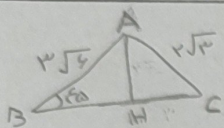


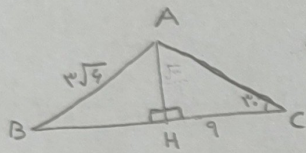
۱۹ آذر (۳) ★

الف) $(\sin 135^\circ + \sin 30^\circ)(\cos 315^\circ - \cos 15^\circ) = \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2} - \left(-\frac{\sqrt{3}}{2}\right)\right) = \frac{\sqrt{2}-\sqrt{3}}{2} \times \frac{\sqrt{2}+\sqrt{3}}{2} =$
 $\frac{2-3}{4} = -\frac{1}{4}$ ✓

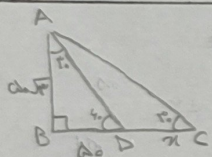
ب) $\frac{1 + 3 \tan^2 11^\circ}{4 \cos^2 33^\circ + 2 \cos^2 22^\circ} = \frac{1 + 3\left(\frac{1}{3}\right)}{4\left(\frac{3}{4}\right) + 2\left(\frac{3}{4}\right)} = \frac{2}{4} = \frac{1}{2}$ ✓



الف) $\sin 45^\circ = \frac{AH}{3\sqrt{3}} \Rightarrow \frac{\sqrt{2}}{2} = \frac{AH}{3\sqrt{3}} \Rightarrow 2AH = 3\sqrt{6} \Rightarrow AH = \frac{3\sqrt{6}}{2}$
 $(2\sqrt{3})^2 - (\sqrt{3})^2 = HC^2 \Rightarrow 9 = HC^2 \Rightarrow 3 = HC$

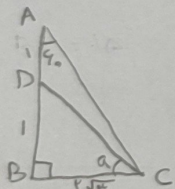


ب) $\tan 30^\circ = \frac{AH}{3} \Rightarrow \frac{1}{\sqrt{3}} = \frac{AH}{3} \Rightarrow AH = \sqrt{3}$
 $\sin B = \frac{2\sqrt{3}}{4} \Rightarrow \sin B = \frac{1}{2} = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$



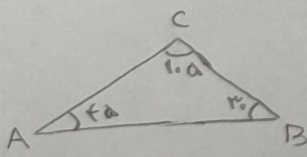
الف) $\tan 45^\circ = \frac{5\sqrt{3}}{BD} \Rightarrow \sqrt{3} = \frac{5\sqrt{3}}{BD} \Rightarrow \sqrt{3}BD = 5\sqrt{3} \Rightarrow BD = 5$

$\tan 30^\circ = \frac{5\sqrt{3}}{5+x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{5\sqrt{3}}{5+x} \Rightarrow 5+x = 15 \Rightarrow x = 10$



ب) $\tan 45^\circ = \frac{BC}{2} \Rightarrow \sqrt{3} = \frac{BC}{2} \Rightarrow BC = 2\sqrt{3}$

$DC^2 = (1^2) + (2\sqrt{3})^2 \Rightarrow DC^2 = 13 \Rightarrow DC = \sqrt{13}$, $\sin \alpha = \frac{1}{\sqrt{13}}$ ✓

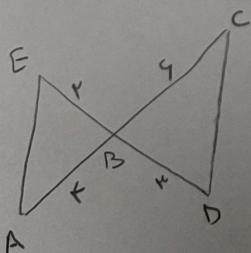


$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \Rightarrow \frac{AB}{\sin C} = \frac{AC}{\sin B} \Rightarrow \frac{AB}{AC} = \frac{\sin C}{\sin B} \Rightarrow$

$\frac{AB}{AC} = \frac{\sin 105^\circ}{\sin 30^\circ} = \frac{\frac{\sqrt{4} + \sqrt{2}}{4}}{\frac{1}{2}} \Rightarrow \frac{AB}{AC} = \frac{\sqrt{4} + \sqrt{2}}{2}$ ✓

$\sin 105^\circ = \sin(45^\circ + 60^\circ) = (\sin 45^\circ)(\cos 60^\circ) + (\cos 45^\circ)(\sin 60^\circ) \Rightarrow$

$\sin 105^\circ = \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) \Rightarrow \sin 105^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}$

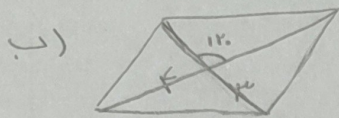


$S(\triangle ABE) = \frac{1}{2} \times AB \times EB \times \sin(\angle ABE) \Rightarrow S(\triangle ABE) = \frac{1}{2} \times 4 \times 4 \times \sin \theta = 4 \sin \theta$

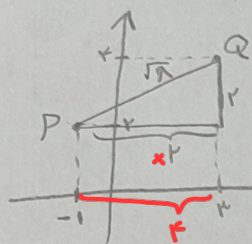
$S(\triangle BCD) = \frac{1}{2} \times BC \times BD \times \sin(\angle CBD) \Rightarrow S(\triangle BCD) = 9 \sin \theta$

