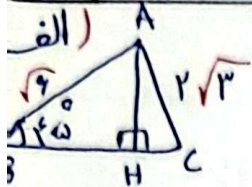


الف) $(\sin 135^\circ + \sin 225^\circ)(\cos 315^\circ - \cos 15^\circ) = \left(\frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}\right) = \frac{2}{4} - \frac{3}{4} = \frac{-1}{4}$

ب) $\frac{1 + 3 \tan^2 45^\circ}{1^2 \cos^2 45^\circ + 2 \cos^2 45^\circ} = \frac{1 + 3 \times \frac{1}{3}}{1 \times \frac{1}{2} + 2 \times \frac{1}{2}} = \frac{1 + 1}{\frac{1}{2} + 1} = \frac{2}{\frac{3}{2}} = \frac{4}{3}$

1

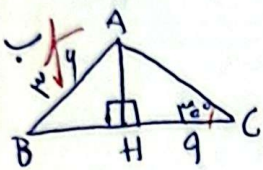


$$AH = \frac{\sqrt{2}}{2} AB = \frac{\sqrt{2}}{2} \times 2\sqrt{3} = \sqrt{6}$$

$$HC = AC - AH = 2\sqrt{3} - \sqrt{6}$$

$$\Rightarrow HC = 12 - 3 \Rightarrow HC = 9$$

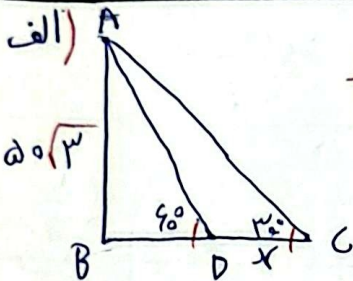
2



$$\frac{AH}{HC} = \frac{1}{\sqrt{3}} = \frac{AH}{9} \Rightarrow AH = 3\sqrt{3}$$

$$3\sqrt{3} \times \sin B = 3\sqrt{3}$$

$$\Rightarrow \sin B = \frac{\sqrt{3}}{\sqrt{3}} \Rightarrow B = 45^\circ$$

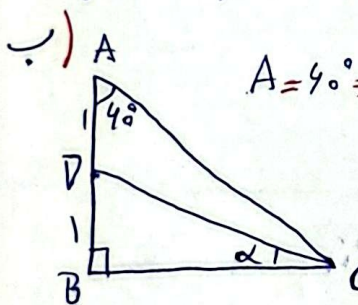


$$\frac{AB}{BD} = \tan 45^\circ = \sqrt{3} \Rightarrow BD = 50$$

$$\frac{AB}{BC} = \tan 45^\circ = \frac{1}{\sqrt{3}} \Rightarrow BC = 100$$

$$x = BC - BD = 100 - 50 = 50$$

3

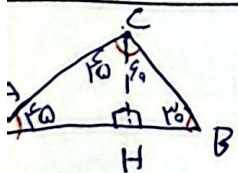


$$A = 45^\circ \Rightarrow C = 45^\circ \Rightarrow \frac{AB}{AC} = \frac{1}{1} = \frac{1}{1} \Rightarrow AC = 1$$

$$BC = AC - AB = 1 - 1 = 0$$

$$CD = BD + BC = 1 + 0 = 1$$

$$\sin \alpha = \frac{BD}{CD} = \frac{1}{1} = 1$$



$$\frac{CH}{AC} = \sin 45^\circ = \frac{\sqrt{2}}{2} \Rightarrow AC \sqrt{2} = 2 CH \Rightarrow AC = CH \frac{2}{\sqrt{2}} = CH \sqrt{2}$$

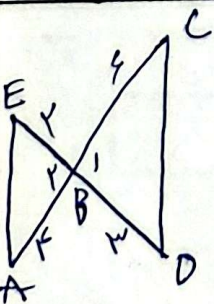
$$\frac{CH}{AH} = \tan 45^\circ = 1 \Rightarrow CH = AH$$

$$\frac{CH}{BH} = \tan 45^\circ = \frac{1}{\sqrt{3}} \Rightarrow BH = CH \sqrt{3}$$

$$\frac{AB}{AC} = \frac{10}{10} = 1$$

$$\frac{AH + HB}{AC} = \frac{CH + CH \sqrt{3}}{CH \sqrt{2}} = \frac{1 + \sqrt{3}}{\sqrt{2}}$$

