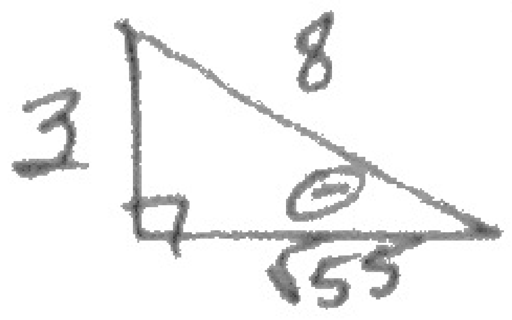
#9 WS Verify Trig Identities

Name Key

Use your trig identities to find the value for each.

1. $\cos x = \frac{3}{2}$. Find $\sec x$. $\sec x = \frac{1}{\cos x}$ $= \frac{1}{\frac{3}{2}}$ $= \frac{2}{3}$	2. $\cos x = \frac{1}{6}$ and $\sin x = \frac{\sqrt{35}}{6}$. Find $\cot x$. $\cot x = \frac{\cos x}{\sin x}$ $= \frac{\frac{1}{6}}{\frac{\sqrt{35}}{6}} = \frac{1}{6} \cdot \frac{6}{\sqrt{35}} = \frac{1}{\sqrt{35}}$ $\boxed{\frac{\sqrt{35}}{35}}$	3. $\cos x = \frac{3}{4}$ and $\sin x = \frac{3}{5}$. Find $\tan x$. $\tan x = \frac{\sin x}{\cos x}$

Use the trig Pythagorean identities to find the value of each.

$\cos^2 x +$ $\sin^2 x$ $= 1$ $1 +$ $\tan^2 x$ $= \sec^2 x$ $\cot^2 x + 1 =$ $\csc^2 x$	4. Find the $\sec\theta$ and $\cos\theta$ if $\tan\theta = -5$ and $\cos\theta > 0$.	5. Find the $\tan\theta$ and $\cos\theta$ if $\csc\theta = \frac{8}{3}$ and $\tan\theta > 0$.  $64 = 3^2 + x^2$ $\sqrt{55} = x$ $\tan\theta = \frac{3\sqrt{55}}{55}$ $\cos\theta = \frac{\sqrt{55}}{8}$

Use trig identities to transform the **LEFT** side into the right side. $(0 < \theta \le 2\pi)$.

6. $\tan\theta\cot\theta = 1$ $\frac{\sin\theta}{\cos\theta} \cdot \frac{\cos\theta}{\sin\theta} =$ $1 = 1$	7. $\cos\theta\sec\theta = 1$ $\cancel{\cos\theta} \cdot \frac{1}{\cancel{\cos\theta}} =$ $1 = 1$	8. $\tan\alpha\cos\alpha = \sin\alpha$ $\frac{\sin\alpha}{\cos\alpha} \cdot \cos\alpha$ $\sin\alpha = \sin\alpha$

9. $\cot\beta\sin\beta = \cos\beta$ $\frac{\cos\beta}{\sin\beta} \cdot \sin\beta =$ $\cos\beta = \cos\beta$	10. $(1+\cos x)(1-\cos x) = \sin^2 x$ $1 - \cos^2 x$ $1 - (1 - \sin^2 x)$ $1 - 1 + \sin^2 x$ $\sin^2 x = \sin^2 x$ workspace $\sin^2 x + \cos^2 x = 1$ $\cancel{\sin^2 x = 1 - \cos^2 x}$ $\cos^2 x = 1 - \sin^2 x$

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

11. $(1+\sin x)(1-\sin x) = \cos^2 x$

$1 - \sin^2 x$

$\cos^2 x = \cos^2 x$

12. $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

$\sec^2\theta - \tan^2\theta$ ... (more to do!)

$\sec^2\theta - (\sec^2 x - 1)$

$\sec^2\theta - \sec^2\theta + 1$

$1 = 1$

$\tan^2\theta + 1 = \sec^2 x$

$\tan^2\theta = \sec^2 x - 1$

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

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

$\sin^2 x - (1 - \sin^2 x) =$

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

$2\sin^2 x - 1 =$

14. $\dfrac{\sin\omega}{\cos\omega} + \dfrac{\cos\omega}{\sin\omega} = \csc\omega\sec\omega$

$\dfrac{\sin^2 w}{\cos w \sin w} + \dfrac{\cos^2 w}{\cos w \sin w}$

$\dfrac{\sin^2 w + \cos^2 w}{\cos w \sin w}$

$\dfrac{1}{\cos w \sin w}$

$\sec w \cdot \csc w = \csc w \cdot \sec w$

15. $\dfrac{\tan\beta + \cot\beta}{\tan\beta} = \csc^2\beta$

$\dfrac{\tan\beta}{\tan\beta} + \dfrac{\cot\beta}{\tan\beta}$

$1 + \dfrac{\frac{\cos B}{\sin B}}{\frac{\sin B}{\cos B}}$

$1 + \dfrac{\cos B}{\sin B} \cdot \dfrac{\cos B}{\sin B}$

$1 + \dfrac{\cos^2 B}{\sin^2 B}$

$1 + \cot^2 B$

$\csc^2 B$

Compute the exact value in radians WITHOUT using a calculator.

16. $Cos^{-1}\left(\dfrac{\sqrt{3}}{2}\right) = 30°$ $\boxed{\dfrac{\pi}{6}}$

17. $Sin^{-1}\left(\dfrac{\sqrt{2}}{2}\right) = \dfrac{\pi}{4} = 45°$

18. $\text{Arccos}\left(-\dfrac{1}{2}\right) = 120°$ $\boxed{\dfrac{2\pi}{3}}$

19. $\sin\left(Cos^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)\right)$

$\sin\left(\dfrac{3\pi}{4}\right) = \dfrac{\sqrt{2}}{2}$

20. $\cos\left(\text{Arcsin}\,\dfrac{1}{2}\right) = \dfrac{\sqrt{3}}{2}$

21. $\text{Arcsin}\left(\sin\dfrac{5\pi}{6}\right)$

$\text{Arcsin}\left(\dfrac{1}{2}\right)$

$= \dfrac{\pi}{6} = 30°$