^2} = \frac{1 + 2 \times \frac{3}{4}}{\frac{1}{2} \times \frac{3}{4} + 2 \times \frac{3}{4}} = \frac{1 + 1}{\frac{3}{4} + 1} = \frac{2}{\frac{7}{4}} = \frac{8}{7}$$

$$\text{الف) } \sin \hat{B} = \frac{AH}{AB} = \sin 40^\circ \rightarrow \frac{\sqrt{2}}{2} = \frac{AH}{\sqrt{6}} \rightarrow AH = \frac{\sqrt{12}}{2} = \sqrt{3}$$

$$\text{HC} = 3 \rightarrow 3 + \text{HC} = 12 \rightarrow \text{HC} = 9$$

$$\text{ب) } \tan 30^\circ = \frac{\sqrt{3}}{3} = \frac{AH}{HC} = \frac{AH}{9} \rightarrow AH = 3\sqrt{3}$$

$$AB = AH + BH \rightarrow 12 = 3\sqrt{3} + BH \rightarrow BH = 12 - 3\sqrt{3} \rightarrow BH = 3\sqrt{3}$$

$$\sin \hat{B} = \frac{AH}{AB} = \frac{3\sqrt{3}}{12} = \frac{1}{4} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{4} \rightarrow \sin \hat{B} = \frac{\sqrt{3}}{4} \rightarrow \hat{B} = 40^\circ \checkmark$$

$$\text{الف) } \sin 30^\circ = \frac{\sqrt{2}}{2} = \frac{AB}{AD} = \frac{100\sqrt{2}}{AD} \rightarrow AD = 100 \rightarrow \overline{AB} + \overline{BD} = \overline{AD}$$

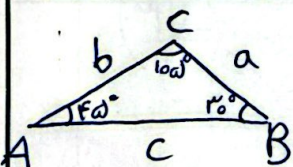
$$\sin 60^\circ = \frac{1}{2} = \frac{AB}{AC} = \frac{100\sqrt{2}}{AC} \rightarrow AC = 100\sqrt{2}$$

$$\overline{AB} + \overline{BC} = \overline{AC} \rightarrow 100\sqrt{2} + \overline{BC} = 100\sqrt{2} \rightarrow \overline{BC} = 100\sqrt{2} \rightarrow \overline{BC} = 100\sqrt{2} \rightarrow \overline{BC} = 100\sqrt{2}$$

$$\text{ب) } \tan 30^\circ = \frac{\sqrt{3}}{3} = \frac{BC}{AB} \rightarrow \sqrt{3} = \frac{BC}{100\sqrt{2}} \rightarrow BC = 100\sqrt{6}$$

$$\tan \alpha = \frac{1}{\sqrt{3}} = \frac{BD}{BC} = \frac{BD}{100\sqrt{6}} \rightarrow BC = 100\sqrt{6}$$

$$DC = BC + BD \rightarrow DC = 100 + 100 = 200 \rightarrow DC = 200 \rightarrow \sin \alpha = \frac{BD}{DC} = \frac{1}{2} = \frac{\sqrt{3}}{2}$$



$$\frac{AC}{\sin C} = \frac{AB}{\sin B} \rightarrow \frac{b}{\sin 20^\circ} = \frac{c}{\sin 100^\circ}$$

$$\rightarrow \frac{c}{\sin 20^\circ} = \frac{b}{\sin 100^\circ} \rightarrow \frac{AB}{\sin 100^\circ} = \frac{AC}{\sin 20^\circ}$$

$$\rightarrow \frac{AB}{AC} = \frac{\sin 100^\circ}{\sin 20^\circ} = \frac{\sin (180^\circ - 80^\circ)}{\sin 20^\circ} = \frac{\sin 80^\circ}{\sin 20^\circ} = \frac{\sin (90^\circ - 10^\circ)}{\sin 20^\circ} = \frac{\cos 10^\circ}{\sin 20^\circ}$$

$$= \frac{\cos 10^\circ}{2 \sin 10^\circ \cos 10^\circ} = \frac{1}{2 \sin 10^\circ} = \frac{1}{2 \times \frac{1}{2}} = 1$$

$$\rightarrow \frac{c}{\sin 20^\circ} = \frac{b}{\sin 100^\circ} \rightarrow \frac{AB}{\sin 100^\circ} = \frac{AC}{\sin 20^\circ}$$

$$\rightarrow \frac{AB}{AC} = \frac{\sin 100^\circ}{\sin 20^\circ} = \frac{\sin 80^\circ}{\sin 20^\circ} = \frac{\sin (90^\circ - 10^\circ)}{\sin 20^\circ} = \frac{\cos 10^\circ}{\sin 20^\circ}$$

$$= \frac{\cos 10^\circ}{2 \sin 10^\circ \cos 10^\circ} = \frac{1}{2 \sin 10^\circ} = \frac{1}{2 \times \frac{1}{2}} = 1$$

$$\text{مساحت } S = \frac{1}{2} \times \sin \alpha \times a \times b$$

$$\text{مساحت } S = \frac{1}{2} ab \sin \alpha$$

$$\hat{B}_1 = \hat{B}_2 \rightarrow \text{مقابل}$$

$$\rightarrow \frac{S_{\triangle ABE}}{S_{\triangle BCD}} = \frac{\frac{1}{2} \times \sin \hat{B}_1 \times 2 \times 4}{\frac{1}{2} \times \sin \hat{B}_2 \times 4 \times 4} = \frac{1}{4} = \frac{1}{4} \rightarrow \frac{S_{\triangle ABE}}{S_{\triangle BCD}} = \frac{1}{4}$$

الف) $S = \frac{1}{r} \times \sin \hat{C} \times A \times B \rightarrow S = \left(\frac{1}{r} \times \frac{1}{2} \sin 110^\circ \times r^2 \times F = \frac{r^2 \sqrt{3}}{4} \times \frac{1}{r} \times \frac{1}{r} \right) = \frac{\sqrt{3}}{4}$

مترابزی
الاضلاع
مساوی است.