4



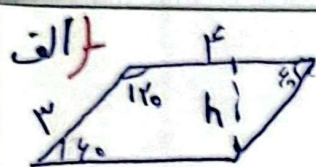
$$B_1 = B_2$$

$$S_{ABE} = \frac{1}{2} \sin B_1 \times 1 \times 1 = \frac{1}{2} \sin B_1$$

$$S_{BCD} = \frac{1}{2} \sin B_2 \times 1 \times 1 = \frac{1}{2} \sin B_2$$

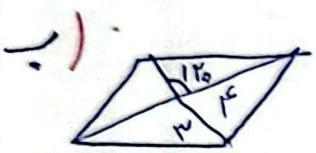
$$\frac{S_{ABE}}{S_{BCD}} = \frac{\frac{1}{2} \sin B_1}{\frac{1}{2} \sin B_2} = \frac{1}{1}$$

5

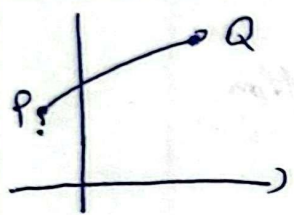


$$h = \frac{\sqrt{3}}{2} \times r \rightarrow S = \frac{1}{2} \times r \times \frac{\sqrt{3}}{2} \times r = \frac{\sqrt{3}}{4} r^2$$

9



$$S = \sin 120^\circ \times r \times \frac{1}{2} = \frac{\sqrt{3}}{4} r^2$$

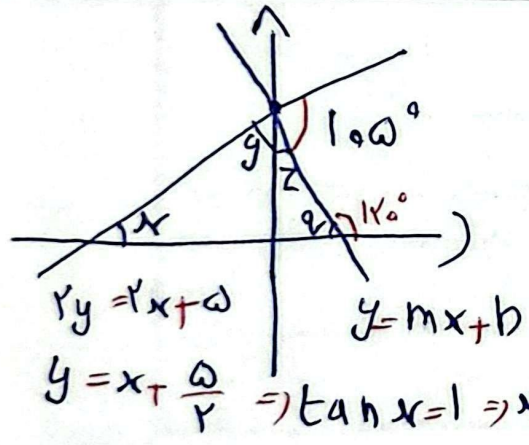


$$P \rightarrow r = -a + b \rightarrow r_a = r \rightarrow a = \frac{1}{r} = \tan \theta$$

$$Q \rightarrow r = r_a + b$$

$$1 + \tan^2 \theta = \frac{1}{\cos^2 \theta} \Rightarrow \cos \theta = \frac{r}{\sqrt{b}}$$

✓



$$ry = rx + w \Rightarrow ry = rx + w \Rightarrow y = \frac{w}{r}$$

$$ry = mx + b \Rightarrow b = ry$$

$$m = \tan 120^\circ = \sqrt{3} \rightarrow mb = \frac{w\sqrt{3}}{r}$$

$$y + z = \sqrt{3} \omega \Rightarrow z = \sqrt{3} \omega \Rightarrow q = 40^\circ$$

✓

$$\cos\left(\pi + \frac{\omega\pi}{9}\right) + \sin\left(\frac{\pi}{r} - \frac{\omega\pi}{9}\right) - \tan\left(\frac{r\pi}{r} + \frac{\omega\pi}{9}\right) = \cos \frac{\omega\pi}{9} + \cos \frac{\omega\pi}{9} + \cot \frac{\omega\pi}{9}$$

$$= \cot \frac{\omega\pi}{9} = \sqrt{3}$$

9

$$\sin\left(\frac{14\pi}{5} + x\right) + \cos\left(\frac{16\pi}{5} + x\right)$$

$$\cos(\pi + x) - \sin(4\pi - x)$$

$$\frac{\sin\left(\frac{\pi}{5} + x\right) + \cos\left(\frac{7\pi}{5} + x\right)}{\cos(\pi + x) - \sin(4\pi - x)} = \frac{\cos x - \sin x}{-\cos x + \sin x} = -1$$

10