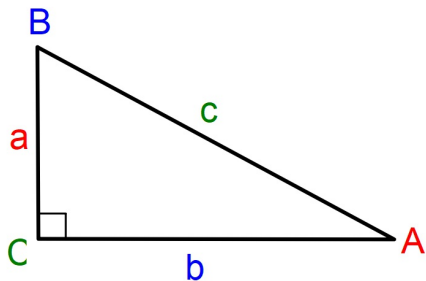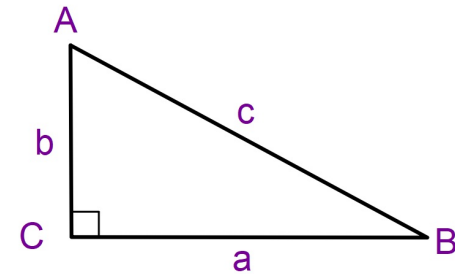**Alg 2**
Tuesday, March 17, 2020

Sec 7-1:
Trig Functions and Acute Angles

Right Triangle Trigonometry

Sides and Angles of triangles:
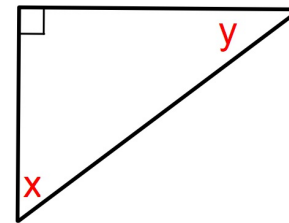
Angles are labeled with: Capital Letters

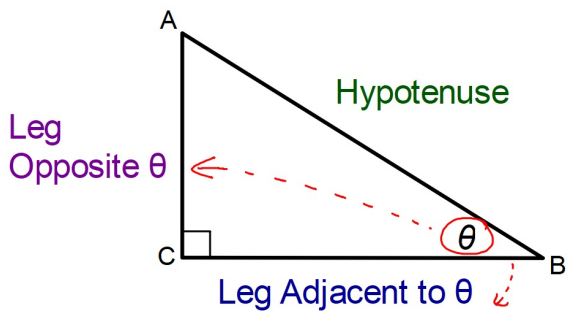Sides are labeled with: lower case Letters

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Side a is opposite Angle A
Side b is opposite Angle B
Side c is opposite Angle C

What is true about angles x and y of EVERY right triangle?

- x and y are acute
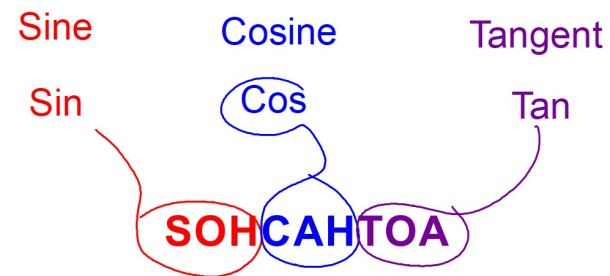- x and y are complementary

θ   Greek letter - Theta
variable commonly used to represent an angle.

A

Hypotenuse

Leg
Opposite θ

θ

C   Leg Adjacent to θ   B

The three basic Trig Ratios:

Sine   Cosine   Tangent
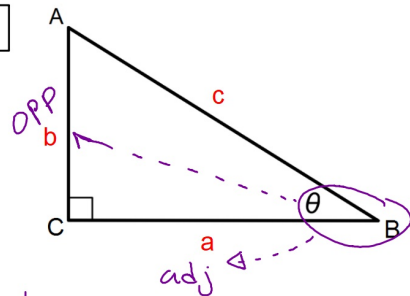
Sin   Cos   Tan

SOHCAHTOA

Right Triangle Trigonometry:

The Tangent Ratio

SOHCAHTOA

Tangent of angle θ:

