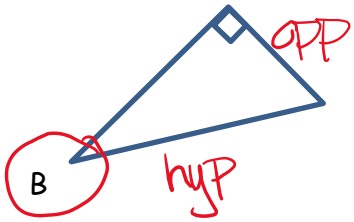
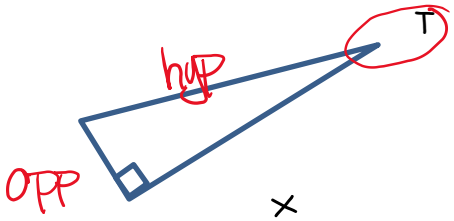
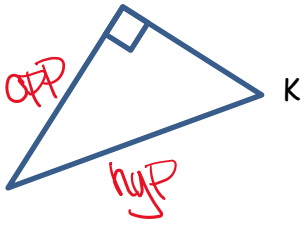
Workplace 10: Notes Name: _____

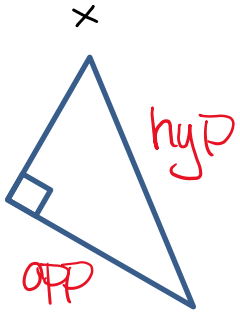
Sine Ratio

To be successful at using this function we have to be able to find the side opposite an angle and hypotenuse every time. You need to label your triangle every single time! Practice on the following.









The trigonometric functions are used in design and construction to find angles and side lengths of right-angle triangles. There are three trig functions we will be exploring. They are:

sine cosine tangent

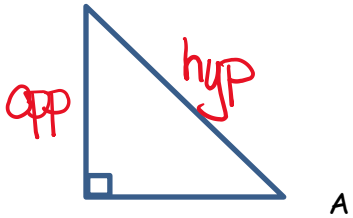
They represent different relationships between the angles and sides found in a right-angle triangle. When given any two of the above we can easily find the missing side or angle.

There is a pneumonic that allows use to easily remember the relationship of the sides and angle for each trig function:

SOH CAH TOA

We will only be exploring the sine (sin) function today. It is

SOH → $\sin = \frac{opp}{hyp}$



Your calculator must always be in degree mode for this unit! Check it now!

Unfortunately, we can't use the ratio of the opposite to the hypotenuse as is. We need to convert the ratios into decimals. We always keep at least 4 decimal places when dealing with trig ratios.

Practice converting these fractions to decimals.

1. $\frac{3}{8}$ = 0.375 $\frac{23}{31}$ = 0.7419
2. $\frac{7}{19}$ = 0.3684

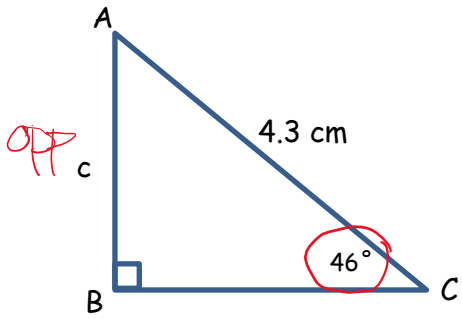
Just as with ratios, angles can't be used as is. We need to convert the angles to decimals. Round to four decimal places.

1. sin 23 ° 0.3907
2. sin 58 ° 0.848
3. sin 46 ° 0.7193
4. sin 72 ° 0.9511

There are 3 types of sine questions

Type 1 – Solving for opposite side

Solve for c:

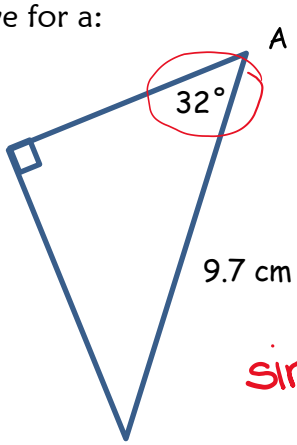


$\sin = \frac{OPP}{hyp}$

$\frac{\sin 46^\circ}{1} = \frac{c}{4.3}$

$c = 3.09$ cm

Solve for a:



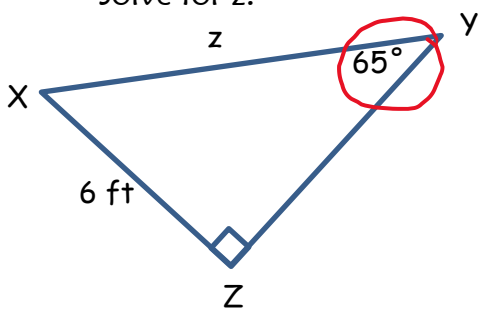
$\sin = \frac{OPP}{hyp}$

$\frac{\sin 32^\circ}{1} = \frac{a}{9.7}$

$a = 5.14$ cm

Type 2 – Solving for the hypotenuse

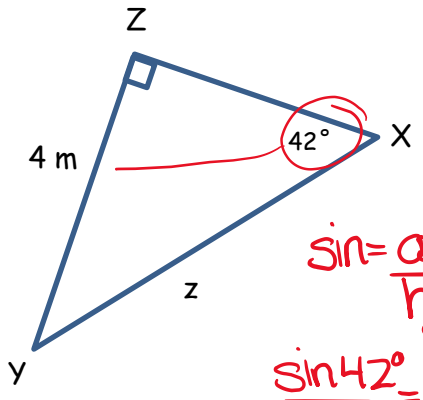
Solve for z:



$\sin = \frac{OPP}{hyp}$

$\frac{\sin 65^\circ}{1} = \frac{6}{z}$

$z = 6.62$ ft



$\sin = \frac{OPP}{hyp}$

$\frac{\sin 42^\circ}{1} = \frac{4}{z}$

$z = 5.98$ m

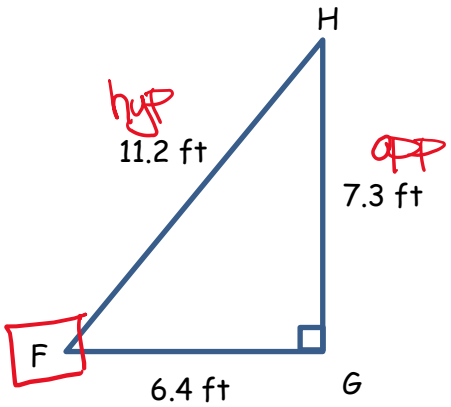
Sometimes we will need to find the size of an angle….

Use your calculator to find the following degrees. Round to nearest degree.

1. 0.2419 14°
2. 0.9998 89°
3. 0.5736 35°
4. 0.882 62°

Type 3 – Solving for the Angle

Solve for F:

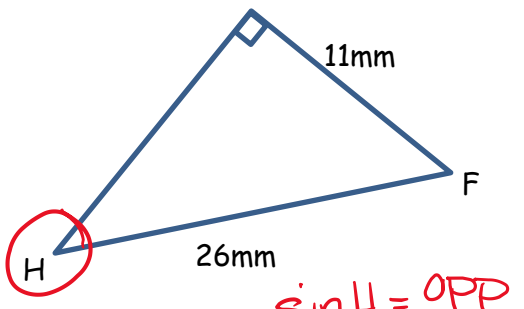


$\sin F = \frac{OPP}{hyp}$

$F = \frac{7.3}{11.2}$

$F = 41^\circ$

Solve for H:



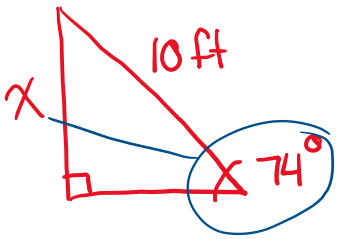
$\sin H = \frac{OPP}{hyp}$

$H = \frac{11}{26}$

$H = 25^\circ$

Examples: **Draw a picture!**

Lois is cleaning the rain gutters around a roof. At what height does her 10' ladder touch the building if it makes a 74-degree angle with the ground?

