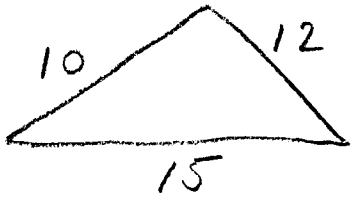
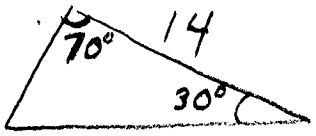
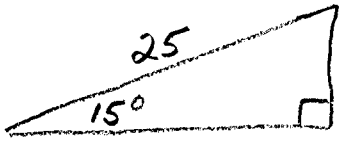
BE - Geometry I

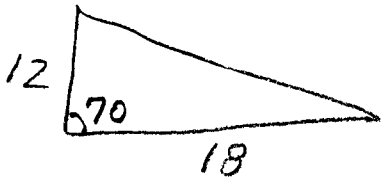
Thursday 1-12-12

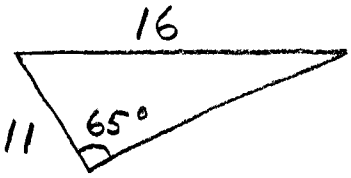
NAME THE tools you would use to solve EACH triangle:

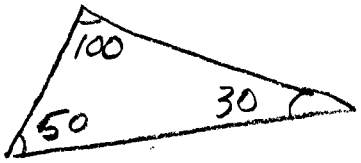
① 

② 

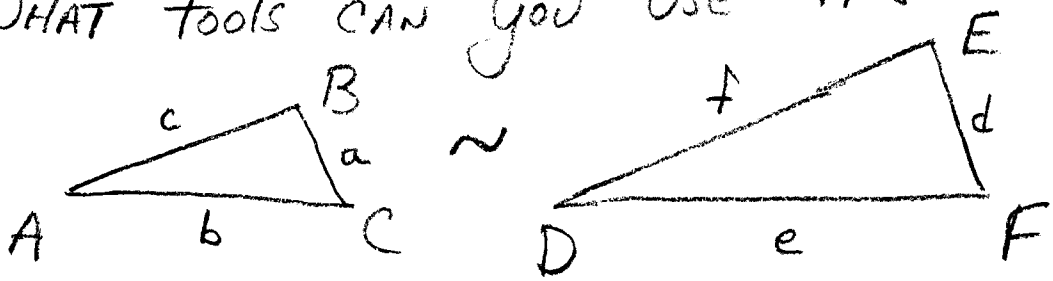
③ 

④ 

⑤ 

⑥ 

⑦ WHAT tools CAN you use IF:



① SSS ⇒ LOC ② ASA ⇒ LOS

③ Right △ ⇒ P.T. + SOHCAHTOA ④ SAS ⇒ LOC

"ACOTLOS" → ⑤ SSA ⇒ LOC, solve QUADRATIC ⑥ AAA ⇒ NONE

⑦ $A \cong D$, $B \cong E$, $C \cong F$ AND $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$ {WIDGETS??

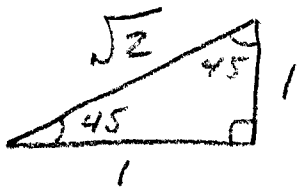
The Reciprocal Trig. Functions

$\sin\theta = \frac{O}{H}$	$\frac{H}{O} = \csc\theta$	"cosecant"
$\cos\theta = \frac{a}{H}$	$\frac{H}{a} = \sec\theta$	"secant"
$\tan\theta = \frac{O}{a}$	$\frac{a}{O} = \cot\theta$	"cotangent"

(EX) Find the exact value of:

(A) $\csc 45^\circ$

Since $\sin 45^\circ \Rightarrow$

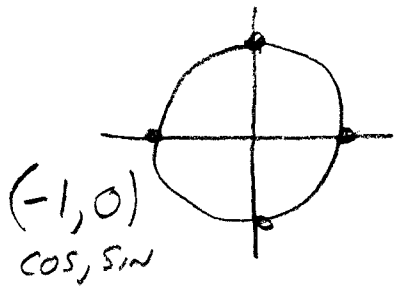


$\sin 45^\circ = \frac{1}{\sqrt{2}}$

$\boxed{\csc 45^\circ = \sqrt{2}}$

(B) $\sec 180^\circ$

Since $\cos 180^\circ \Rightarrow$



$\cos 180^\circ = -1$

$\boxed{\sec 180^\circ = -1}$

identity AN EQUATION WHICH IS true for every VALUE of the variable.

(EX) $2(x+1) = 2x+2$

$2x+2 = 2x+2$

$-2x \qquad -2x$

$2 = 2$ TRUE FOR ALL VALUES OF x

IDENTITY

Trigonometric Identities ARE EQUATIONS involving trig. functions that are true for ANY ANGLE.

There are MANY, MANY trig. identities and a big part of most trig. classes is proving whether or not a particular trig. identity is true.

(EX) SHOW THAT $\sin\theta = \frac{1}{\csc\theta}$

proof: $\sin\theta = \frac{O}{H}$, $\csc\theta = \frac{H}{O}$

$\therefore \quad \frac{O}{H} = \frac{1}{\frac{H}{O}}$

$\frac{O}{H} = \frac{1}{1} \cdot \frac{O}{H}$ ✓

ALSO:

$\sin\theta = \frac{1}{\csc\theta}$ $\quad$ $\cos\theta = \frac{1}{\sec\theta}$ $\quad$ $\tan\theta = \frac{1}{\cot\theta}$

These ARE called the Reciprocal Identities

There ARE OTHER Common trig. identities that ARE grouped/NAMED

NOTE:

THERE IS A CONVENTION USED IN WRITING trig. functions that ARE SQUARED.

