

$$\text{الف)} (-1) + (-\frac{\sqrt{3}}{2}) \times (-\frac{\sqrt{3}}{2}) = -1 + \frac{1}{2} = -\frac{1}{2} \quad \checkmark$$

$$\text{ب)} (-\frac{\sqrt{3}}{2}) \times (-\frac{\sqrt{3}}{2}) + (-\frac{1}{2}) = \frac{1}{2} - \frac{1}{2} = 0 \quad \checkmark$$

$$\tan \frac{4\pi}{3} = \tan \frac{2\pi}{3} \quad \sin \frac{4\pi}{3} = \sin \frac{2\pi}{3} \quad \cos \frac{4\pi}{3} = \cos \frac{2\pi}{3}$$

$$\tan \frac{10\pi}{3} = \tan \frac{4\pi}{3} \quad \sin \frac{10\pi}{3} = \sin \frac{4\pi}{3} \quad \cos \frac{10\pi}{3} = \cos \frac{4\pi}{3}$$

$$\cot x = 2 \Rightarrow \frac{\cos x}{\sin x} = 2 \Rightarrow \cos x = 2 \sin x$$

$$\Rightarrow \frac{2(2 \sin x) - \sin x}{(2 \sin x) + \sin x} = \frac{4 \sin x - \sin x}{2 \sin x + \sin x} = \frac{3 \sin x}{3 \sin x} = \frac{3}{3} = 1 \quad \checkmark$$

$$\sin \alpha = 2 \cos \alpha \Rightarrow \frac{\sin \alpha}{\cos \alpha} = 2 \Rightarrow \tan \alpha = 2$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \Rightarrow 1 + 2^2 = \frac{1}{\cos^2 \alpha} \Rightarrow 5 = \frac{1}{\cos^2 \alpha} \Rightarrow \cos^2 \alpha = \frac{1}{5} \Rightarrow \cos \alpha = \pm \frac{1}{\sqrt{5}} = \pm \frac{\sqrt{5}}{5} \quad \checkmark$$

$$\text{الف)} \cos\left(\frac{11\pi}{3} + \alpha\right) = \cos \frac{11\pi}{3} \cos \alpha - \sin \frac{11\pi}{3} \sin \alpha = \frac{\sqrt{3}}{2} \left(-\frac{1}{\sqrt{2}}\right) - \left(-\frac{1}{2}\right) \left(\frac{\sqrt{2}}{2}\right) = 0/\sqrt{2} - 0/1 = 0 \quad \checkmark$$

$$\sin^2 \alpha + \cos^2 \alpha = 1 \Rightarrow 0/2 + \cos^2 \alpha = 1 \Rightarrow \cos^2 \alpha = 1/2 \Rightarrow \cos \alpha = \pm 1/\sqrt{2} \Rightarrow \cos \alpha = -1/\sqrt{2}$$

$$\text{ب)} \sin\left(\frac{13\pi}{6} + \alpha\right) = \sin \frac{13\pi}{6} \cos \alpha + \sin \alpha \cos \frac{13\pi}{6} = \frac{\sqrt{3}}{2} \left(\frac{1}{\sqrt{2}}\right) + \left(\frac{1}{2}\right) \left(\frac{\sqrt{2}}{2}\right) = 0/\sqrt{2} + (-0/1) = -0/1 \quad \checkmark$$

$$2 \sin^2 x + \cos^2 x = \frac{4}{5} \Rightarrow \sin^2 x + \sin^2 x + \cos^2 x = \frac{4}{5} \Rightarrow \sin^2 x + 1 = \frac{4}{5} \Rightarrow \sin^2 x = -\frac{1}{5}$$

$$1 + \cot^2 x = \frac{1}{\sin^2 x} \Rightarrow 1 + \cot^2 x = \frac{1}{-\frac{1}{5}} = -5 \Rightarrow \cot^2 x = -6$$

$$\tan^2 x = \frac{1}{\cot^2 x} = \frac{1}{-6} \quad \checkmark$$

$$\text{۴. ب)} 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \Rightarrow 1 + \frac{1}{49} = \frac{1}{\cos^2 \alpha} \Rightarrow \frac{50}{49} = \frac{1}{\cos^2 \alpha} \Rightarrow \cos^2 \alpha = \frac{49}{50} \Rightarrow \cos \alpha = \pm \frac{7}{\sqrt{50}}$$

$$\Rightarrow \cos \alpha = \frac{7}{\sqrt{50}} \Rightarrow \tan \alpha = \frac{1}{7} \Rightarrow \frac{\sin \alpha}{\cos \alpha} = \frac{1}{7} \Rightarrow 7 \sin \alpha = \cos \alpha \Rightarrow 7 \sin \alpha = \frac{7}{\sqrt{50}} \Rightarrow \sin \alpha = \frac{1}{\sqrt{50}}$$