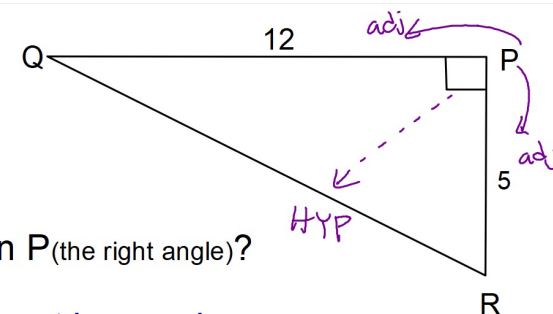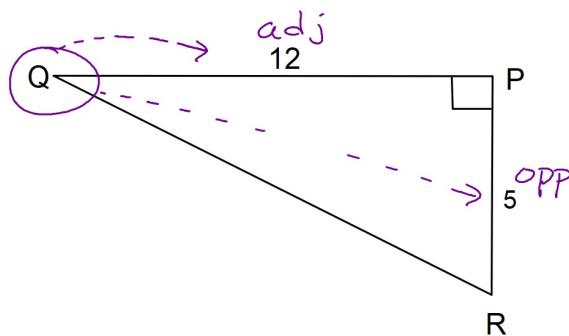$$Tan\theta = \frac{\text{Leg Opposite }\theta}{\text{Leg Adjacent to }\theta} = \frac{b}{a}$$

A

OPP
b

c

C   a   B

θ

adj

Write each as a ratio

SOHCAHTOA

Q   12   OPP   P

$$Tan\ R = \frac{12}{5}$$

5   adj

R

Write each as a ratio

SOH CAH TOA

adj
12

5 OPP

Tan Q = $\dfrac{5}{12}$

---

12   adj

Q   P

adj

5

HYP
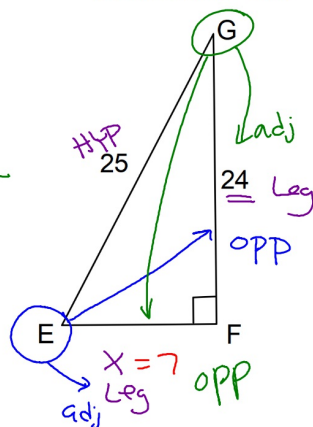
R
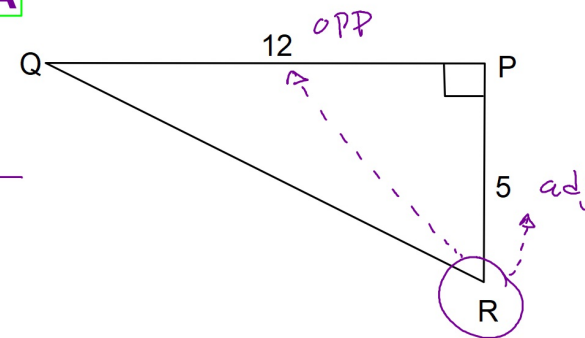
Why don't we do Tan P(the right angle)?

There are two adjacent legs and
no opposite leg!

Write each as a ratio   **SOH CAH TOA**

Tan E = $\dfrac{24}{7}$

Tan G = $\dfrac{7}{24}$

G

HYP 25   adj

24 = Leg

OPP

E   F

x = 7
Leg OPP

adj

$25^2 = x^2 + 24^2$

$\sqrt{25^2 - 24^2} = \sqrt{x^2}$

$x = 7$

When an angle is given in degrees you can use your calculator to find
the tangent of that angle. This will be the same value as if you could
write the ratio of OPP/ADJ and turn it into its decimal form.

Make sure your calculator is in **DEGREE MODE**. On a Ti83 or Ti84
press the MODE key and arrow key down to the fourth line. You'll see
RADIAN   DEGREE make sure that DEGREE is highlighted. The
default setting on the Ti graphing calculator is RADIAN.

Other scientific and graphing calculators can use either radians or degrees
so you'll have to check your's to be sure it's in the degree mode.

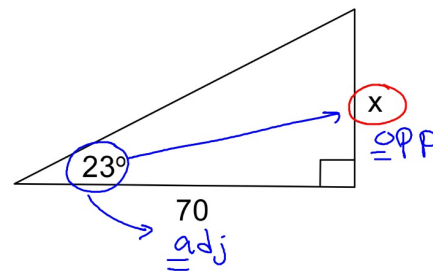Radians is just another unit that angles are measured with.
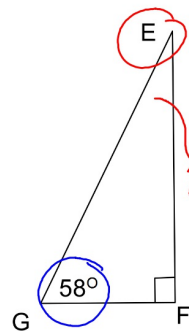
Find each to the nearest hundredth.

