Unit 8

1. Reciprocal (6)
2. Quotient (2)
3. Pythagorean (3)
4. Odd/even (6)
5. Co-function (6)

1.

$$\sin\theta = \frac{1}{\csc\theta}$$

$$\csc\theta = \frac{1}{\sin\theta}$$

$$\sec\theta = \frac{1}{\cos\theta}$$

$$\cos\theta = \frac{1}{\sec\theta}$$

$$\tan\theta = \frac{1}{\cot\theta}$$

$$\cot\theta = \frac{1}{\tan\theta}$$

2.

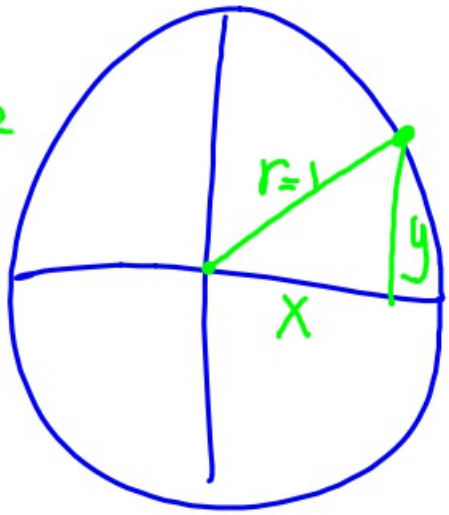
$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

3. $x^2+y^2=r^2$

$(\cos\theta)^2+(\sin\theta)^2=1^2$

$\boxed{\cos^2\theta+\sin^2\theta=1}$



÷ orig by $\cos^2\theta$

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

$$\boxed{1+\tan^2\theta=\sec^2\theta}$$

÷ $\sin^2\theta$ into orig.

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

$$\boxed{\cot^2\theta+1=\csc^2\theta}$$

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

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

$1=\csc^2\theta-\cot^2\theta$

$\cot^2\theta=\csc^2\theta-1$

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

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

4. odd

$\sin(-\theta) = -\sin(\theta)$

ex)

$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

$\sin\left(-\frac{\pi}{6}\right) = \sin\left(\frac{11\pi}{6}\right) = -\frac{1}{2}$

ex) $\sin w = \frac{3}{5}$

$\sin(-w) = -\frac{3}{5}$

$\csc(-\theta) = -\csc(\theta)$

$\cot(-\theta) = -\cot(\theta)$

$\tan(-\theta) = -\tan(\theta)$

even

$\cos\theta = \cos(-\theta)$

ex) $\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\cos\left(-\frac{\pi}{6}\right) = \cos\left(\frac{11\pi}{6}\right) = \frac{\sqrt{3}}{2}$

$\sec\theta = \sec(-\theta)$

5.

$\cos\left(\frac{\pi}{2}-\theta\right)=\sin\theta$

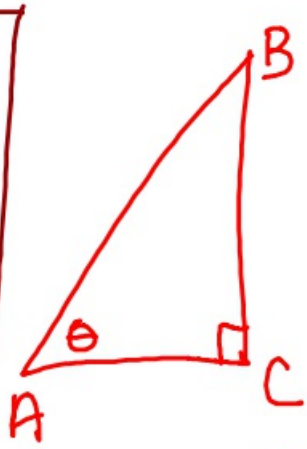
$\sec\left(\frac{\pi}{2}-\theta\right)=\csc\theta$

$\sin\left(\frac{\pi}{2}-\theta\right)=\cos\theta$

$\csc\left(\frac{\pi}{2}-\theta\right)=\sec\theta$

$\cot\left(\frac{\pi}{2}-\theta\right)=\tan\theta$

$\tan\left(\frac{\pi}{2}-\theta\right)=\cot\theta$



$\sin(A)=\frac{BC}{AB}$

$\cos B=\frac{BC}{AB}$

$A+B=90^\circ$

$A=90^\circ-B$

$\sin(90^\circ-B)=\cos B$

Ex Given: $\sin 30^\circ=\frac{1}{2}$

$\cos(60^\circ)=\frac{1}{2}$

AKA: $\cos(90^\circ-30^\circ)=\frac{1}{2}$

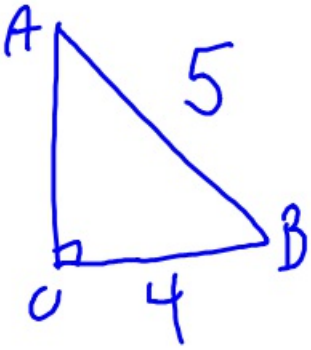
Ex Given: $\sin A=\frac{4}{5}$

& $\angle A$ is part of a right $\triangle ABC$

Where $\angle C$ is a rt $\angle$.

$\cos B=?\ \frac{4}{5}$

$\cos(90^\circ-A)$



Ex Prove the identity

$$\frac{\sin\theta}{\sin\theta(1+\cos\theta)} \cdot \frac{\sin\theta}{\sin\theta} + \frac{\cos\theta}{(\sin\theta)(1+\cos\theta)} \cdot \frac{(1+\cos\theta)}{(1+\cos\theta)} = \csc\theta \cdot 1$$

$$\frac{\sin^2\theta + \cos\theta + \cos^2\theta}{\sin\theta(1+\cos\theta)} = \csc\theta$$

$$\frac{1 + \cos\theta}{\sin\theta(1+\cos\theta)} = \csc\theta$$

$$\frac{1}{\sin\theta} = \csc\theta$$

$$\csc\theta = \csc\theta \quad \checkmark$$

B. $\sec^4 x - \tan^4 x = 1 + 2\tan^2 x$

$(\sec^2 x)^2 - (\tan^2 x)^2 = 1 + 2\tan^2 x$

$(\sec^2 x - \tan^2 x)(\sec^2 x + \tan^2 x) = 1 + 2\tan^2 x$

$(1)(\sec^2 x + \tan^2 x) = 1 + 2\tan^2 x$

$(1 + \tan^2 x) + \tan^2 x = 1 + 2\tan^2 x$

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

✓

C. $\ln|1+\cos\theta| + \ln|1-\cos\theta| = 2\ln|\sin\theta|$

$\ln|(1+\cos\theta)(1-\cos\theta)| = 2\ln|\sin\theta|$

$\ln|1-\cos^2\theta| = 2\ln|\sin\theta|$

$\ln|\sin^2\theta| = 2\ln|\sin\theta|$

$2\ln|\sin\theta| = 2\ln|\sin\theta|$

Homework:

Identity Worksheet: even except for 32