Secondary 3 Honors: Unit 8: Trigonometry   Name:_____

Notes 8-1: Right Triangle Trigonometry and Special Right Triangles

Today we will learn:
- What a radian is
- How to convert from degrees to radians and vice versa
- Review Right Triangle Trig
- Find missing sides and angles of a triangle

Degrees	Radians
What is <u>one</u> degree? measurement of a "very, small" acute angle $1/360$th of a full circle	What is <u>one</u> radian? $1/6.28$ th measurement of a full circle
How many degrees make up a circle? $360°$	How many radians make up a circle? 2π

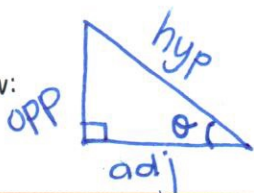360 degrees equals ___2π___ radians.

What is a RADIAN?
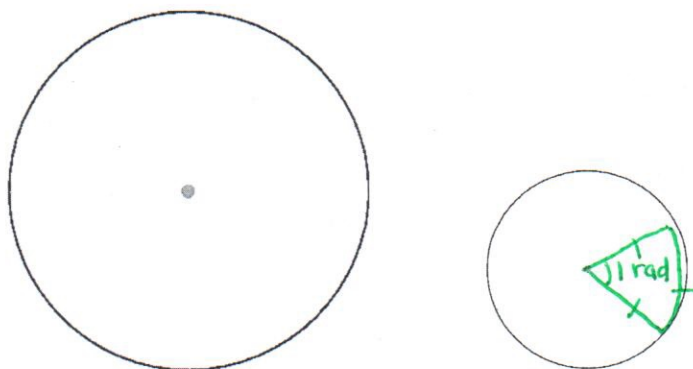
Radian video

Converting between radians and degrees:

Just remember: ___$180° = \pi$___

Let's practice:

Degrees → Radians $\bullet \dfrac{\pi}{180°}$			Radians → Degrees $\bullet \dfrac{180°}{\pi}$		
$\dfrac{120°}{1} \to \dfrac{\pi}{180}$	$= \dfrac{120\pi}{180}$	$= \boxed{\dfrac{2\pi}{3}}$	$\dfrac{\pi}{4} \cdot \dfrac{180°}{\pi}$	$= \dfrac{180°}{4}$	$= \boxed{45°}$
$\dfrac{160°}{1} \cdot \dfrac{\pi}{180°}$	$= \dfrac{160\pi}{180}$	$= \boxed{\dfrac{8\pi}{9}}$	$\dfrac{3\pi}{5} \cdot \dfrac{180°}{\pi}$	$= \dfrac{540°}{5}$	$= \boxed{108°}$
$\dfrac{-70°}{1} \cdot \dfrac{\pi}{180°}$	$= \dfrac{-70\pi}{180}$	$= \boxed{-\dfrac{7\pi}{18}}$	$\dfrac{-7\pi}{3} \cdot \dfrac{180°}{\pi}$	$= \dfrac{-7(180°)}{3}$	$= \boxed{-420°}$

Right Triangle Trig Review:

SOH CAH TOA

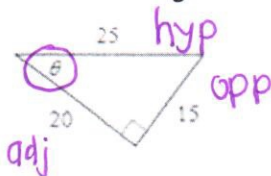| $\sin\theta = \dfrac{opp}{hyp}$	$\cos\theta = \dfrac{adj}{hyp}$	$\tan\theta = \dfrac{opp}{adj}$
$\csc\theta = \dfrac{hyp}{opp}$	$\sec\theta = \dfrac{hyp}{adj}$	$\cot\theta = \dfrac{adj}{opp}$

Reciprocal

Express $\sin\theta$, $\cos\theta$, $\tan\theta$ as ratios: Find the value of the trig function indicated!

