①

الف) $۲۷ \times \frac{\pi}{۱۸۰} = \frac{۳\pi}{۲۰}$

ب) $۱۲۵ \times \frac{\pi}{۱۸۰} = \frac{۲۵\pi}{۳۶}$

ج) $\frac{۵\pi}{۱۲} \times \frac{۱۸۰}{\pi} = \frac{۹۰۰}{۱۲} = ۷۵$

د) $\frac{۴\pi}{۹} \times \frac{۱۸۰}{\pi} = \frac{۷۲۰}{۹} = ۸۰$

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②

۱۰a درجه

گراد $\frac{۱۲۵a}{۹} \longrightarrow ۱۲٫۵a$

رادیان $\frac{۹\pi}{۹} \longrightarrow \times \frac{۱۸۰}{\pi} \longrightarrow ۲۲٫۵a$ درجه

$۱۰a + ۲۲٫۵a + ۱۲٫۵a \longrightarrow a = ۱۸۰$

$a = \frac{۱۸۰}{۴۵} \longrightarrow \frac{۳۶۰}{۹۰}$

$a = ۴$

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③

الف) $\frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2} - \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} + 2\left(\frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}}\right) \longrightarrow \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} - 1 + 2 = 1$

ب) $\dfrac{\left(\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right)^2 + \left(\frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}}\right)^2 + \left(\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}\right)^2}{\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} - \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}} = \dfrac{\frac{1}{3} + 1 + 3}{\sqrt{3} - \frac{1}{\sqrt{3}}} = \dfrac{\frac{13}{3}}{\frac{3-1}{\sqrt{3}}} = \frac{2\sqrt{3}}{3}$

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④

$\frac{-1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} = \sin^2\theta \longrightarrow -\frac{1}{4} + \frac{3}{4} \longrightarrow \sin^2\theta = \frac{1}{2} \longrightarrow \sin\theta = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\downarrow \; \frac{\pi}{4}$

$\sin\theta = \cos\theta$

$\tan = \dfrac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1$

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⑤

$\dfrac{2\left(\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right)\left(1 - \left(\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right)^2\right)}{\left(1 - \left(\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right)^2\right)^2} = \dfrac{\frac{2}{\sqrt{3}} \times \frac{2}{3}}{\frac{4}{9}} = \dfrac{\frac{4}{3\sqrt{3}}}{\frac{4}{9}} = \frac{9}{3\sqrt{3}} = \frac{3}{\sqrt{3}}$

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

$\longrightarrow \frac{3\sqrt{3}}{3} = \sqrt{3}$

$\downarrow$ ۶۰ درجه

$\frac{\pi}{3}$

$\boxed{\frac{\pi}{3}}$

$$\frac{3\sin\theta - \cos\theta}{\sin\theta - 4\cos\theta} = \frac{3(5\cos\theta) - \cos\theta}{5\cos\theta - 4\cos\theta} = \frac{14\cos\theta}{\cos\theta} = 14$$

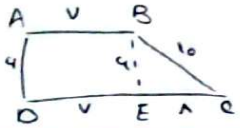
$$\tan\theta = \frac{\sin\theta}{\cos\theta} \longrightarrow 5\cos\theta = \sin\theta$$

$$\sin\alpha = \frac{9}{10} \longrightarrow \text{مجاور} = 10$$

BC

$$100 = 36 + EC^2 \longrightarrow EC = 8$$

$$AB + BC + EC + DE + AD = 9 + 7 + 10 + 8 + 7 = 41$$



$$45 + 15 = 60$$

$$\sin 60 = \frac{\sqrt{3}}{2} \longrightarrow \frac{\sqrt{3}}{2} = \frac{BD}{10} \longrightarrow BD = 5\sqrt{3}$$

$$AB \longrightarrow 100 = 75 + AB^2 \longrightarrow AB = 5$$

$$\cos 30 = \frac{\sqrt{3}}{2} \rightarrow \frac{5}{AC} = \frac{\sqrt{3}}{2} \longrightarrow \frac{10}{\sqrt{3}} = AC \longrightarrow 5\sqrt{3}$$

$$BC \Rightarrow \text{وتر} = 25 + BC^2 \longrightarrow BC = 5$$

$$5\sqrt{3} - 5 \longrightarrow 5(\sqrt{3} - 1) \longrightarrow 5\left(\frac{3 - \sqrt{3}}{\sqrt{3}} \longrightarrow \frac{\sqrt{3}(\sqrt{3} - 1)}{\sqrt{3}} = 5(\sqrt{3} - 1)\right)$$

الف) ربع ۳

ب) ربع ۲

$\cos\downarrow$ $\sin\uparrow$ ربع اول

$\cos\downarrow$ $\sin\downarrow$ ربع ۲

$\cos\uparrow$ $\sin\downarrow$ ربع ۳

$\cos\uparrow$ $\sin\uparrow$ ربع ۴

ربع ۳ $\longrightarrow \sin 240$

$$\frac{\sin}{\cos} = \frac{1}{3} \rightarrow 3\sin = \cos\alpha$$

$$\sin^2 + \cos^2 = 1 \longrightarrow \sin^2\alpha + (3\sin\alpha)^2 = 10\sin^2\alpha = 1$$

$$\sin^2\alpha = \frac{1}{10} \longrightarrow \sin\alpha = \frac{1}{\sqrt{10}}$$

$$\sin = \frac{\pm\sqrt{10}}{10} \longrightarrow -\frac{\sqrt{10}}{10}$$