Chapter 5 Analytic Trigonometry

QW: What does analytic mean?

an·a·lyt·ic

[ˌanəˈlidik]

ADJECTIVE

1. another term for analytical.
   - logic
     true by virtue of the meaning of the words or concepts used to express it, so that its denial would be a self-contradiction. Compare with synthetic.
   - linguistics
     (of a language) tending not to alter the form of its words and to use word order rather than inflection or agglutination to express grammatical structure. Often contrasted with synthetic.

On a notecard, you need to copy down all the trigonometric identities for sections:
5.1
5.4
5.5
(Also in Chapter summary)

You will use this notecard throughout the chapter. Since some will have to be memorized, we will make a new one for the test.

FUNDAMENTAL TRIGONOMETRIC IDENTITIES

Reciprocal Identities

$$\sin u = \frac{1}{\csc u} \qquad \cos u = \frac{1}{\sec u} \qquad \tan u = \frac{1}{\cot u}$$

$$\csc u = \frac{1}{\sin u} \qquad \sec u = \frac{1}{\cos u} \qquad \cot u = \frac{1}{\tan u}$$

FUNDAMENTAL TRIGONOMETRIC IDENTITIES

Quotient Identities

$$\tan u = \frac{\sin u}{\cos u} \qquad \cot u = \frac{\cos u}{\sin u}$$

FUNDAMENTAL TRIGONOMETRIC IDENTITIES

******Pythagorean Identities*******

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

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

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

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

FUNDAMENTAL TRIGONOMETRIC IDENTITIES

Cofunction Identities

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

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

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

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

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

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

FUNDAMENTAL TRIGONOMETRIC IDENTITIES

Even/Odd Identities

$\sin(-u) = -\sin u$ $\cos(-u) = \cos u$ $\tan(-u) = -\tan u$

$\csc(-u) = -\csc u$ $\sec(-u) = \sec u$ $\cot(-u) = -\cot u$

Simplify:

$\tan x \csc x$

$\frac{\sin x}{\cos x} \cdot \frac{1}{\sin x}$

$\frac{1}{\cos x}$

$\sec x$

Simplify:

$\cos^2 x\left(\sec^2 x - 1\right)$

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

$\cos^2 x\left(\tan^2 x\right)$

$\cos^2 x\left(\frac{\sin^2 x}{\cos^2 x}\right)$

$\sin^2 x$

Simplify:

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

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

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

$-\sin^3 x$

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

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

Simplify:

$$\sec^2 x\left(1-\sin^2 x\right)$$

$$\sec^2 x(\cos^2 x)$$

$$\frac{1}{\cos^2 x}\cdot\frac{\cos^2 x}{1}$$

$$1$$

Factor

a. $4\tan^2\theta + 1\tan\theta - 3$

$(4\tan\theta - 3)(1\tan\theta + 1)$

b. $1 - \cos^2 x$

c. $2\csc^2\theta - 7\csc\theta + 6$

$(2\csc\theta - 3)(\csc\theta - 2)$

d. $\sec^2 x + 3\tan x + 1$

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

$1 + \tan^2 x + 3\tan x + 1$

$\tan^2 x + 3\tan x + 2$

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

Simplify: $\dfrac{\csc^2 x - 1}{\csc x - 1}$

$$\frac{(\csc x - 1)(\csc x + 1)}{\csc x - 1}$$

$\csc x + 1$

Rewrite $\frac{\cos^2 y}{1-\sin y}$ so that it is not in fractional form

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

$$\frac{1-\sin^2 y}{1-\sin y}$$

$$\frac{(1-\sin y)(1+\sin y)}{1-\sin y}$$

$$1+\sin y$$

Use the substitution $x = 5\sin\theta$, $0 < \theta < \frac{\pi}{2}$ to write $\sqrt{25 - x^2}$ as a trigonometric function of θ

Summarize the major points of the lesson

Essential Question: How do you rewrite trigonometric expressions in order to simplify and evaluate trigonometric functions?