

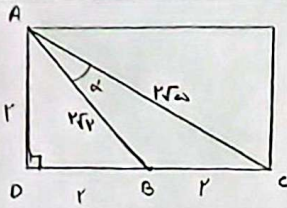
$$S = \frac{1}{2} \times \sqrt{14} \times \sqrt{2} \sin \alpha = \frac{1}{2} \times \sqrt{28} \sin \alpha = \frac{1}{2} \times 2\sqrt{7} \sin \alpha = \sqrt{7} \sin \alpha$$

$$\sin \alpha = \frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7} \rightarrow \alpha = 40^\circ, \alpha = 110^\circ$$

-  $\frac{12}{6} = 2$  برابر

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$$\triangle ABD: AB^2 = (r)^2 + (r)^2 = r^2 + r^2 = 2r^2 \rightarrow AB = r\sqrt{2}$$

$$\triangle ADC: AC^2 = (r)^2 + (r)^2 = r^2 + r^2 = 2r^2 \rightarrow AC = r\sqrt{2}$$

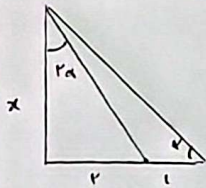
$$S_{\triangle ABC} = \frac{\text{مساحت} \times \text{ارتفاع}}{2} = \frac{r \times r \times \frac{1}{2}}{r} = \frac{1}{2} AB \times AC \times \sin \alpha$$

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$$\rightarrow r = \frac{1}{2} \times r\sqrt{2} \times r\sqrt{2} \times \sin \alpha \rightarrow \sin \alpha = \frac{1}{\sqrt{2}}$$

$$1) \cot^2 \alpha = \frac{1}{\sin^2 \alpha} = 1 \rightarrow \cot^2 \alpha = 1 \rightarrow \cot \alpha = \pm 1 \rightarrow \alpha = 45^\circ \rightarrow \cot \alpha = 1$$



$$\tan \alpha = \frac{x}{r}$$

$$\tan \alpha = \frac{r}{x} = \frac{r \tan \alpha}{1 - \tan^2 \alpha} = \frac{\frac{r^2}{x}}{1 - \frac{r^2}{x^2}} = \frac{\frac{r^2}{x}}{\frac{x^2 - r^2}{x^2}} = \frac{4x}{x^2 - r^2}$$

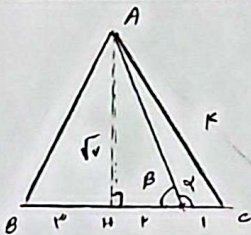
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$$\rightarrow 11 - 2x^2 = 4x^2 \rightarrow 11x^2 = 11 \rightarrow x^2 = \frac{11}{1} = 11 \rightarrow x = \sqrt{11}$$

$$\cot \alpha = \frac{r}{x} = \frac{r}{\sqrt{11}}$$

(در مثلث مستطی‌الکعبین ارتفاع، نیمه از برهم منطبقند) شکل را ببین



$$\triangle AHC: AH = 14 - 4 = 10 \rightarrow AH = 10$$

$$\tan \beta = \frac{AH}{HC} = \frac{10}{4} \rightarrow \tan \alpha = \tan(\pi - \beta) = -\tan(\beta) = -\frac{10}{4}$$

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

$$\cos^2 \alpha = 1 - \sin^2 \alpha = 1 - \frac{1}{r} = \frac{r-1}{r}$$

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

$$\tan^2 \alpha = \frac{1}{\frac{r-1}{r}} = \frac{r}{r-1} = \frac{1}{2} \quad \text{(1/2)}$$

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$$(1 + \sin^2 \alpha)^r = 1 + r \sin^2 \alpha + \sin^2 \alpha = (1 + \cos^2 \alpha)^r = (r + \cos^2 \alpha)^r = r + r \cos^2 \alpha + \cos^2 \alpha$$

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

$$(1 + \cos^2 \alpha)^r = 1 + r \cos^2 \alpha + \cos^2 \alpha = (1 + \sin^2 \alpha)^r = (r + \sin^2 \alpha)^r = r + r \sin^2 \alpha + \sin^2 \alpha$$

$$\cos^2 \alpha + r \sin^2 \alpha = r + 1 - r \cos^2 \alpha + \sin^2 \alpha = r - r(1 - \sin^2 \alpha) + \sin^2 \alpha = r - r + r \sin^2 \alpha + \sin^2 \alpha = 1 + \sin^2 \alpha + r \sin^2 \alpha = (\sin^2 \alpha + 1)^r$$