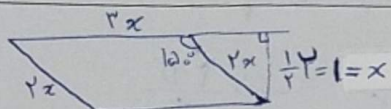
$$\Rightarrow \sin \alpha = \frac{1}{\sqrt{50}} = \frac{\sqrt{2}}{10}$$

$$S = \frac{1}{r} ab \sin \alpha \Rightarrow f/d = \frac{1}{r} \sqrt{r^2} \times \sin \alpha \Rightarrow \sqrt{r^2} \sin \alpha = \frac{r/d}{r} = 1/d \Rightarrow \sin \alpha = \frac{1/d}{\sqrt{r^2}}$$

$$\Rightarrow \sin \alpha = 0/d \sqrt{r^2} = \frac{\sqrt{r^2}}{r} \Rightarrow \alpha = 90^\circ, 120^\circ$$

$$\frac{120^\circ}{90^\circ} = \boxed{2} \quad \checkmark$$

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$$S = \omega r^2$$

$$\rightarrow \omega r = x \times r \times x = r^2 x^2 \Rightarrow x^2 = 1/r \Rightarrow x = \pm \sqrt{1/r} \xrightarrow{\text{دالة موجبة}} x = \sqrt{1/r} = \sqrt{r^2} = r$$

$$\text{مساحة المثلث} = 9\sqrt{r^2} \times r + 9\sqrt{r^2} \times r = 18\sqrt{r^2} + 18\sqrt{r^2} = \boxed{36\sqrt{r^2}} \quad \checkmark$$

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$$S = \frac{1}{r} ab \sin \alpha$$

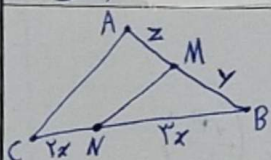
$$S_{ABC} = \frac{1}{r} \times V \times \omega \times \sin \alpha = 1/V/d \sin \alpha$$

$$S_{ADE} = \frac{1}{r} \times V \times f \times \sin \alpha = 1/f \sin \alpha$$

$$1/V/d \sin \alpha - 1/f \sin \alpha = 1/V\omega \Rightarrow \sin \alpha (r/d) = 1/V\omega \Rightarrow \sin \alpha = \frac{1}{r} \Rightarrow \alpha = 90^\circ, 120^\circ$$

$$\xrightarrow{\text{دالة موجبة}} \alpha = 90^\circ \rightarrow \tan \alpha = \tan 90^\circ = \frac{1}{\sqrt{r^2}} = \frac{r}{r} = \tan A \quad \checkmark$$

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$$r \overline{BN} = r \overline{NC} \Rightarrow \frac{BN}{NC} = \frac{r}{r} \Rightarrow \left\{ \begin{array}{l} \overline{BN} = r \\ \overline{NC} = r \end{array} \right.$$

$$\frac{S_{ABC}}{S_{BMN}} = r = \frac{\frac{1}{r} \times (r+x) \times (z+y) \times \sin B}{\frac{1}{r} \times r \times y \times \sin B} \Rightarrow \frac{\omega x(z+y)}{rxy} = r$$

$$\Rightarrow \frac{\omega(z+y)}{ry} = r \Rightarrow \omega z + \omega y = ry \Rightarrow \omega z = ry \Rightarrow \frac{y}{z} = \frac{\omega}{r} = \frac{BM}{AM} \quad \checkmark$$

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$$\frac{1}{\sqrt{\cos \alpha}} - \tan \alpha = \frac{1 + \sin \alpha}{|\cos \alpha|} \Rightarrow \frac{1}{|\cos \alpha|} - \frac{\sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha}{|\cos \alpha|} - \frac{1}{|\cos \alpha|}$$

$$\Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{1 + \sin \alpha - 1}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{\sin \alpha}{|\cos \alpha|} = \frac{|\sin \alpha|}{\cos \alpha} \Rightarrow \left\{ \begin{array}{l} \sin < 0, \cos < 0 \\ \sin > 0, \cos > 0 \end{array} \right.$$

$$\rightarrow \left\{ \begin{array}{l} \sin < 0, \cos < 0 \rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{-\cos \alpha} \checkmark \Rightarrow \sin < 0, \cos < 0 \Rightarrow \alpha \rightarrow \text{دالة موجبة} \\ \sin > 0, \cos > 0 \rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{\cos \alpha} \quad \alpha \end{array} \right.$$

$$\left\{ \begin{array}{l} \sin < 0, \cos < 0 \rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{-\cos \alpha} \checkmark \Rightarrow \sin < 0, \cos < 0 \Rightarrow \alpha \rightarrow \text{دالة موجبة} \\ \sin > 0, \cos > 0 \rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{|\cos \alpha|} \Rightarrow \frac{-\sin \alpha}{\cos \alpha} = \frac{\sin \alpha}{\cos \alpha} \quad \alpha \end{array} \right.$$