$\frac{S(\triangle ABE)}{S(\triangle BCD)} = \frac{4 \sin \theta}{9 \sin \theta} = \frac{4}{9}$ ✓

الف) $S = r \left(\frac{1}{r} \times r \times r \times \sin 120^\circ \right) = r \times r \times \frac{\sqrt{3}}{2} = 4\sqrt{3}$



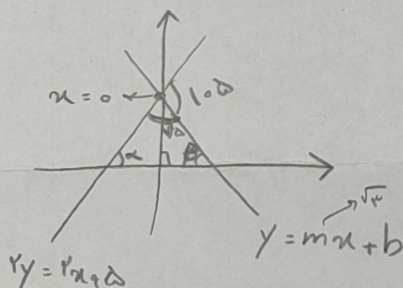
$$S = \frac{1}{2} \times r \times r \times \sin 120^\circ = 4 \times \frac{\sqrt{3}}{2} = 2\sqrt{3}$$



$$\cos \theta = \frac{r}{\sqrt{3}} \rightarrow \frac{r}{r\sqrt{3}} \rightarrow \frac{\sqrt{3}}{r}$$

$$\tan \theta = \frac{y-r}{x-r} = \frac{1-1}{0-1} = 1 = \tan \theta \rightarrow \tan \theta = \frac{1}{\cos \theta}$$

$$1 + \frac{1}{2} = \frac{1}{\cos \theta} \rightarrow \cos \theta = \frac{2}{3} \rightarrow \cos \theta = \frac{r}{\sqrt{3}} = \frac{\sqrt{3}}{2}$$



$$m = b = \frac{a}{r} \times \sqrt{3} = \frac{\omega \sqrt{3}}{r}$$

$$y = x + \frac{\omega}{r} \Rightarrow m = 1 \Rightarrow \alpha = 45^\circ$$

$$\tan \alpha = \tan \beta = \tan 45^\circ = \sqrt{3}$$

$$B = 180^\circ - (45^\circ + 45^\circ) = 90^\circ$$

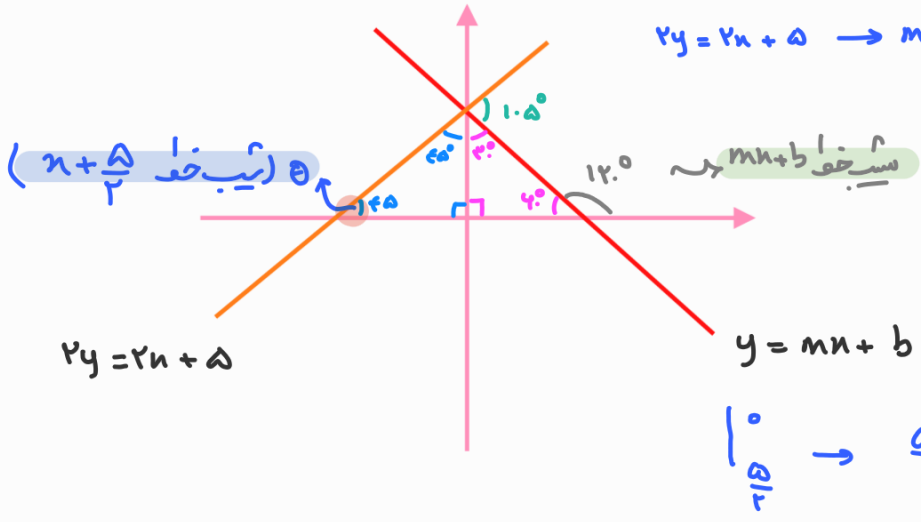
$$\alpha = 0 \rightarrow y = \frac{a}{r} \rightarrow y = mx + b \rightarrow \frac{a}{r} = \sqrt{3}x + b \Rightarrow b = \frac{a}{r}$$

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

$$\cot x = f(x)$$

$$f\left(\frac{a\pi}{4}\right) = \cot\left(\frac{a\pi}{4}\right) = -\sqrt{3}$$

$$\frac{\sin\left(\frac{14\pi}{r} + x\right) + \cos\left(\frac{14\pi}{r} - x\right)}{\cos(3\pi + x) - \sin(4\pi - x)} = \frac{+\cos x - \sin x}{-\cos x - (-\sin x)} = \frac{-(\cos x + \sin x)}{(-\cos x + \sin x)} = -1$$



$y = x + 0 \rightarrow m = 1 \rightarrow \tan \theta = 1 \rightarrow \theta = 45^\circ$
 (صیقلی شکل داده است)

$y = mx + b \rightarrow m = \tan 135^\circ = -\sqrt{3}$

$\frac{1}{\sqrt{3}} \rightarrow \frac{a}{r} = -\sqrt{3}(\cdot) + b \rightarrow b = \frac{a}{r}$

$mb = -\sqrt{3} \times \frac{a}{r} = -\frac{a\sqrt{3}}{r}$