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$$1) \quad 2V^\circ = (n) \text{ rad} \rightarrow \frac{2V}{180} = \frac{\text{rad}}{\pi} \rightarrow \text{rad} = \frac{2\pi}{V}$$

$$2) \quad 120^\circ = (n) \text{ rad} \rightarrow \frac{120}{180} = \frac{\text{rad}}{\pi} \rightarrow \text{rad} = \frac{2\pi}{3}$$

$$3) \quad \frac{2\pi}{15} \text{ rad} = (n)^\circ \rightarrow \frac{\frac{2\pi}{15}}{\frac{2\pi}{180}} = \frac{D}{180} \rightarrow D = 120^\circ$$

$$4) \quad \frac{2\pi}{9} \text{ rad} = (n)^\circ \rightarrow \frac{\frac{2\pi}{9}}{\frac{2\pi}{180}} = \frac{D}{180} \rightarrow D = 40^\circ$$

$$10a + \frac{20}{3}a + \frac{40}{3}a = \frac{30+20+40}{3} = \frac{90}{3}a = 30a = 180 \rightarrow a = 6$$

$$\frac{\frac{20a}{3}}{\frac{2\pi}{180}} = \frac{D}{180} \rightarrow D = \frac{20}{3}a, \quad \frac{\frac{40a}{3}}{\frac{2\pi}{180}} = \frac{D}{180} \rightarrow D = \frac{40}{3}a$$

$$5) \quad \frac{\cos 30^\circ \cos 60^\circ - \sin 30^\circ \sin 60^\circ}{\sin 30^\circ \sin 60^\circ} = \frac{\tan 60^\circ + \tan 30^\circ}{1} = 0 - 1 + 1 = 1$$

$$6) \quad \frac{\tan 30^\circ + \tan 60^\circ + \tan 45^\circ}{\tan 30^\circ \tan 60^\circ} = \left(\frac{1}{\sqrt{3}} + 1 + \sqrt{3} \right) = \left(\frac{1+\sqrt{3}+\sqrt{3}+1}{\sqrt{3}} \right) = \frac{2+2\sqrt{3}}{\sqrt{3}} = \frac{2(\sqrt{3}+1)}{\sqrt{3}}$$

$$7) \quad \sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ = \sin \theta$$

$$8) \quad (\cos 30^\circ)^2 + (\sin 30^\circ)^2 = \left(\frac{1}{2} \right)^2 + \left(\frac{\sqrt{3}}{2} \right)^2 = \frac{1}{4} + \frac{3}{4} = 1 = \sin^2 \theta \rightarrow \sin \theta = \frac{\sqrt{3}}{2}$$

$\tan 60^\circ = 1 \rightarrow \theta = 60^\circ$

$$\tan \alpha = \frac{1}{9} \rightarrow 1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha} \rightarrow 1 + \frac{1}{81} = \frac{10}{81} = \frac{1}{\cos^2 \alpha} \rightarrow \cos^2 \alpha = \frac{9}{10}$$

$$\rightarrow \cos^2 \alpha + \sin^2 \alpha = 1 \rightarrow \frac{9}{10} + \sin^2 \alpha = 1 \rightarrow \sin^2 \alpha = \frac{1}{10} \rightarrow \sin \alpha = \pm \frac{1}{\sqrt{10}}$$

$$\rightarrow \sin \alpha = \pm \frac{1}{\sqrt{10}} = \pm \frac{\sqrt{10}}{10}$$

$$\sin \alpha = \pm \frac{\sqrt{10}}{10}$$

$$\sin \alpha = -\frac{\sqrt{10}}{10}$$

$\sin \alpha < 0$ α is in 3rd or 4th quadrant