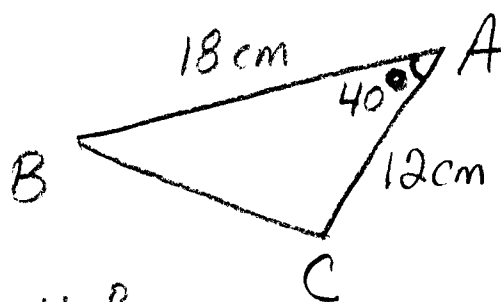


Alg. 2-BE | TUESDAY 2-2-10

ACT Problem:

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



- (A) $12 \sin 40^\circ$
- (B) $18 \sin 40^\circ$
- (C) $\sqrt{18^2 - 12^2}$
- (D) $\sqrt{12^2 + 18^2}$
- (E) $\sqrt{12^2 + 18^2 - 2(12)(18)\cos 40^\circ}$

-
- Exam 1 Thursday
 - IGW Weds.
 - ACT Practice Friday

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:

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

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

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

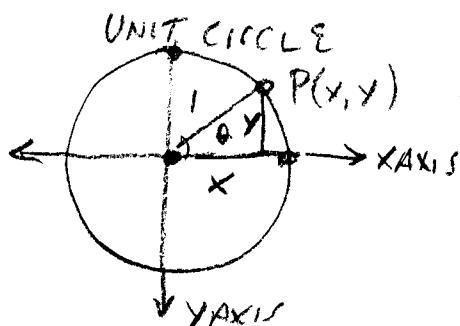
Prove: $\boxed{\frac{\sin \theta}{\cos \theta} = \tan \theta}$

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

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

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

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



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

Pythagorean Theorem

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

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

NOTE: $(\cos \theta)^2$ normally written $\cos^2 \theta$ NOT $\cos \theta^2$
 $(\sin \theta)^2$ normally written $\sin^2 \theta$ WHY??

EXERCISE: 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: $\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta} = \frac{1}{\cos^2 \theta}$ divide by $\cos^2 \theta$

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

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

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

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

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

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

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

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

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

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

Homework: Pg 779-780 # 8-11, 33, 34

Memorize:

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

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

↑ clip

↑ by $\sin^2$
or $\cos^2$