5-1-1 Identities

Identity - equation where the left side equals the rightside.

Trigonometric Identity → an identity that uses trig functions.

Reciprocal & Quotient Identities

$\sin\theta = \dfrac{1}{\csc\theta}$ $\qquad$ $\csc\theta = \dfrac{1}{\sin\theta}$

$\cos\theta = \dfrac{1}{\sec\theta}$ $\qquad$ $\sec\theta = \dfrac{1}{\cos\theta}$

$\tan\theta = \dfrac{1}{\cot\theta}$ $\qquad$ $\cot\theta = \dfrac{1}{\tan\theta}$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ $\qquad$ $\cot\theta = \dfrac{\cos\theta}{\sin\theta}$

Ex 1A $\csc\theta = \frac{7}{4}$, find $\sin\theta$.

$\csc\theta = \dfrac{1}{\sin\theta} = \dfrac{7}{4}$

$\boxed{\sin\theta = \dfrac{4}{7}}$

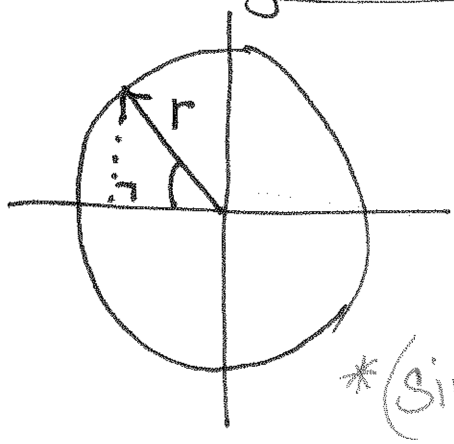
Ex 1B $\cot x = \dfrac{2}{5\sqrt{5}}$, $\sin x = \dfrac{\sqrt{5}}{3}$

find $\cos x$. $\qquad \cot\theta = \dfrac{\cos\theta}{\sin\theta}$

$\left(\dfrac{\sqrt{5}}{3}\right)\dfrac{2}{5\sqrt{5}} = \dfrac{\cos\theta}{\left(\frac{\sqrt{5}}{3}\right)}\left(\dfrac{\sqrt{5}}{3}\right)$

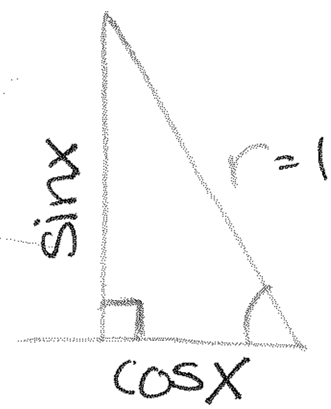
$\dfrac{\sqrt{5}}{3}\cdot\dfrac{2}{5\sqrt{5}} = \boxed{\cos\theta = \dfrac{2}{15}}$

Pythagorean Identities



unit circle
$r=1$

$a^2+b^2=c^2$



*$(\sin\theta)^2 = \sin^2\theta$

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

$\tan^2\theta + 1 = \sec^2\theta$ ($\cos^2\theta$ denom.)

$\cot^2\theta + 1 = \csc^2\theta$ ($\sin^2\theta$ denom)

Ex 2A if $\tan\theta = -8$ $\sin\theta > 0$ find $\sin\theta, \cos\theta$

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

$-8 = \frac{\sin\theta}{\cos\theta}$

stuck!

$\tan^2\theta + 1 = \sec^2\theta$
$(-8)^2 + 1 = \sec^2\theta$
$65 = \sec^2\theta$
$\pm\sqrt{65} = \sec\theta$
$\frac{1}{\pm\sqrt{65}} = \frac{\pm\sqrt{65}}{65} = \cos\theta$ ✓

$\sec^2\theta = \frac{1}{\cos^2\theta}$

$\boxed{\cos\theta = -\frac{\sqrt{65}}{65}}$

$-8 = \frac{\sin\theta}{\cos\theta}\left(\frac{\sqrt{65}}{65}\right)$ $\quad -8 = \frac{\sin\theta}{\cancel{\left(-\frac{\sqrt{65}}{65}\right)}}\left(-\frac{\sqrt{65}}{65}\right)$

* which $\cos\theta$ $(\pm)$ makes $\sin\theta$ pos.?

$\boxed{\sin\theta = \frac{8\sqrt{65}}{65}}$