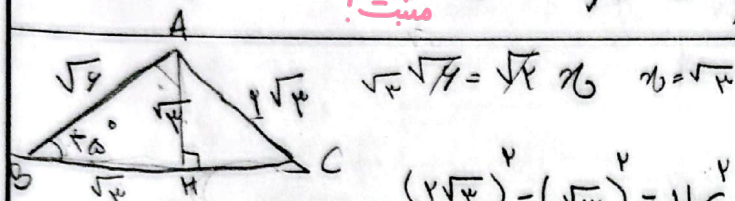


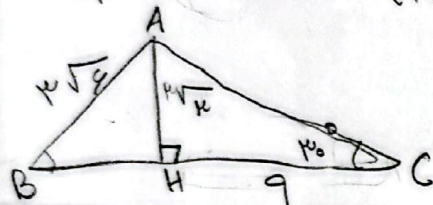
۱۹۱۷۵ آزمون (۳) ★

الف) $(\sin 135^\circ + \sin 10^\circ)(\cos 115^\circ - \cos 15^\circ) \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} \right) \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} \right) =$
 $\sin 115^\circ = \sin(90^\circ + 25^\circ)$

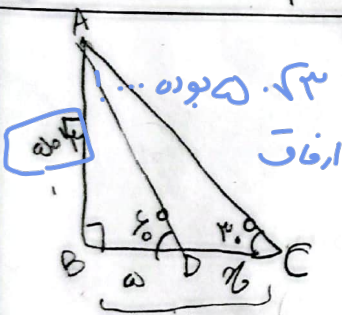
ب) $\frac{1 + 2 \tan^2 10^\circ}{\cos^2 40^\circ + 2 \cos^2 20^\circ} = \frac{1 + (2 \times \frac{1}{9})}{(\frac{4}{9} \times \frac{1}{9}) + (\frac{4}{9} \times \frac{1}{9})} = \frac{1}{\frac{4}{9}} = \frac{9}{4}$
 (نکته: $\tan 10^\circ = \frac{1}{3}$)



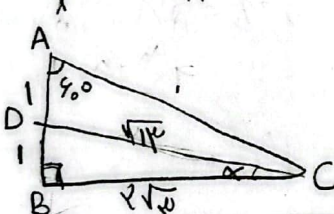
$(2\sqrt{3})^2 - (\sqrt{6})^2 = HC^2 \Rightarrow 12 - 6 = 6 \Rightarrow HC = \sqrt{6}$



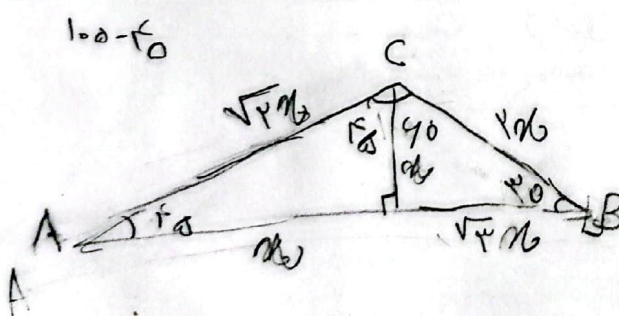
$\frac{\sqrt{3}}{2} = \frac{AH}{9} \Rightarrow AH = \frac{9\sqrt{3}}{2}$
 $\sin B = \frac{AH}{AB} = \frac{\frac{9\sqrt{3}}{2}}{2\sqrt{6}} = \frac{\sqrt{2}}{2} \Rightarrow B = 45^\circ$



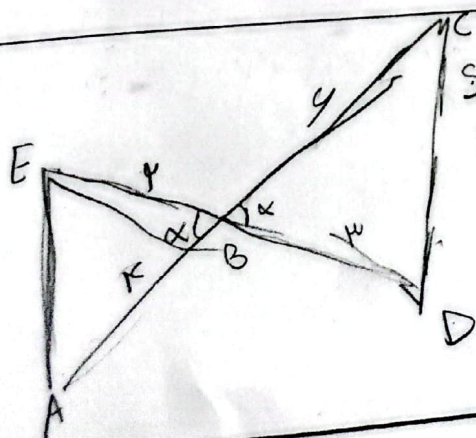
$\frac{1}{\sqrt{3}} = \frac{BD}{2\sqrt{3}} \Rightarrow BD = 2$
 $\frac{1}{\sqrt{3}} = \frac{AD}{BC} \Rightarrow BC = 1\sqrt{3}$



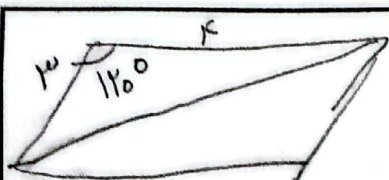
$AD + DB = 1\sqrt{3} \Rightarrow DB = 1$
 $\frac{\sqrt{3}}{1} = \frac{BC}{2} \Rightarrow BC = 2\sqrt{3}$
 $1 + 1\sqrt{3} = 1\sqrt{3} \Rightarrow DC = \sqrt{3}$
 $\sin \alpha = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$



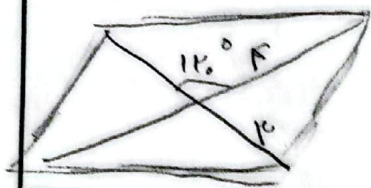
$\frac{AB}{AC} = \frac{10 + \sqrt{3} \cdot 10}{\sqrt{2} \cdot 10} = \frac{10(1 + \sqrt{3})}{10\sqrt{2}} = \frac{1 + \sqrt{3}}{\sqrt{2}}$



