

6 Ratios

(SOH CAH TOA)

6 Solving Right Triangles

6 Trig Functions

6 Solving a Side or Angle

6 Applications

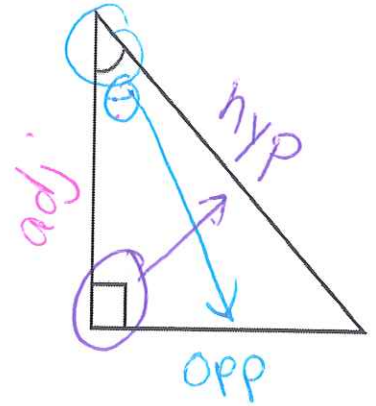
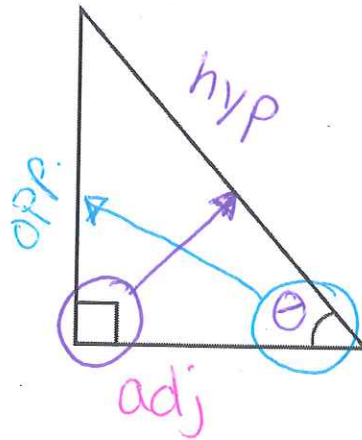
6 Solving Right Triangles

The hypotenuse is across from the right angle.

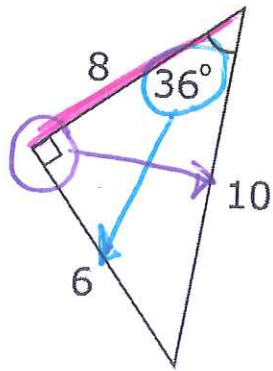
θ is the given angle.

Opposite is across from angle.

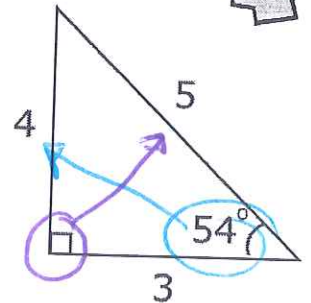
Adjacent is touching angle.



$\theta: 36^\circ$
Hypotenuse: 10
Opposite: 6
Adjacent: 8



$\theta: 54^\circ$
Hypotenuse: 5
Opposite: 4
Adjacent: 3



Labeling Right Triangles

Finding 6 Trig Functions

Finding a Side or Angle

Applications

Solving Right Triangles

Reciprocals

Sine $\sin \theta = \frac{o}{h}$ **Cosecant** $\csc \theta = \frac{h}{o}$

Cosine $\cos \theta = \frac{a}{h}$ **Secant** $\sec \theta = \frac{h}{a}$

Tangent $\tan \theta = \frac{o}{a}$ **Cotangent** $\cot \theta = \frac{a}{o}$

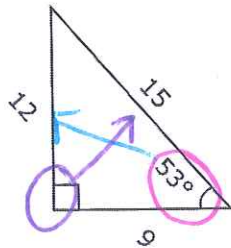
1. Find the six trig functions.

$\theta: 53^\circ$

Hypotenuse: 15

Opposite: 12

Adjacent: 9



Sine: $\frac{12}{15} = \frac{4}{5}$

Cosecant: $\frac{5}{4}$

Cosine: $\frac{9}{15} = \frac{3}{5}$

Secant: $\frac{5}{3}$

Tangent: $\frac{12}{9} = \frac{4}{3}$

Cotangent: $\frac{3}{4}$

Reduce if can

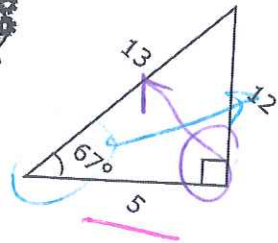
2. Find the six trig functions.

