

$$\tan \frac{\pi}{4} = a \Rightarrow \frac{\pi}{4} \times \frac{180^\circ}{\pi} = 45^\circ \Rightarrow 1a^\circ = a$$

$$\tan 45^\circ = \frac{1}{a}, \tan 135^\circ = -\frac{1}{a} \quad (V)$$

$$\tan 140^\circ = -a, \tan 10^\circ = \cot 10^\circ = \frac{1}{a}$$

$$A = \frac{\tan 45^\circ + \tan 135^\circ}{\tan 140^\circ - \tan 10^\circ} = \frac{\tan(45^\circ - a) + \tan(45^\circ + a)}{\tan(140^\circ - a) - \tan(40^\circ - a)} = \frac{\left(\frac{1}{\tan a}\right) - \frac{1}{\tan a}}{(-\tan a) - \cot a}$$

$$A = \frac{\frac{1}{a} + (-\frac{1}{a})}{-\tan a - \frac{1}{a}} = \frac{\frac{1}{a} - \frac{1}{a}}{-\tan a - \frac{1}{a}} = \frac{0}{-\tan a - \frac{1}{a}} = \boxed{-\frac{1}{\tan a + 1}}$$

$$\frac{\sin x + \cos x}{\sin x - \cos x} + \frac{\sin x - \cos x}{\sin x + \cos x} = r$$

$$\tan^2 x = ? \Rightarrow 1 + \tan^2 x = \frac{1}{\cos^2 x} \Rightarrow \tan^2 x = \frac{1}{\cos^2 x} - 1$$

$$\frac{(\sin x + \cos x)^2 + (\sin x - \cos x)^2}{(\sin x - \cos x)(\sin x + \cos x)} = r \Rightarrow \frac{\sin^2 x + \cos^2 x + 2\sin x \cos x + \sin^2 x + \cos^2 x - 2\sin x \cos x}{\sin^2 x - \cos^2 x} = r$$

$$\frac{2}{\sin^2 x - \cos^2 x} = r \Rightarrow 2(\sin^2 x - \cos^2 x) = r \Rightarrow \sin^2 x - \cos^2 x = \frac{r}{2} \Rightarrow 1 - \cos^2 x - \cos^2 x = \frac{r}{2}$$

$$-2\cos^2 x = -\frac{1}{2} \Rightarrow \cos^2 x = \frac{1}{4} \Rightarrow \frac{1}{\cos^2 x} = 4 \Rightarrow \tan^2 x = 4 - 1 = 3 \Rightarrow \boxed{\tan^2 x = 3}$$

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

$$\tan^2 x = ?$$

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

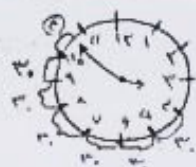
$$\Rightarrow \sin^2 x - 2\cos^2 x + 1 = 1 - \cos^2 x - 2\cos^2 x + 1 = 2 - 3\cos^2 x$$

$$\omega = 2\sin^2 x + 1 - \cos^2 x \Rightarrow \omega = 2(1 - \cos^2 x) + 1 - \cos^2 x = 3 - 3\cos^2 x \Rightarrow 3\cos^2 x = 3 - \omega \Rightarrow \cos^2 x = \frac{3 - \omega}{3} \Rightarrow \frac{1}{\cos^2 x} = \frac{3}{3 - \omega}$$

$$\tan^2 x = \frac{1}{\cos^2 x} - 1 \Rightarrow \tan^2 x = \frac{3}{3 - \omega} - 1 \Rightarrow \boxed{\tan^2 x = \frac{\omega}{3 - \omega}}$$

$$(A) \cos(45^\circ) \cos^2(45^\circ) = \frac{1 + \cos^2(45^\circ)}{2} \Rightarrow \frac{1 + \frac{\sqrt{2}}{2}}{2} = \frac{\sqrt{2} + \sqrt{2}}{2} = \frac{2\sqrt{2}}{2} = \sqrt{2}$$

$$(B) \sin(45^\circ) \sin^2(45^\circ) = \frac{1 - \cos^2(45^\circ)}{2} \Rightarrow \frac{1 - \frac{\sqrt{2}}{2}}{2} = \frac{\sqrt{2} - \sqrt{2}}{2} = \frac{0}{2} = 0$$



$$4 \times 2 = 8$$

$$8 \times 4 = 32$$

$$\frac{32}{4} = 8 \Rightarrow 3 - 2 = 1$$

$$180 + 2 \times 4 + 3 = 191$$

(الف)

جواب

$$\alpha = |\omega_1 M - \omega_2 H| \Rightarrow |\omega_1 \times \omega_2 - \omega_2 \times \omega_1| = 2 \times 2 = 4 \Rightarrow 34 - 20 = 14$$

(ب)



$\Rightarrow$

$$3 \times 2 = 6$$

$$\frac{1}{2} \times 2 \times 2 = 2$$

$$40 + 21 = 61$$

(الف)

$$\alpha = |\omega_1 M - \omega_2 H| \Rightarrow |\omega_1 \times \omega_2 - \omega_2 \times \omega_1| \Rightarrow |99 - 180| = 81$$

(ب)

$$\alpha = \frac{\pi}{4}, R = 3 \text{ cm}$$

$$S_{\text{OAB}} = \frac{\alpha}{2} R^2 \Rightarrow \frac{\pi}{4} \times 3^2 \Rightarrow \frac{\pi}{4} \times 9 = \frac{9\pi}{4}$$

(الف)

جواب

$$S_{\text{OAB}} = 2R + L \Rightarrow 2R + \alpha R \Rightarrow 2 \times 3 + \frac{\pi}{4} \times 3 = 6 + \frac{3\pi}{4}$$

(ب)



$$S_{ABC} = \frac{1}{2} \times 1 \times 2 \times \sin 40^\circ \Rightarrow \frac{1}{2} \times 2 \times \sin 40^\circ \Rightarrow \sin 40^\circ$$

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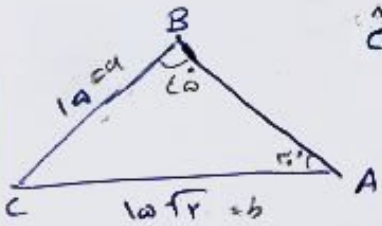
جواب

$$BC^2 = 1^2 + 2^2 - 2 \times 1 \times 2 \times \cos 40^\circ \Rightarrow 1 + 4 - 4 \cos 40^\circ \Rightarrow 5 - 4 \cos 40^\circ$$

(ب)

جواب

$$P_{ABC} = CB + AB + AC \Rightarrow 1 + 2 + 3 = 6$$



$$\hat{C} + \hat{B} = 180^\circ \Rightarrow \hat{A} = 180^\circ - 100^\circ = 80^\circ$$

(الف)

$$\frac{a}{\sin A} = \frac{b}{\sin B} \Rightarrow \frac{1}{\sin 40^\circ} = \frac{2}{\sin B} \Rightarrow \sin B = 2 \sin 40^\circ$$

$$100^\circ - 40^\circ = 60^\circ \Rightarrow \hat{B} = 60^\circ$$

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$$\hat{B} = 60^\circ \times \frac{\pi}{180} = \frac{\pi}{3}, \hat{C} = 40^\circ \times \frac{\pi}{180} = \frac{2\pi}{9}$$

$$\frac{\tan(\pi - \alpha) + \tan(\pi + \alpha)}{\tan(\pi - \alpha) - \tan(\pi + \alpha)} = \frac{-\tan \alpha + \tan \alpha}{-\tan \alpha - \tan \alpha} = \frac{0}{-2 \tan \alpha} = 0$$

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