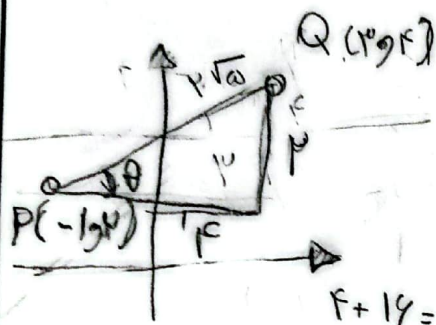
$\frac{S_{ABE}}{S_{BCD}} = \frac{\frac{1}{2} \times 4 \times 3 \times \sin \alpha}{\frac{1}{2} \times 4 \times 3 \times \sin \alpha} = \frac{4}{9}$



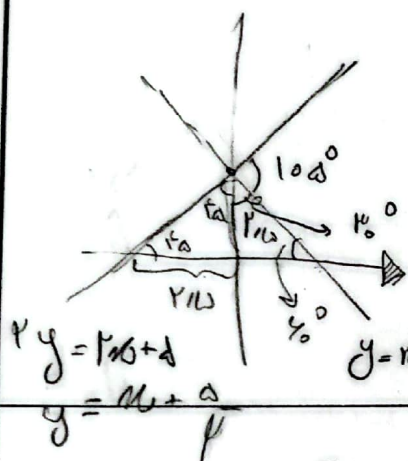
$$\frac{1}{2} \times r \times r \times \sin 110^\circ = r^2 \sqrt{\mu}$$



$$r \left(\frac{1}{r} \times \frac{r}{r} \times \frac{r}{r} \times \sin 110^\circ \right) = r^2 \sqrt{\mu}$$



$$\cos \theta = \frac{r}{r\sqrt{a}} = \frac{r}{r\sqrt{a}} = \frac{r\sqrt{a}}{a}$$



$$0 = r_0 + \frac{a}{r} \rightarrow r_0 = -\frac{a}{r}$$

$$y = 0 + \frac{a}{r} \rightarrow y = \frac{a}{r}$$

$$m = -\tan \theta_0 = -\sqrt{\mu}$$

$$y = -\sqrt{\mu}x + b$$

$$r_0 + a = b$$

$$y = -\sqrt{\mu}x + r_0 + a$$

$$\cos(\pi + \theta_0) + \sin\left(\frac{\pi}{r} - \theta_0\right) - \tan\left(\frac{\pi}{r} + \theta_0\right) = -\cos \theta_0 + \cos \theta_0$$

$$-\tan\left(\frac{\pi}{r} + \frac{a}{r}\right) \rightarrow \tan(\theta_0) = -\sqrt{\mu}$$

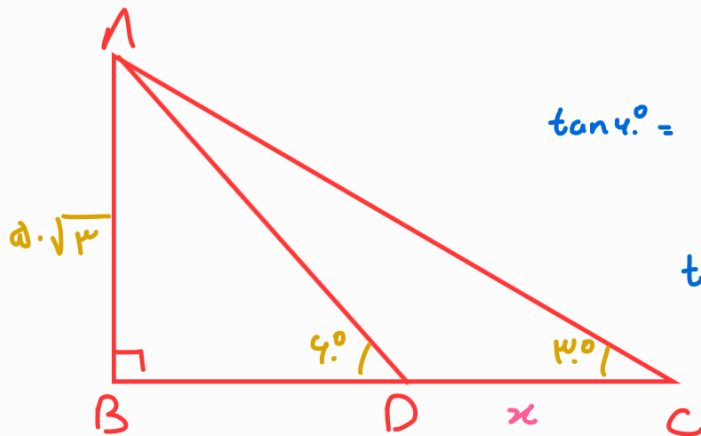
$$\frac{\sin\left(\frac{\pi}{r} + \frac{a}{r} + \theta_0\right) + \cos\left(\frac{\pi}{r} + \frac{a}{r} - \theta_0\right)}{\cos\left(\frac{\pi}{r} + \theta_0\right) - \sin\left(\frac{\pi}{r} - \theta_0\right)} = \frac{\cos \theta_0 - \sin \theta_0}{-\cos \theta_0 + \sin \theta_0} = -1$$

$$\text{حل) } (\sin 135^\circ + \sin 45^\circ) (\cos 135^\circ - \cos 45^\circ)$$

$$\left(\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}\right) \left(\frac{\sqrt{2}}{2} - \left(-\frac{\sqrt{2}}{2}\right)\right) = \left(\frac{\sqrt{2}}{2}\right)^2 - \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2} - \frac{2}{2} = \boxed{-\frac{1}{2}}$$

$$\hookrightarrow \frac{1 + \tan^2 15^\circ}{\sec^2 15^\circ + \sec^2 22.5^\circ} = \frac{1 + 2\left(\frac{\sqrt{2}}{2}\right)^2}{2\left(\frac{\sqrt{2}}{2}\right)^2 + 2\left(-\frac{\sqrt{2}}{2}\right)^2} = \frac{1 + 1}{2 + 2} = \boxed{\frac{1}{2}}$$

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$$\tan 40^\circ = \frac{AB}{BD} \rightarrow BD = \frac{a \cdot \sqrt{3}}{\sqrt{3}} = a.$$

$$\tan 14^\circ = \frac{AB}{BC} \rightarrow BC = \frac{a \cdot \sqrt{3}}{\frac{1}{\sqrt{3}}} = 1a.$$

$$\boxed{BD = 100}$$