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

IS NORMALLY WRITTEN $= \sin^2\theta$

Be careful, this is NOT THE SAME AS $\sin(\theta)^2$ WHICH MEANS $\sin(\theta \cdot \theta)$

(EX) $\sin^2 45^\circ = (.7071)^2 \approx .499990$

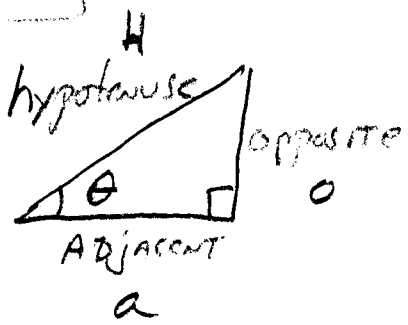
(EXACT) $\sin^2 45^\circ = \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} = .5$

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

Here is ONE OF THE MOST important and MOST OFTEN SEEN (think ACT) trig. identities:

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

Proof: $\left(\frac{O}{H}\right)^2 + \left(\frac{a}{H}$



$$\frac{O^2}{H^2} + \frac{a^2}{H^2} = 1$$

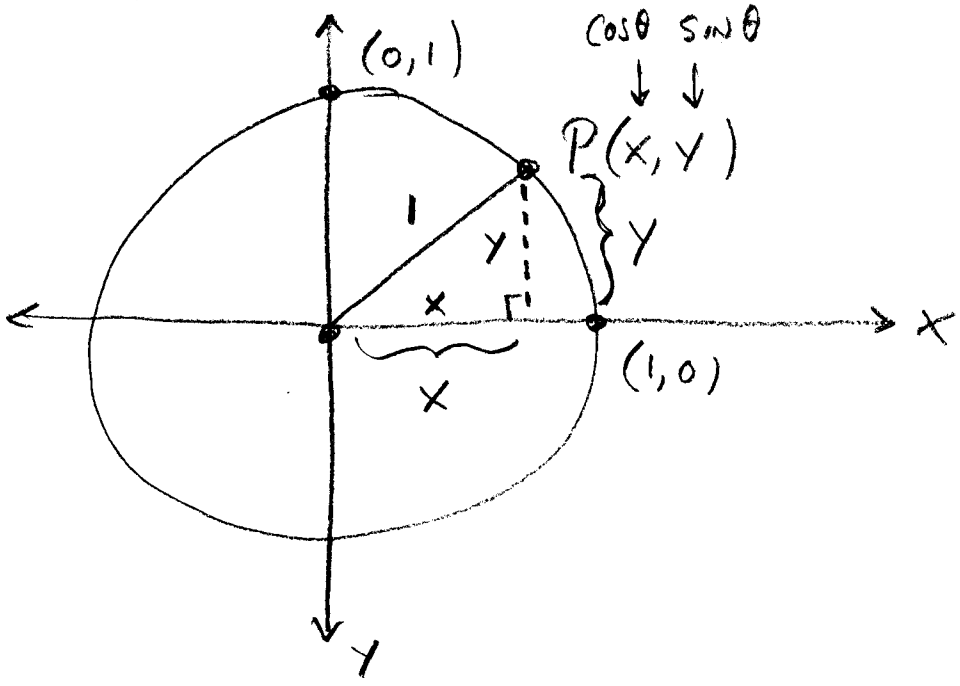
$$\frac{O^2 + a^2}{H^2} = 1$$

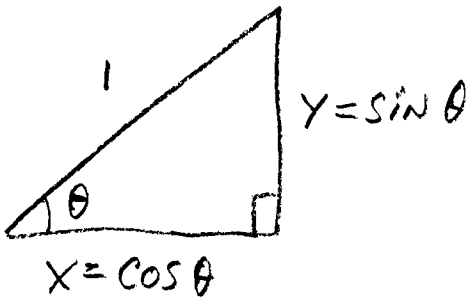
But $O^2 + a^2 = H^2$ by Pythagorean Theorem

$$\therefore \frac{H^2}{H^2} = 1 \checkmark$$

This is one of several trig. identities called the Pythagorean Identities

You can use the unit circle to show $\sin^2\theta + \cos^2\theta = 1$





Pythagorean Theorem $\Rightarrow$ $\sin^2\theta + \cos^2\theta = 1^2$ ✓

Can you use the above △ to see another very useful & common trig. identity?

$$\frac{\sin\theta}{\cos\theta} = ? \qquad \boxed{\frac{\sin\theta}{\cos\theta} = \tan\theta}$$

Also: $\dfrac{\frac{O}{H}}{\frac{a}{H}} = \frac{O}{H} \cdot \frac{H}{a} = \frac{O}{a} = \tan$

(EX) Verify $\tan^2\theta + 1 = \sec^2\theta$

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

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

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

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

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

$\sec^2\theta$ | $\sec^2\theta$ ✓

Tips for proving identities:

LEFT SIDE = RIGHT SIDE

- Work one side at a time, try to take the more complicated side and simplify it. If both sides are complicated, simplify both
- Try changing everthing to sin and cos
- Don't forget "common denominators"

Homework

Memorize: The Reciprocal Functions

The Reciprocal Identities

"The" Pythagorean Identity

Definition of Identity

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

Meaning of $\sin^2\theta$

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