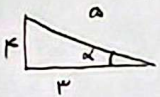
$$\frac{(1 + \cos^2 \alpha)^r}{1 + \cos^2 \alpha} - \frac{(1 + \sin^2 \alpha)^r}{(1 + \sin^2 \alpha)} = 1 + \cos^2 \alpha - 1 - \sin^2 \alpha = \cos^2 \alpha - \sin^2 \alpha = \cos(2\alpha)$$

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$$\sin\left(\frac{\pi}{4} + \alpha\right) = \sin\left(\frac{\pi}{4} + \frac{\pi}{4} + \alpha\right) = \sin\left(\frac{\pi}{2} + \alpha\right) = \cos(\alpha)$$

$$\cos\left(\frac{\pi}{4} - \alpha\right) = \cos\left(\frac{\pi}{4} + \frac{\pi}{4} - \alpha\right) = \cos\left(\frac{\pi}{2} - \alpha\right) = \sin(\alpha)$$

$$\tan\left(\alpha - \frac{\pi}{4}\right) = -\tan\left(\frac{\pi}{4} - \alpha\right) = -\cot(\alpha)$$



$$\cos(\alpha)(-\sin(\alpha)) = (-\cot(\alpha)) = -\frac{r}{a} \times \left(-1 - \frac{r}{a}\right) + \frac{r}{r} = \frac{r}{r} - \frac{r^2}{ra} = \frac{ra - r^2}{ra} = \frac{r(a-r)}{ra}$$

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Y

$$\sqrt{r} \sin x - \sqrt{r} \cos x = r \left( \frac{\sqrt{r}}{r} \sin x - \frac{\sqrt{r}}{r} \cos x \right) = r (\cos \alpha \sin x - \sin \alpha \cos x)$$

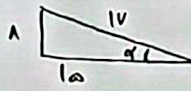
$$= r \sin(x - \alpha) \rightarrow \frac{\pi}{11} = \frac{D}{\omega} = \frac{1}{11} \rightarrow D = \omega \rightarrow r \sin(x - \alpha) = r \sin(-\alpha) = -r \sin(\alpha) = -r \times \frac{1}{r} = -1$$

$$r \cos x = r \cos \frac{\pi}{11} = r \times \frac{1}{r} = \frac{r}{r} \rightarrow \frac{r}{r} - 1 = \frac{1}{r}$$

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A

$$\cot \alpha = \frac{r \tan\left(\frac{\alpha}{r}\right)}{1 - \tan^2\left(\frac{\alpha}{r}\right)} = \frac{r \times \frac{1}{r}}{1 - \frac{1}{14}} = \frac{1}{\frac{13}{14}} = \frac{14}{13}$$



$$\frac{\tan \alpha - \sin \alpha}{\sin \alpha - \cos \alpha} = \frac{\frac{14}{13} - \frac{14}{14}}{\frac{14}{14} - \frac{13}{14}} = \frac{\frac{14}{13} - \frac{14}{14}}{\frac{1}{14}} = \frac{\frac{14(14-13)}{13 \times 14}}{\frac{1}{14}} = \frac{\frac{14 \times 1}{13 \times 14}}{\frac{1}{14}} = \frac{\frac{1}{13}}{\frac{1}{14}} = \frac{14}{13}$$

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$$\frac{\cot \alpha}{\sin \alpha} = \frac{\cos \alpha}{\sin \alpha} = \frac{\cos \alpha}{\sin \alpha} \rightarrow \sin^2 \alpha > 0 \Rightarrow \cos \alpha > 0$$

$$r \sin \alpha < \sin^2 \alpha \rightarrow r \sin \alpha - \sin^2 \alpha \cos \alpha < 0 \quad r \sin \alpha (1 - \cos \alpha) < 0$$

$$\left. \begin{array}{l} \text{أو} \\ \text{أو} \end{array} \right\} (1 - \cos \alpha) < 0, \sin \alpha > 0 \rightarrow \cos \alpha > 1 \text{ غير ممكن}$$

$$\left. \begin{array}{l} \text{أو} \\ \text{أو} \end{array} \right\} (1 - \cos \alpha) > 0, \sin \alpha < 0 \rightarrow \cos \alpha < 1 \text{ ممكن} \rightarrow \cos \alpha > 0 \rightarrow \sin \alpha < 0 \rightarrow \text{مستحيل}$$

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