ب) $\frac{1}{r} = \frac{1}{2} \times \frac{1}{r} \times \sin 110^\circ \times \frac{1}{r} = \frac{1}{2} \times \frac{\sqrt{3}}{r} \times \frac{1}{r} = \frac{\sqrt{3}}{2r}$

مترابزی
الاضلاع

$\frac{1}{r} = \frac{1}{2} \times \frac{1}{r} \times \sin 110^\circ \times \frac{1}{r} = \frac{1}{2} \times \frac{\sqrt{3}}{r} \times \frac{1}{r} = \frac{\sqrt{3}}{2r}$

مترابزی
الاضلاع

$y = mx + b \rightarrow \begin{cases} \text{نقطه } Q \rightarrow r = rm + b \\ \text{نقطه } P \rightarrow r = -m + b \end{cases} \rightarrow r = rm \rightarrow m = \frac{1}{r} \rightarrow b = r - \frac{r}{r} = \frac{r}{r}$

$\rightarrow b = \frac{r}{r}$

$m = \tan \theta = \frac{1}{r} \rightarrow \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{1}{r} \rightarrow r \sin \theta = \cos \theta$

$\rightarrow \sin^2 \theta + \cos^2 \theta = 1 \rightarrow r^2 \sin^2 \theta + \sin^2 \theta = 1 \rightarrow \omega \sin^2 \theta = 1 \rightarrow \sin^2 \theta = \frac{1}{\omega} \rightarrow \sin \theta = \frac{1}{\sqrt{\omega}}$

$\rightarrow \cos \theta = \frac{r}{\sqrt{\omega}} \times \frac{\sqrt{\omega}}{\sqrt{\omega}} = \frac{r\sqrt{\omega}}{\omega} \rightarrow \cos \theta = \frac{r\sqrt{\omega}}{\omega} = \frac{r}{\sqrt{\omega}}$

$ry = rx + \frac{\omega}{r} \rightarrow y = x + \frac{\omega}{r} \rightarrow \begin{cases} \text{عوض المبدأ} \\ \text{معدل برطرف} \\ \text{باعتبارها} \end{cases} \rightarrow \frac{\omega}{r} \rightarrow \begin{cases} \text{نقطه } Q \text{ و } P \text{ در یک خط} \\ \text{مستقیم است} \end{cases}$

$y = mx + b \rightarrow \begin{cases} m = \tan \alpha \\ b = \frac{\omega}{r} \end{cases} \rightarrow \tan \alpha = 1 \rightarrow \alpha = 45^\circ$

$y = mx + b \rightarrow m = \tan 110^\circ = -\sqrt{r} \rightarrow \begin{cases} m = -\sqrt{r} \\ b = \frac{\omega}{r} \end{cases} \rightarrow y = mx + b \rightarrow y = -\sqrt{r}x + \frac{\omega}{r}$

$\rightarrow mx + b = -\sqrt{r}x + \frac{\omega}{r} \rightarrow mx + b = \frac{-\omega\sqrt{r}}{r} = -\frac{\omega\sqrt{r}}{r}$

$f\left(\frac{\omega\pi}{r}\right) = \cos\left(\pi + \frac{\omega\pi}{r}\right) + \sin\left(\frac{\pi}{r} - \frac{\omega\pi}{r}\right) - \tan\left(\frac{r\pi}{r} + \frac{\omega\pi}{r}\right)$

$\rightarrow f\left(\frac{\omega\pi}{r}\right) = \cos\left(\frac{11\pi}{r}\right) + \sin\left(-\frac{\pi}{r}\right) - \tan\left(\frac{r\pi}{r}\right)$

$\rightarrow f\left(\frac{\omega\pi}{r}\right) = \cos 110^\circ + \sin 100^\circ - \tan\left(\frac{\pi}{r}\right) = \frac{\sqrt{r}}{r} + \left(-\frac{\sqrt{r}}{r}\right) - \sqrt{r}$

$\rightarrow f\left(\frac{\omega\pi}{r}\right) = -\sqrt{r} = -\sqrt{3}$

$\frac{\sin\left(\frac{11\pi}{r} + \pi\right) + \cos\left(\frac{10\pi}{r} - \pi\right)}{\cos\left(\frac{r\pi}{r} + \pi\right) - \sin\left(\frac{\pi}{r} - \pi\right)} = \frac{\sin\left(\frac{\pi}{r} + \pi\right) + \cos\left(\frac{r\pi}{r} - \pi\right)}{\cos\left(\pi + \pi\right) - \sin\left(\pi - \pi\right)}$

$\rightarrow \frac{\cos 2\pi - \sin 2\pi}{-\cos 2\pi - (-\sin 2\pi)} = \frac{\cos 2\pi - \sin 2\pi}{-(\cos 2\pi - \sin 2\pi)} = (-1)$

$= (-1)$