

سوال ۱

$$\frac{a \sin \frac{\pi}{3} + b \cos \frac{\pi}{4}}{a \sin \frac{11\pi}{4} + b \cos \frac{\pi}{3}} = \tan \frac{5\pi}{4}$$

$$\frac{ax - \frac{\sqrt{3}}{2} + b - \frac{\sqrt{3}}{2}}{ax - \frac{1}{2} + b \times \frac{1}{2}} = -\frac{\sqrt{3}}{3} \rightarrow$$

$$\frac{\sqrt{3}}{2}(a+b) \times 3 = -\sqrt{3} \times \frac{1}{2}(b-a)$$

$$\rightarrow 3a = -2b \quad \boxed{\frac{b}{a} = -\frac{3}{2}}$$

سوال ۳ نسبت درجه به کل $\frac{\frac{\pi}{4}}{2\pi} = \frac{1}{8}$ کل دایره می باشد

مادر ساعت دایره را به ۲ قسمت تقسیم کرده ایم $\frac{1}{2} \times \frac{1}{8} = \frac{1}{16}$

ساعت نوایی $\frac{1}{16} \times 40 = 2.5 \text{ min} \rightarrow \boxed{2.5 \text{ min}}$

سوال ۵

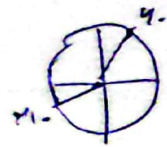
$$-\frac{1}{2} < \sin x \leq 1$$



$$-\frac{1}{2} < \frac{m-\pi}{\omega} \leq 1 \rightarrow \frac{\pi}{2} < m-\pi \leq \frac{3\pi}{2}$$

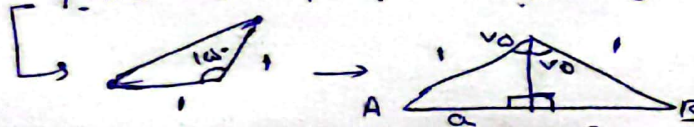
$$\frac{\pi}{2} < m \leq \frac{5\pi}{2}$$

اعداد صحیح $m = \{1, 2, 3, \dots, 8\} \rightarrow \boxed{8 \text{ عدد}}$



سوال ۲ با توجه به طول نقطه P زاویه ۴۵ است

اگر ۲۱۵ درجه در خلاف جهت عقربه های ساعت به زاویه ۲۱۵ می رسم



$$\sin 45 \rightarrow \sin(45+135) = \sin 45 \cos 135 + \sin 135 \cos 45 = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}$$

$$AB = 2a = 2 \times \sin(45) \times 1 = \sqrt{2} + \sqrt{2}$$

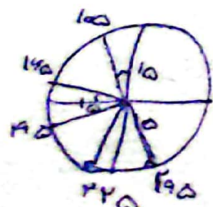
$$\text{محیط مثلث} = 1 + 1 + \sqrt{2} + \sqrt{2} = \boxed{2 + \sqrt{2} + \sqrt{2}}$$

سوال ۴

$$|-30 \times \frac{1}{3} + (5/5)| = 20$$

$$|-90 + 5/5 \times m| = 20 \rightarrow -90 + 5/5 \times m = -20 \rightarrow m = 14$$

بجای گذشت ۲۰ دقیقه بزرگ با برعکس ۲۰ درجه می شود



سوال ۶ $\frac{1}{F} = \frac{\sin 135}{\cos 225}$

$$\frac{\sin(135) + K \cos(225)}{\cos(135) + K \sin(225)} = \frac{F + -K}{-F - K} = 3$$

$$F - K = -18 \rightarrow \boxed{K = -22}$$

نسبت مساحت = $\frac{A_{\text{مربع}}}{B_{\text{مربع}}} = \frac{A_{\text{مربع}}^2}{B_{\text{مربع}}^2}$ سوال ۸ $\frac{9 \times 10^6}{10^6} \times \frac{10^6}{10^6} = 9 \times 10^6 = 144$

$R_A \propto A = R_B \propto B \rightarrow \frac{R_A}{R_B} = \frac{A}{B} = \frac{9 \times 10^6}{10^6} = \frac{144}{10^6} = \frac{12}{10^3}$

