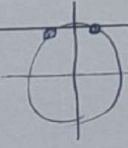


$$S_{\Delta} = \frac{1}{2} \times \sqrt{c} \times 9 \times \sin \alpha = \frac{9}{2} \rightarrow \sin \alpha = \frac{\sqrt{c}}{2}$$


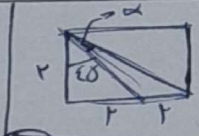
$$\alpha = 90^\circ \text{ یا } 120^\circ \rightarrow \frac{120}{60} = 2 \checkmark$$

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جواب بر حسب زرادیاں هم ۲ می شود

$$\tan(\pi + \alpha) = \frac{\tan \pi + \tan \alpha}{1 - \tan \pi \tan \alpha} = 2 \rightarrow$$

$$\rightarrow 2 = \frac{1 + \tan \alpha}{1 - \tan \alpha} \rightarrow \tan \alpha = \frac{1}{2} \rightarrow \cot \alpha = \frac{1}{\tan \alpha} = 2 \checkmark$$

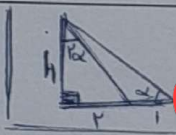


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$$\tan \alpha = \frac{h}{c} \text{ و } \tan 2\alpha = \frac{r}{h} \rightarrow \tan 2\alpha = \frac{2 \tan \alpha}{1 - \tan^2 \alpha} \rightarrow \frac{r}{h} = \frac{2 \frac{h}{c}}{1 - \frac{h^2}{c^2}}$$

$$\rightarrow \frac{r}{h} = \frac{2h}{c - \frac{h^2}{c}} \rightarrow r h^2 - 9 = 0 \rightarrow h = \frac{3}{r} \text{ (اندازه گیری ندارد)} \Rightarrow \text{طبق شکل } \cot \alpha = 2 \checkmark$$

$$\cot \alpha = \frac{r}{\frac{3}{r}} = \frac{r^2}{3} = 2 \checkmark$$

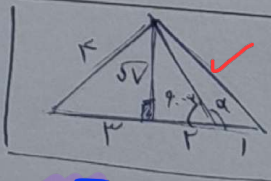


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$$\cot(90 - \alpha) = \cot\left(\frac{\pi}{2} - \alpha\right) = \tan \alpha = 2$$

$$\cot(90 - \alpha) = \frac{2}{\sqrt{3}}$$

$$\tan \alpha = -\tan(90 - \alpha) = -\frac{\sqrt{3}}{2}$$



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از روی شکل جدول خط کسینوس با رابطه فیثاغورث می آید

$$\sin^2 \alpha + \sin^2 \alpha + \cos^2 \alpha = 1 + \frac{1}{4} \Rightarrow \sin^2 \alpha = \frac{1}{4} \xrightarrow{\sin^2 + \cos^2 = 1} \cos^2 \alpha = \frac{3}{4}$$

$$\frac{\sin^2 \alpha}{\cos^2 \alpha} = \tan^2 \alpha = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{3} \checkmark$$

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$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\sin^2 \alpha = 1 - \cos^2 \alpha$$

$$\cos^2 \alpha = 1 - \sin^2 \alpha \rightarrow \frac{\sin^2 \alpha + r(1 - \sin^2 \alpha)}{1 + (1 - \sin^2 \alpha)} = \frac{(1 - \sin^2 \alpha)^2 + r \sin^2 \alpha}{1 + \sin^2 \alpha}$$

$$\frac{t^2 - rt + r}{-t+r} + \frac{t^2 + rt + 1}{t+1} \rightarrow \frac{(t-r)^2}{-(t+r)} + \frac{(t+1)^2}{t+1} = -(t+r) + t+1 \rightarrow 6$$

$$\rightarrow -t-r+t+1 = 0 \quad (c)$$

$$\tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha} \rightarrow \frac{r^2}{a} = \frac{1}{\cos^2 \alpha} \rightarrow \cos^2 \alpha = \frac{a}{r^2}, \sin^2 \alpha = \frac{r^2 - a}{r^2}$$

$$\sin^2 \alpha = (\cos \alpha)(-\sin \alpha) + \cos^2 \alpha = \frac{r}{r} - \frac{r}{r} = 0 \quad (2)$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\sin^2 \left(\frac{\pi}{12}\right) = \frac{1 - \cos \frac{\pi}{6}}{2} = \frac{1 - \frac{\sqrt{3}}{2}}{2} \rightarrow \frac{\sqrt{2 - \sqrt{3}}}{2} = \sin \frac{\pi}{12}$$