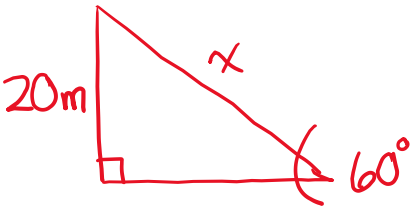


$\sin = \frac{opp}{hyp}$

$\frac{\sin 74^\circ}{1} = \frac{x}{10}$

$x = 9.61 \text{ ft}$

A communications tower is 20 m tall. For extra support, **cables** must be attached. The cables form a 60-degree angle with the ground. How much cable is needed?



$\sin = \frac{opp}{hyp}$

$\frac{\sin 60^\circ}{1} = \frac{20}{x}$

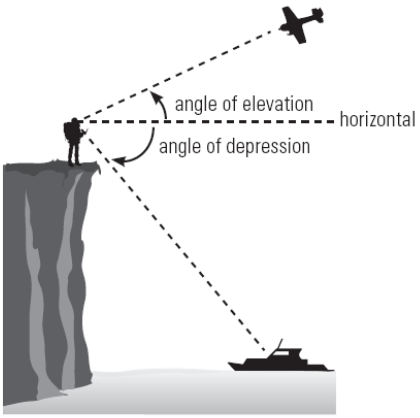
$x = 23.09 \text{ m}$

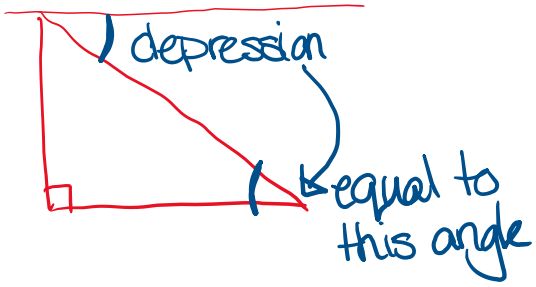
Angles of Elevation and Depression

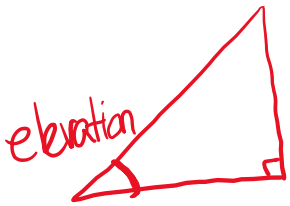
Angles of elevation and depression are used a lot in architectural drawings and in flying.

When you look up the angle of _____elevation_____ is the angle formed between the horizontal and your line of sight.

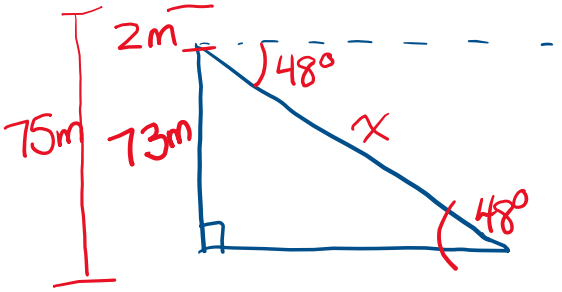
When you look down the angle of _____depression_____ is the angle formed between the horizontal and your line of sight.







From the top of a cliff by the ocean, Cindy sights a boat at an angle of depression of 48°. If the top of the cliff is 73 m above the surface of the water, and Cindy is 2 m tall, how far is Cindy from the boat?

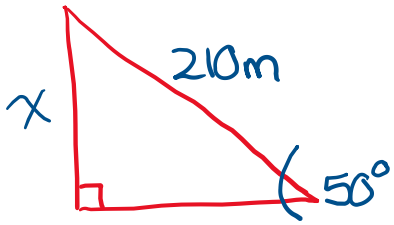


$$\sin = \frac{opp}{hyp}$$

$$\frac{\sin 48^\circ}{1} = \frac{75}{x}$$

$$x = 100.92\text{ m}$$

Sally is flying a kite. She has let out 210 m of string. Ignore Sally's height for the calculation. If the angle of elevation is 50°, how high above the ground is the kite?



$$\sin = \frac{opp}{hyp}$$

$$\frac{\sin 50^\circ}{1} = \frac{x}{210}$$

$$x = 160.87\text{m}$$