$\theta: 67^\circ$

Hypotenuse: 13

Opposite: 12

Adjacent: 5



Sine: $\frac{12}{13}$

Cosecant: $\frac{13}{12}$

Cosine: $\frac{5}{13}$

Secant: $\frac{13}{5}$

Tangent: $\frac{12}{5}$

Cotangent: $\frac{5}{12}$

Finding 6 Trig Functions

Finding a Side or Angle

1 20

28

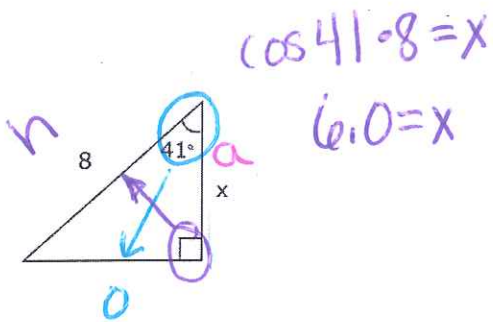
Applications

Solve for a Missing Side

1. Label
2. SohCahToa
3. Proportion
4. Cross Multiply / Solve

Solve for a Missing Angle

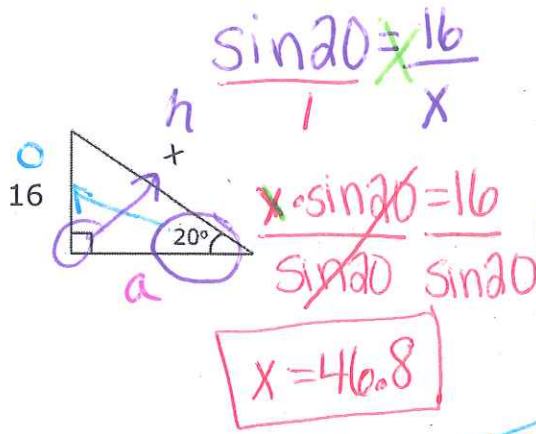
1. Label
2. SohCahToa
3. Proportion
4. Inverse



$$\cos 41 \cdot 8 = x$$

$$6.0 = x$$

$$\frac{\cos 41}{1} = \frac{x}{8}$$

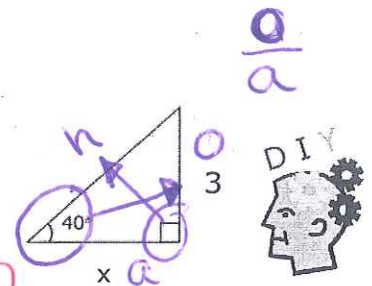


$$\frac{\sin 20}{1} = \frac{16}{x}$$

$$x \cdot \sin 20 = 16$$

$$\frac{x \cdot \sin 20}{\sin 20} = \frac{16}{\sin 20}$$

$$x = 46.8$$

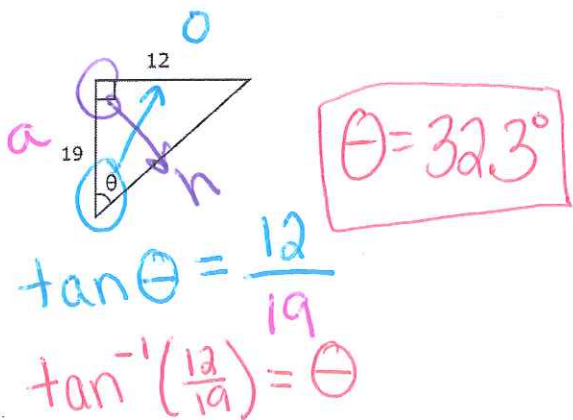


$$\frac{3}{a}$$

$$\frac{\tan 40}{1} = \frac{3}{x}$$

$$x = 3.6$$

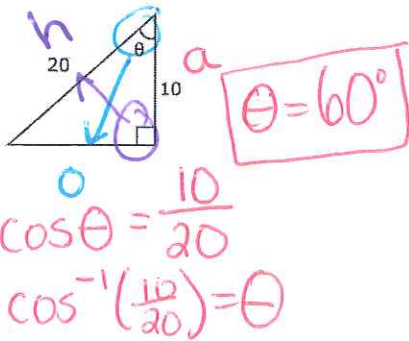
$$\frac{x \cdot \tan 40}{\tan 40} = \frac{3}{\tan 40}$$



$$\theta = 32.3^\circ$$

$$\tan \theta = \frac{12}{19}$$

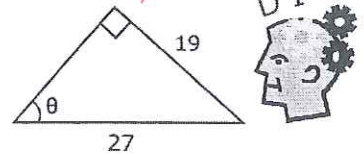
$$\tan^{-1}\left(\frac{12}{19}\right) = \theta$$



$$\theta = 60^\circ$$

$$\cos \theta = \frac{10}{20}$$

$$\cos^{-1}\left(\frac{10}{20}\right) = \theta$$



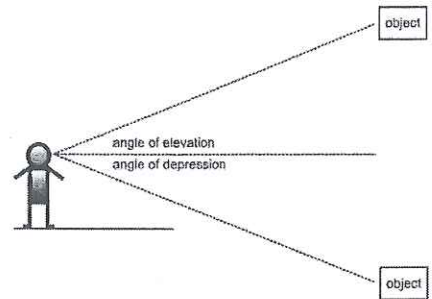
Finding a Side or Angle

If you look up at an object, the angle your line of sight makes with a horizontal

