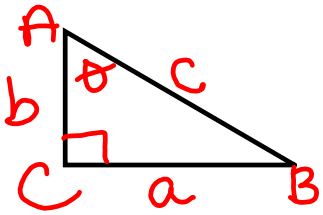
13-1A Trigonometric Identities

Trigonometric Identity: an equation involving trigonometric functions that is true for all values for which every expression in the equation is defined.

Trigonometric Identities		
Quotient Identities	$\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$	
Reciprocal Identities	$\csc\theta = \frac{1}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\cot\theta = \frac{1}{\tan\theta}$	
$\cos^2\theta = (\cos\theta)^2 \neq \cos\theta^2$ Pythagorean Identities		
$\cos^2\theta + \sin^2\theta = 1$	$\tan^2\theta + 1 = \sec^2\theta$	$\cot^2\theta + 1 = \csc^2\theta$

Trigonometric Identities - prove it!

Quotient Identities



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

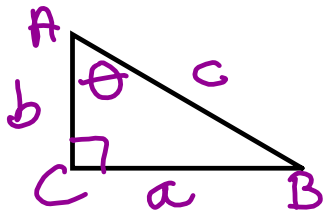
$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

$\frac{b}{a} = \frac{\frac{b}{c}}{\frac{a}{c}}$ $\frac{b}{c} \div \frac{a}{c}$

$\frac{b}{a} = \frac{b}{a}$ $\frac{b}{c} \cdot \frac{c}{a}$

$\frac{b}{a}$

Trigonometric Identities - prove it!
Reciprocal Identities



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

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

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

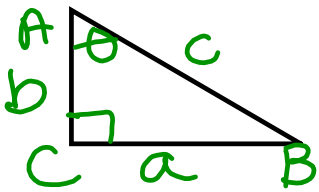
$$\frac{c}{a} = \frac{1}{\frac{a}{c}}$$

$$1 \div \frac{a}{c}$$

$$1 \cdot \frac{c}{a}$$

$$\frac{c}{a} = \frac{c}{a}$$

Trigonometric Identities - prove it!
Pythagorean Identities



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

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

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

$$\left(\frac{a}{b}\right)^2 + 1 = \left(\frac{c}{b}\right)^2$$

$$b^2 \cdot \frac{a^2}{b^2} + \frac{b^2}{b^2} = \frac{c^2}{b^2} \cdot b^2$$

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

Using trig. identities to find a value

1. Find tanθ if secθ = -2 and $180^o < \theta < 270^o$

"x"

+

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

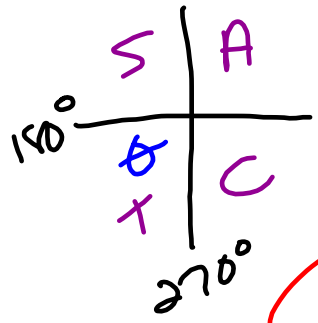
$\tan^2\theta + 1 = (-2)^2$

$\tan^2\theta + 1 = 4$

$-1 \quad -1$

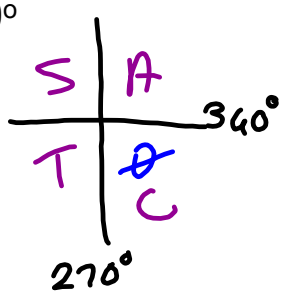
$\tan^2\theta = 3$

$\tan\theta = \pm\sqrt{3}$



$x^2 + 1 = 4$

2. Find sinθ if cosθ = 1/2 and $270^o < \theta < 360^o$



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

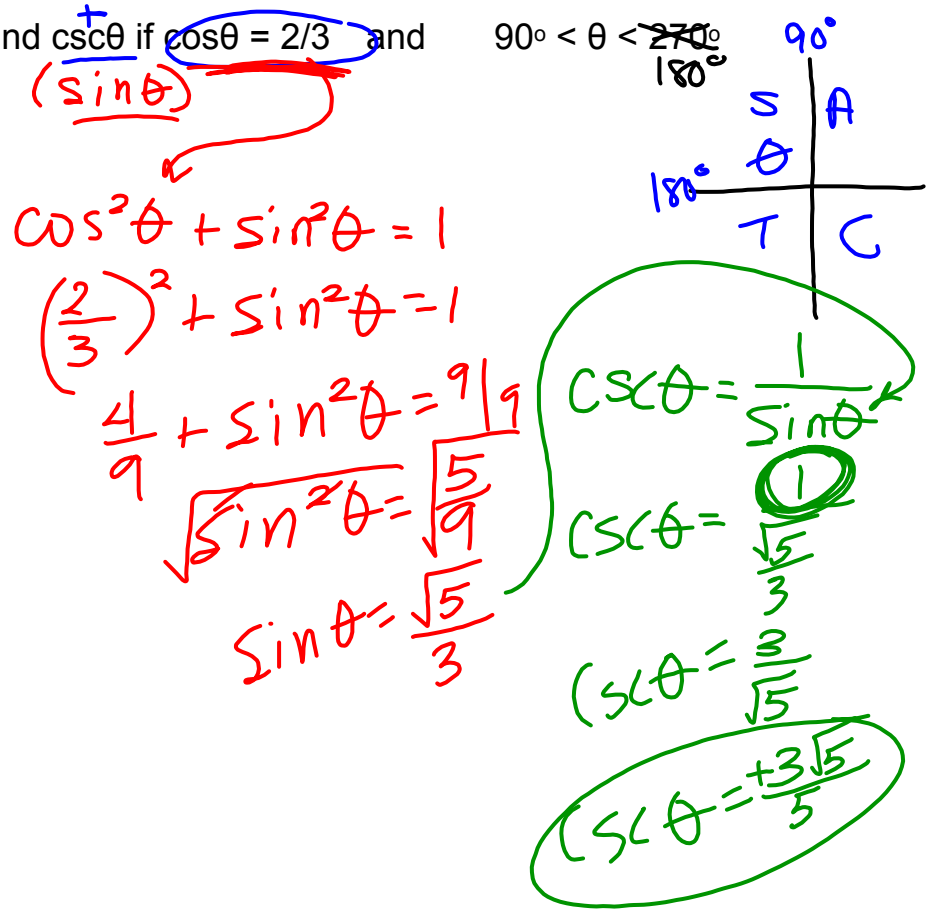
$\left(\frac{1}{2}\right)^2 + \sin^2\theta = 1$

$\frac{1}{4} + \sin^2\theta = \frac{4}{4}$

$\sin^2\theta = \frac{3}{4}$

$\sin\theta = \pm\frac{\sqrt{3}}{2}$

3. Find cscθ if cosθ = 2/3 and $90^\circ < \theta < 270^\circ$



How to use trigonometric identities to find exact trig. values

- Determine which trig. identity/identities to use.
  - Is there an identity with function & function? 1 identity
  - Is there an identity with function & reciprocal?
  - Is there an identity with reciprocal & function? 2 Id's
  - Is there an identity with reciprocal & reciprocal? 3 Id's
- Use the trig. identity/identities as formulas.
- Use substitution and solve.
- Determine the sign of the trig. value based on the quadrant.

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