$$\cos^2 \left(\frac{\pi}{12}\right) = \frac{1 + \cos \frac{\pi}{6}}{2} = \frac{1 + \frac{\sqrt{3}}{2}}{2} \rightarrow \frac{\sqrt{2 + \sqrt{3}}}{2} = \cos \frac{\pi}{12}$$

$$3 \cos^2 \frac{\pi}{12} + \sqrt{3} \sin^2 \frac{\pi}{12} - \sqrt{2} \cos \frac{\pi}{12} = \frac{3}{2} + \frac{\sqrt{3} - \sqrt{2}}{2} - \frac{\sqrt{2 + \sqrt{3}}}{2}$$

$$= \frac{3 + \sqrt{3} - \sqrt{2} - \sqrt{2 + \sqrt{3}}}{2} \quad \checkmark$$

به روش مشتق کردن این بزرگتر است

$$\tan \alpha = \frac{r \tan \frac{\alpha}{2}}{1 - \tan^2 \frac{\alpha}{2}} \rightarrow \tan \alpha = \frac{\frac{1}{10}}{\frac{1}{10}} = \frac{1}{10} \Rightarrow \tan^2 \alpha + 1 = \frac{1}{\cos^2 \alpha}$$

$$\cos^2 \alpha \sin^2 \alpha = 1 \Rightarrow \sin^2 \alpha = \frac{1}{10}, \cos^2 \alpha = \frac{9}{10} \Rightarrow \sin \alpha = \frac{1}{\sqrt{10}}, \cos \alpha = \frac{3}{\sqrt{10}}$$

$$\frac{1}{\sqrt{10}} - \frac{3}{\sqrt{10}} = \frac{-2}{\sqrt{10}} = -\frac{2\sqrt{10}}{10} = -\frac{\sqrt{10}}{5}$$

$2 \sin \alpha < \sin 2\alpha \Rightarrow \sin 2\alpha = 2 \sin \alpha \cos \alpha \Rightarrow 2 \sin \alpha < 2 \sin \alpha \cos \alpha$

$\sin \alpha < \cos \alpha$  با توجه به اینکه  $\cos \alpha$  پس از  $\sin \alpha$  عددی مثبت است حاصل را کمتر از عدد کرده نامیه ۳ و ۴

اما اعداد منفی را به هم نزدیک تر و در نتیجه بیشتر می کند

$$\frac{\cos \alpha}{\sin \alpha} > 0 \rightarrow \frac{\cos \alpha}{\sin \alpha} > 0 \rightarrow \frac{\cos \alpha}{\sin \alpha} > 0 \rightarrow \cos \alpha > 0$$

نامیه ۱ و ۲

نامیه ۱ که  $\sin \alpha > 0$  و  $\cos \alpha < 0$  باشد نامیه ۲ است

$$\frac{\sin^r \alpha + r(1 - \sin^r \alpha)}{1 + (1 - \sin^r \alpha)} - \frac{\cos^r \alpha + r(1 - \cos^r \alpha)}{1 + (1 - \cos^r \alpha)} =$$

-4

$$\frac{(r - \sin^r \alpha)^{\cancel{r}}}{\cancel{r - \sin^r \alpha}} - \frac{(r - \cos^r \alpha)^{\cancel{r}}}{\cancel{r - \cos^r \alpha}} = \cos^r \alpha - \sin^r \alpha = \boxed{\cos^r \alpha}$$

$$r \cos \frac{\pi}{r} + \sqrt{r} \sin \frac{\pi}{r} - \sqrt{r} \cos \frac{\pi}{r} = \frac{r}{r} + \sqrt{r} \underbrace{\left( \sin \frac{\pi}{r} - \cos \frac{\pi}{r} \right)}_A$$

-A

$$A^r = 1 - \sin \frac{\pi}{4} = \frac{1}{r} \quad A < 0 \rightarrow A = -\frac{1}{\sqrt{r}}$$

$$\text{جواب} = \frac{r}{r} + \sqrt{r} \left( -\frac{1}{\sqrt{r}} \right) = \boxed{\frac{1}{r}}$$