$\sin\theta = \dfrac{15}{17}$

$\cos\theta = \dfrac{8}{17}$
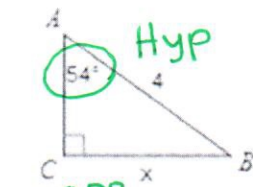
$\tan\theta = \dfrac{15}{8}$

$\sin\theta = \dfrac{15}{25}$
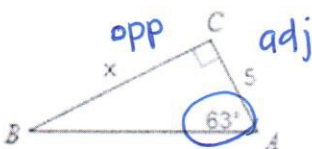
$\cos\theta = \dfrac{20}{25}$

$\tan\theta = 15/20$

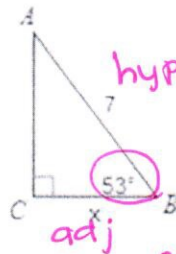Solve for the variable. Round to one decimal place. SHOW ALL WORK!

4. $\sin 54° = \dfrac{x}{4} \cdot 4$

$x = 4\sin 54° = \boxed{3.2}$

$\tan 63° = \dfrac{x}{5}$

$x = 5\tan 63° = \boxed{9.8}$

$\cos 53° = \dfrac{x}{7}$

$x = 7\cos 53° = \boxed{4.2}$

Inverse Trigonometry: Find each angle measure to the nearest degree:

$\cos Y = \dfrac{2}{3}$ $\qquad\qquad \cos B = 0.5736$ $\qquad\qquad \sin W = 0.2588$ $\qquad\qquad \tan U = 1.4826$

$\cos^{-1}(\cos Y) = \cos^{-1}\left(\dfrac{2}{3}\right)$

$Y = \cos^{-1}\left(\dfrac{2}{3}\right)$

$\boxed{Y = 48°}$

$\tan^{-1}(\tan U) = \tan^{-1}(1.4826)$
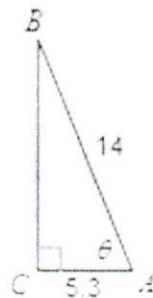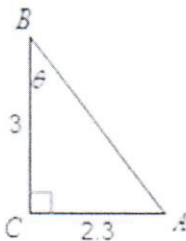
$y = \tan^{-1}(1.4826)$

$\boxed{y = 56°}$

Find each angle measure. Round to the tenth.
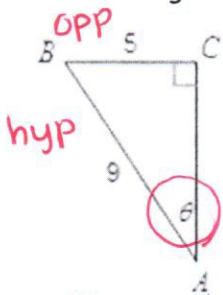
$\sin\theta = \dfrac{5}{9}$

$\sin^{-1}(\sin\theta) = \sin^{-1}\left(\dfrac{5}{9}\right)$

$\theta = \sin^{-1}\left(\dfrac{5}{9}\right) = \boxed{33.7°}$
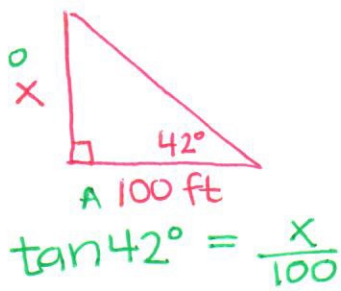
APPLICATION PROBLEMS

Solving for an unknown side or angle: (Where do I begin... Where does it end?)

