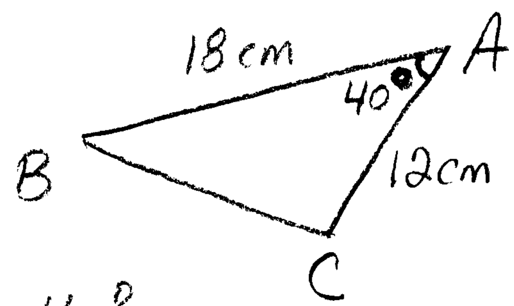
Alg. 2 - BE

Monday 2-6-12

ACT Problem:

Triangle $\triangle ABC$ is shown in the figure below. The $m\angle A$ is $40°$. $AB = 18$ cm. $AC = 12$ cm. What is the length, in centimeters, of $\overline{BC}$?



Ⓐ $12\sin 40°$

Ⓑ $18\sin 40°$

Ⓒ $\sqrt{18^2-12^2}$

Ⓓ $\sqrt{12^2+18^2}$

Ⓔ $\sqrt{12^2+18^2-2(12)(18)\cos 40°}$

Intro. to Ch. 14-3, Trigonometric Identities

trigonometric identity $\Rightarrow$ an equation involving trig. functions that is always true.

You already know 3 trig. identities:

$$\boxed{\sin\theta = \frac{1}{\csc\theta} \quad \text{or} \quad \csc\theta = \frac{1}{\sin\theta}}$$

$$\boxed{\cos\theta = \frac{1}{\sec\theta} \quad \text{or} \quad \sec\theta = \frac{1}{\cos\theta}}$$

$$\boxed{\tan\theta = \frac{1}{\cot\theta} \quad \text{or} \quad \cot\theta = \frac{1}{\tan\theta}}$$

Prove: $\boxed{\dfrac{\sin\theta}{\cos\theta} = \tan\theta}$

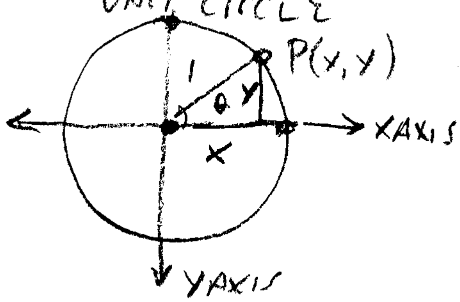
$$\frac{\sin\theta = \frac{O}{H}}{\cos\theta = \frac{a}{H}} \quad \therefore \quad \frac{O}{H} \cdot \frac{H}{a} = \frac{O}{a} = \tan\theta \ \checkmark$$

Prove: $\boxed{\dfrac{\cos\theta}{\sin\theta} = \cot\theta}$

$$\frac{\cos\theta = \frac{a}{H}}{\sin\theta = \frac{O}{H}} \quad \therefore \quad \frac{a}{H} \cdot \frac{H}{O} = \frac{a}{O} = \cot\theta \ \checkmark$$

The BIG ONE! $\boxed{\sin^2\theta + \cos\theta = 1}$

UNIT CIRCLE



$\sin\theta = y \qquad \cos\theta = x$

Pythagorean Theorem

$$\Rightarrow x^2 + y^2 = 1$$

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

<u>NOTE</u>: $(\cos\theta)^2$ NORMALLY WRITTEN $\cos^2\theta$ <u>NOT</u> $\cos\theta^2$

$(\sin\theta)^2$ Normally WRITTEN $\sin^2\theta$ WHY??

<u>EXERCISE</u>: Prove THIS is TRUE using Trig. TABLE

If you remember $\sin^2\theta + \cos^2\theta = 1$

A couple of more identities are easily found:

$$\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta} \quad \text{divide by } \cos^2\theta$$

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

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta} \quad \text{divide by } \sin^2\theta$$

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

The Art... simplifying trig. expressions

And later... proving identities are true. Fun!!

Simplify!

Ex 2

Pg 779

$$\frac{\csc^2\theta - \cot^2\theta}{\cos\theta}$$

What does $\cot^2\theta$ equal?

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

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

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

$$\frac{\csc^2\theta - [\csc^2\theta - 1]}{\cos\theta}$$

$$\frac{\csc^2\theta - \csc^2\theta + 1}{\cos\theta} = \frac{1}{\cos\theta} = \boxed{\sec\theta}$$

There are many ways to solve these, check out the book solution, it is different...

Homework: Pg 779–780 # 8–11, 33, 34

Memorize:

$\boxed{\sin\theta = \frac{1}{\csc\theta}}$ $\boxed{\cos\theta = \frac{1}{\sec\theta}}$ $\boxed{\tan\theta = \frac{1}{\cot\theta}}$ $\boxed{\frac{\sin\theta}{\cos\theta} = \tan\theta}$ $\boxed{\sin^2\theta + \cos^2\theta = 1}$

Be able to find the other identies in Ch. 14-3 from these

flip

÷ by $\sin^2$ or $\cos^2$