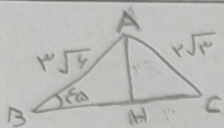
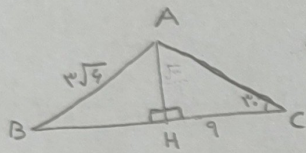


(الف) $(\sin 135^\circ + \sin 30^\circ)(\cos 315^\circ - \cos 15^\circ) = \left(\frac{\sqrt{2}}{2} + \frac{1}{2}\right)\left(\frac{\sqrt{2}}{2} - \left(-\frac{\sqrt{2}}{2}\right)\right) = \frac{\sqrt{2} + \sqrt{2}}{2} \times \frac{\sqrt{2} + \sqrt{2}}{2} =$
 $\frac{2 + \sqrt{2}}{2} = -\frac{1}{2}$

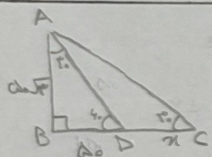
(ب) $\frac{1 + 3 \tan^2 11^\circ}{4 \cos^2 33^\circ + 4 \cos^2 22^\circ} = \frac{1 + 3\left(\frac{1}{3}\right)}{4\left(\frac{1}{4}\right) + 4\left(\frac{1}{4}\right)} = \frac{2}{4} = \frac{1}{2}$



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

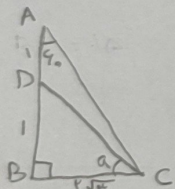


$\tan 30^\circ = \frac{AH}{9} \Rightarrow \frac{1}{\sqrt{3}} = \frac{AH}{9} \Rightarrow AH = 3\sqrt{3}$ (ب)
 $\sin B = \frac{3\sqrt{3}}{3\sqrt{4}} \Rightarrow \sin B = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$

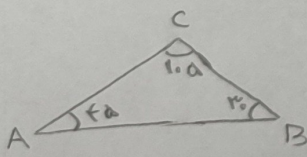


$\tan 45^\circ = \frac{5\sqrt{3}}{BD} \Rightarrow \sqrt{3} = \frac{5\sqrt{3}}{BD} \Rightarrow \sqrt{3} BD = 5\sqrt{3} \Rightarrow BD = 5$ (الف)

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



$\tan 30^\circ = \frac{BC}{5} \Rightarrow \sqrt{3} = \frac{BC}{5} \Rightarrow BC = 5\sqrt{3}$ (ب)
 $DC^2 = (5)^2 + (5\sqrt{3})^2 \Rightarrow DC^2 = 100 \Rightarrow DC = 10, \sin \alpha = \frac{1}{\sqrt{13}} = \frac{\sqrt{13}}{13}$

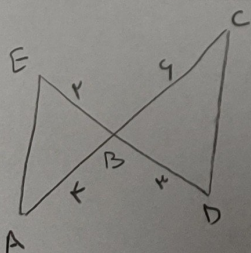


$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \Rightarrow \frac{AB}{\sin C} = \frac{AC}{\sin B} \Rightarrow \frac{AB}{\sin 30^\circ} = \frac{10}{\sin 40^\circ} \Rightarrow$

$\frac{AB}{AC} = \frac{\sin 10^\circ}{\sin 30^\circ} = \frac{\sqrt{4} + \sqrt{2}}{4} \Rightarrow \frac{AB}{AC} = \frac{\sqrt{4} + \sqrt{2}}{2}$

$\sin 10^\circ = \sin(40^\circ + 30^\circ) = (\sin 40^\circ)(\cos 30^\circ) + (\cos 40^\circ)(\sin 30^\circ) \Rightarrow$

$\sin 10^\circ = \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) \Rightarrow \sin 10^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}$

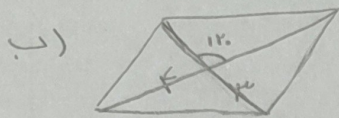


$S(\triangle ABE) = \frac{1}{2} \times AB \times BE \times \sin(\angle ABE) \Rightarrow S(\triangle ABE) = \frac{1}{2} \times 4 \times 9 \times \sin \theta = 18 \sin \theta$

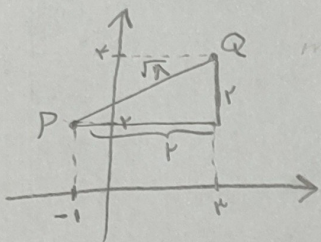
$S(\triangle BCD) = \frac{1}{2} \times BC \times BD \times \sin(\angle CBD) \Rightarrow S(\triangle BCD) = 9 \sin \theta$

$\frac{S(\triangle ABE)}{S(\triangle BCD)} = \frac{18 \sin \theta}{9 \sin \theta} = \frac{2}{1}$

الف) $S = \frac{1}{2} \times r \times r \times \sin 120^\circ = r \times r \times \frac{\sqrt{3}}{2} = 9\sqrt{3}$

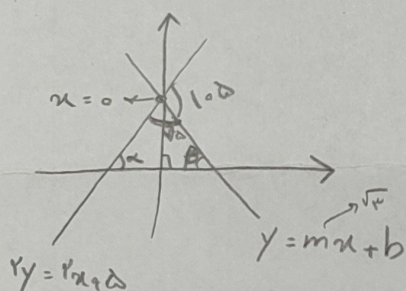


$$S = \frac{1}{2} \times r \times r \times \sin 120^\circ = 9 \times \frac{\sqrt{3}}{2} = 9\sqrt{3}$$



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

$$a = \tan \theta = \frac{\sqrt{3}}{1} = \sqrt{3}$$



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

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

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

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

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

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

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

$$f(\frac{\omega \pi}{4}) = \cot(\frac{\omega \pi}{4}) = -\sqrt{3}$$

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