1. Sketch the triangle, if one has not been provided for you.
2. Label the given angle(s) and side(s). Include the variable for the unknown side or angle, where needed.
3. Write the trig ratio that contains the given information and the unknown you want to find.
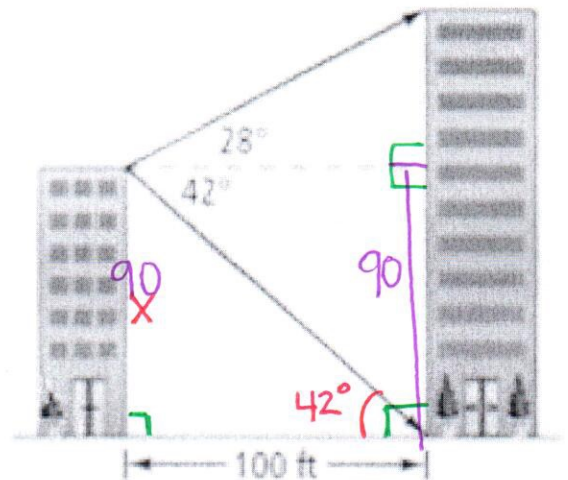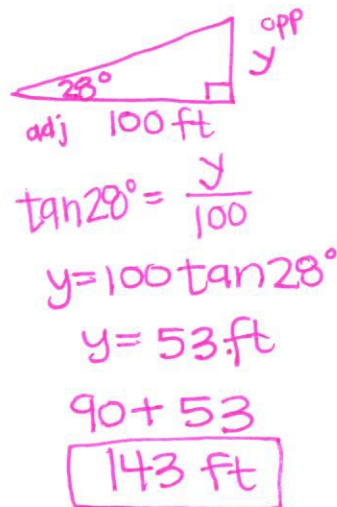4. Substitute in the given information, and solve for the unknown.
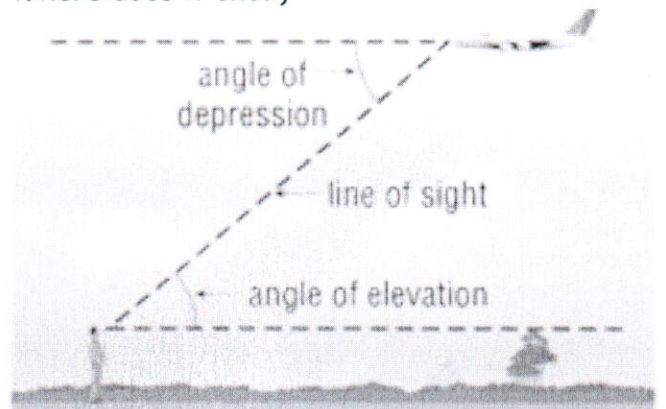
Practice:

Two office buildings are 100 ft. apart. From the edge of the shorter building, the angle of elevation to the top of the taller building is 28°, and the angle of depression to the bottom is 42°. How tall is each building? Round to the nearest foot.

$$\tan 42° = \frac{x}{100}$$

$$x = 100 \tan 42°$$

$$\boxed{x = 90 ft}$$

$$\tan 28° = \frac{y}{100}$$

$$y = 100 \tan 28°$$

$$y = 53 ft$$

$$90 + 53$$

$$\boxed{143 ft}$$

(Stamp Quesiton!) A surveyor is 300 ft. from the base of an apartment building. The angle of elevation to the top of the building is 24°, and her angle-measuring device is 5 ft. above the ground. Find the height of the building.

(Stamp Question!) A Salvage ships sonar locates wreckage at 12° of depression. Directly below the boat, a diver is lowered 40 meters to the ocean floor. How far does the diver need to walk along the ocean floor to the wreckage?

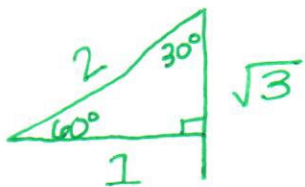SPECIAL RIGHT TRIANGLES
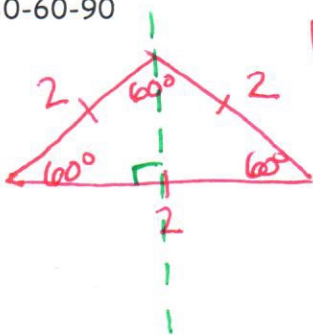
45-45-90   isosceles
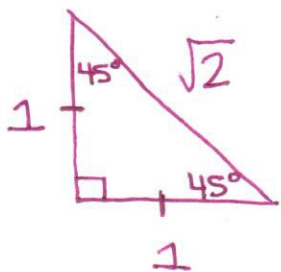
Pythagorean thm

$$1^2 + 1^2 = c^2$$

$$2 = c^2$$

$$c = \sqrt{2}$$

30-60-90   EQUILATERAL

$$1^2 + b^2 = 2^2$$

$$1 + b^2 = 4$$

$$-1 \qquad\qquad -1$$

$$b^2 = 3$$

$$b = \sqrt{3}$$