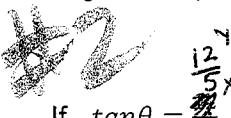


Trigonometry Practice Review

 Name Key Hour 2nd & 6th


If $\tan \theta = \frac{12}{5}$ when $\pi < \theta < \frac{3\pi}{2}$, set up and solve for the following

$$1. \sin \theta = \frac{12}{13}$$

$$\begin{aligned} 5^2 + 12^2 &= r^2 \\ 25 + 144 &= r^2 \\ \sqrt{169} &= r^2 \\ r &= 13 \end{aligned}$$

$$\cos \theta = \frac{-5}{13}$$

$$\begin{aligned} 2. \sin \frac{\theta}{2} &= \pm \sqrt{\frac{1 - \cos \theta}{2}} = \pm \sqrt{\frac{1 + \frac{5}{13}}{2}} \\ \pm \sqrt{\frac{\frac{13}{13} + \frac{5}{13}}{2}} &= \pm \sqrt{\frac{\frac{18}{13}}{2}} = \pm \sqrt{\frac{18}{13} \cdot \frac{1}{2}} \\ \pm \sqrt{\frac{9}{13}} &= \pm \frac{3}{\sqrt{13}} = \boxed{\frac{3\sqrt{13}}{13}} \end{aligned}$$

$$2. \tan \frac{\theta}{2} = \frac{1 - \cos \theta}{\sin \theta} = \frac{1 - (-\frac{5}{13})}{-\frac{12}{13}}$$

$$\frac{\frac{13}{13} + \frac{5}{13}}{-\frac{12}{13}} = \frac{\frac{18}{13}}{-\frac{12}{13}} = \frac{18}{13} \cdot \frac{13}{-12}$$

$$\frac{18}{-12} = \boxed{-\frac{3}{2}}$$

Half angle in Q II

$$4. \cos 2\theta = 2\cos^2 \theta - 1$$

$$2\left(-\frac{5}{13}\right)^2 - 1$$

$$2\left(\frac{25}{169}\right) - 1$$

$$\frac{50}{169} - \frac{169}{169} = \boxed{-\frac{119}{169}}$$

5. Simplify

A) $\cos^2(21^\circ) - \sin^2(21^\circ)$

$$\cos 2(21)$$

$$\cos 42$$

B) $\frac{\tan 3^\circ + \tan 9^\circ}{1 - \tan 3^\circ \tan 9^\circ}$

$$\tan(3+9)$$

$$\tan 12$$

C) $2\sin 76^\circ \cos 76^\circ$

$$\sin 2(76)$$

$$\sin(152)$$

D) $\sin 16^\circ \cos 17^\circ + \cos 16^\circ \sin 17^\circ$

$$\sin(16+17)$$

$$\sin 33$$

E) $2\cos^2(13^\circ) - 1$

$$\cos 2(13)$$

$$\cos 26$$

F) $\frac{\sin 33^\circ}{1 + \cos 33^\circ}$

$$\tan\left(\frac{33}{2}\right)$$

$$\tan 16.5^\circ$$

6. Express the following as a function of γ alone angles whose functional values $\cos(\pi + \gamma)$

$$\begin{aligned} \cos \pi \cos \gamma - \sin \pi \sin \gamma \\ = 1 \cos \gamma - 0 \sin \gamma \\ = \cos \gamma \end{aligned}$$

7. Write the expression $\sin \frac{7\pi}{12}$ as the sum of known angles and then evaluate

$$\begin{aligned} \sin \frac{7\pi}{12} &= \sin \left(\frac{\pi}{12} + \frac{3\pi}{4} \right) = \sin \left(\frac{\pi}{3} + \frac{\pi}{4} \right) = \sin \frac{\pi}{3} \cos \frac{\pi}{4} + \cos \frac{\pi}{3} \sin \frac{\pi}{4} \\ &\quad \frac{\sqrt{3}}{2} \left(\frac{\sqrt{2}}{2} \right) + \frac{1}{2} \left(\frac{\sqrt{2}}{2} \right) \\ &\quad \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6} + \sqrt{2}}{4} \text{ or } \frac{\sqrt{2} + \sqrt{6}}{4} \end{aligned}$$

8. Verify: $\cos x \cot x = \frac{1 - \sin^2 x}{\sin x}$

$$\frac{\cos^2 x}{\sin x}$$

$$\cos x \cdot \frac{\cos x}{\sin x}$$

$$\cos x \cdot \cot x$$

9. Verify: $(\tan^2 \theta + 1)(\cos^2 \theta + 1) = \tan^2 \theta + 2$

$$\tan^2 \theta \cos^2 \theta + \tan^2 \theta + \cos^2 \theta + 1$$

$$\frac{\sin^2 \theta}{\cos^2 \theta} \cancel{\cos^2 \theta} + \tan^2 \theta + \cos^2 \theta + 1$$

$$\underbrace{\sin^2 \theta + \cos^2 \theta}_{1} + \tan^2 \theta + 1$$

$$1 + \tan^2 \theta + 1$$

$$\tan^2 \theta + 2$$

10. Simplify $\frac{\tan \frac{\pi}{12} + \tan \frac{\pi}{4}}{1 - \tan \frac{\pi}{12} \tan \frac{\pi}{4}}$

$$\tan \left(\frac{\pi}{12} + \frac{\pi}{4} \right) = \tan \left(\frac{\pi}{12} + \frac{3\pi}{4} \right) = \tan \left(\frac{4\pi}{12} \right) = \tan \frac{\pi}{3} = \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2} \cancel{\frac{2}{1}} = \sqrt{3}$$

11. Verify $\frac{\cos(\alpha - \beta)}{\sin \alpha \sin \beta} = \cot \alpha \cot \beta + 1$

$$\frac{\cos \alpha \cos \beta + \sin \alpha \sin \beta}{\sin \alpha \sin \beta}$$

$$\frac{\cos \alpha \cos \beta}{\sin \alpha \sin \beta} + \frac{\sin \alpha \sin \beta}{\sin \alpha \sin \beta}$$

$$\cot \alpha \cot \beta + 1$$