(نسبت مساحت) $R = \text{نسبت مساحت} \rightarrow \left(\frac{12}{10^3}\right)^2 = \boxed{\frac{9}{10^6}}$

مساحت A برابر مساحت B است

سوال ۷ $\frac{\tan\left(\frac{\pi}{2} - x\right) - \cot(x-x)}{\cot\left(\frac{\pi}{2} - x\right) + \tan(x-x)} = \frac{\cot(x) + \cot(x)}{\tan(x) + \tan(x)}$

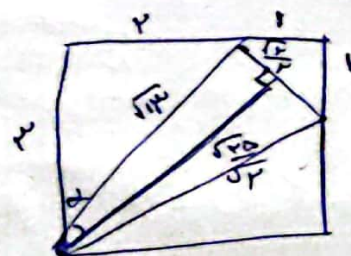
$\frac{r \cot(x)}{-\tan(x)} = \frac{r \times \frac{\cos x}{\sin x}}{-\frac{\sin x}{\cos x}} = -r \times \frac{\cos^2 x}{\sin^2 x} \quad (1)$

$\frac{1 - \cos x}{1 + \cos x} = r \rightarrow r + r \cos x = 1 - \cos x$

$\left[-\frac{1}{r}\right] = \cos x \leftarrow 1 = -r \cos x$

$\sin^2 x + \cos^2 x = 1 \rightarrow \sin^2 x = \boxed{\frac{1}{9}}$

(1) $\rightarrow -r \times \frac{\cos^2 x}{\sin^2 x} = \frac{\frac{1}{9}}{\frac{1}{9}} = -r \times \frac{1}{1} = \boxed{-\frac{1}{r}}$

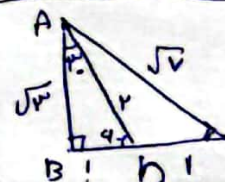


$\sqrt{r^2 + r^2} = \sqrt{13}$
 $\sqrt{r^2 + r^2} = \sqrt{2} \div r = \frac{\sqrt{2}}{r}$

$\sin \alpha = \frac{\sqrt{2}}{r} = \frac{\sqrt{2}}{r \sqrt{13}}$

$(\sqrt{13})^2 = \left(\frac{\sqrt{2}}{r}\right)^2 + r^2 \rightarrow 13 = \frac{2}{r^2} + r^2 \rightarrow r^2 = 12, \alpha \rightarrow r = \sqrt{\frac{12}{13}}$

$\cos \alpha = \frac{\sqrt{2}}{\sqrt{13}} = \frac{\sqrt{2}}{\sqrt{13}}$
 $\Rightarrow \sin^2 \alpha = \sin^2 \alpha \cos^2 \alpha = r^2 \times \frac{\sqrt{2}}{r \sqrt{13}} \times \frac{\sqrt{2}}{r \sqrt{13}} = \boxed{\frac{12}{13}}$
 $\sin \alpha$



سوال ۹ $AB \text{ ضلع} = \frac{\sqrt{3}}{r} \times r = \sqrt{3}$

$\text{وتر} = r \times 1 = r$

مساحت = $\frac{\text{ارتفاع} \times \text{مقاعد}}{2} \rightarrow \frac{\sqrt{3} \times BC}{2} = \sqrt{3} \rightarrow BC = 2$

$AB^2 + BC^2 = AC^2 \rightarrow 3 + 4 = 5 \rightarrow AC = \sqrt{5}$

$\frac{C}{\sin C} = \frac{AB}{\sin B} \rightarrow \frac{\sqrt{5}}{1} = \frac{\sqrt{3}}{\sin C} \rightarrow \sin C = \sqrt{\frac{3}{5}}$

$\sin^2 C + \cos^2 C = 1 \rightarrow \frac{3}{5} + \cos^2 C = 1 \rightarrow \cos^2 C = \frac{2}{5}$

$\cos C = \frac{r}{\sqrt{5}} \quad \sin r C = r \sin C \cos C = \boxed{\frac{r \sqrt{3}}{\sqrt{5}}}$