E

90−58°=32°

58°

G   F

Tan G = $Tan 58° = 1.60$

Tan E = $Tan 32° = 0.62$

Using Tangent to find a missing side. **SOHCAHTOA**

x
OPP

23°

70
adj
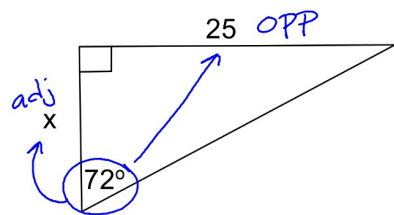
$70 \cdot Tan 23° = \dfrac{x}{70} \cdot 70$

$x = 70 \cdot Tan 23°$

$\boxed{x = 29.71}$

Using Tangent to find a missing side. **SOHCAHTOA**
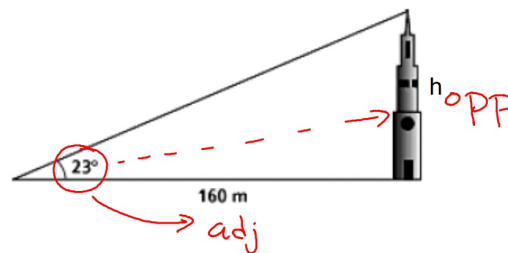
25 OPP

adj
x

72°

$Tan 72° = \dfrac{25}{x}$ $\dfrac{}{1}$

$x = \dfrac{25}{Tan 72°}$

$\boxed{x = 8.12}$

You stand 160m from a tower and measure the angle from the ground to the top of the tower as 23°. Use the Tangent Ratio to find the height of the tower.
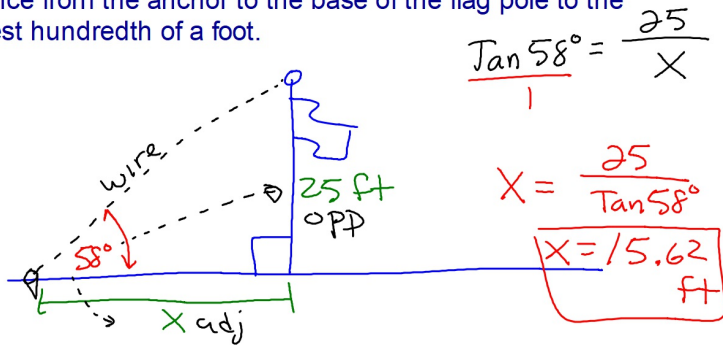
h
OPP

23°

160 m
adj

$160 \cdot Tan 23° = \dfrac{h}{160} \cdot 160$

$h = 160 \, Tan 23°$

$\boxed{h = 67.92 \, m}$

A wire supporting a tall flag pole is attached at the top of the pole and tied to an anchor in the ground. The wire makes a 58° with the ground. If the flagpole is 25 feet tall find the distance from the anchor to the base of the flag pole to the nearest hundredth of a foot.
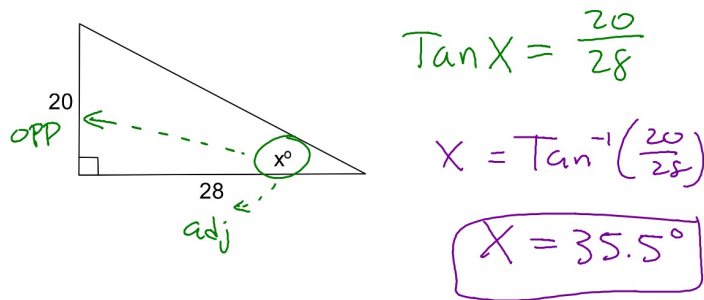
$$\frac{\tan 58°}{1} = \frac{25}{x}$$

wire
25 ft
OPP
58°
X adj

$$X = \frac{25}{\tan 58°}$$

$$X = 15.62 \text{ ft}$$

If TanX = 0.37 how would you solve for X?

The X is inside the Tangent function (it's not Tan times X) we need to "undo" the Tangent function to be able to solve for X.

Use the Inverse of Tangent: Called Inverse Tangent.

$$X = \tan^{-1}(0.37) = 20.30°$$

Find the value of x to the nearest tenth using the Tangent Ratio.

20
OPP
x°
28
adj

$$\tan X = \frac{20}{28}$$

$$X = \tan^{-1}\left(\frac{20}{28}\right)$$

$$X = 35.5°$$

You can now try the practice problems in Practice #2 that can be found on the link on my blog.