line is called the angle of elevation

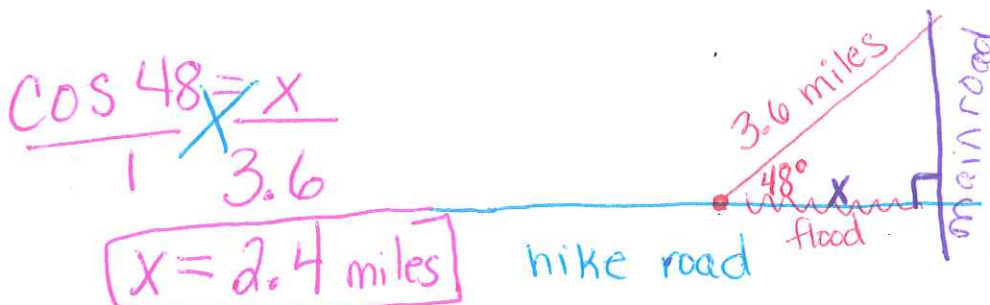
If you look down at an object, the angle your line of sight makes with a

horizontal line is called the angle of depression

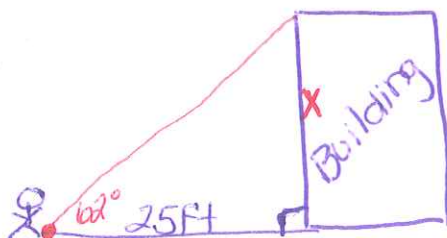


These two angles have the same measure.

1. You are hiking toward a main road, but reach a point where the road is flooded. To avoid the flooded area, you turn onto a diagonal road that meets your original road at a 48° angle and follow that road for 3.6 miles until you hit the main road. How far were you from the main road when you turned onto the diagonal road?



2. You are measuring the height of your school building. You stand 25 feet from the base of the school. The angle of elevation from a point on the ground to the top of the school is 62° . Estimate the height of the school.



$$\frac{\tan 62}{1} = \frac{x}{25}$$

$$x = 47 \text{ ft}$$

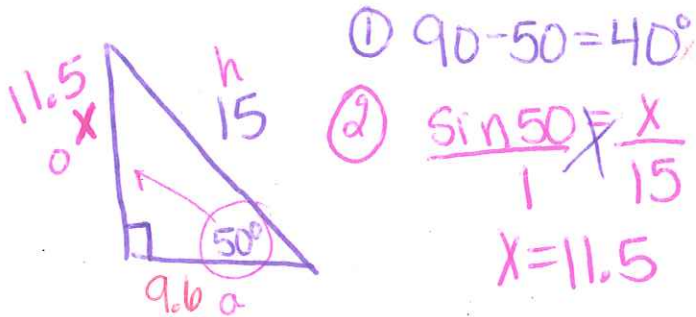
3. From a point on the ground 28 feet from the base of a flagpole, the angle of elevation to the top of the flagpole is 63° . Estimate the height of the flagpole.

$$x = 55 \text{ ft}$$



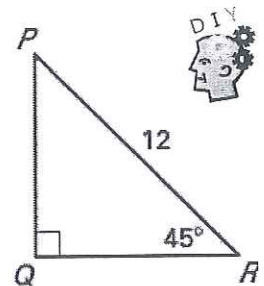
To solve a right triangle with one angle first find the missing angle of the triangle, $90 - \theta$; label the triangle and choose Soh Can Toa; write an equation; then cross multiply. To find the third side use $a^2 + b^2 = c^2$.

1. Solve a right triangle that has a 50° angle and a 15 in hypotenuse.



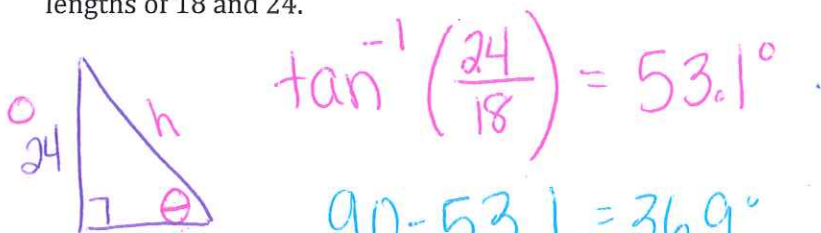
③ $11.5^2 + b^2 = 15^2$
 $132.25 + b^2 = 225$
 $b^2 = 92.75$
 $b = 9.6$

2. Solve the right triangle

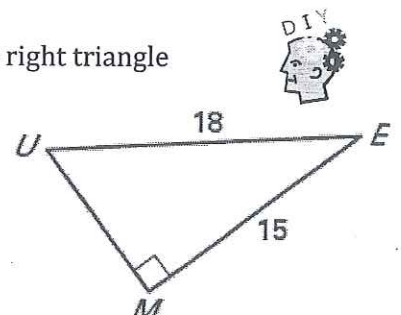


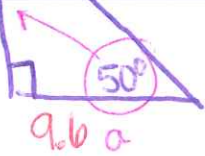
To solve a right triangle with 2 sides first label the triangle and choose Soh Can Toa; write an equation; then take the inverse of both sides. Then find the third angle of the triangle, $90 - \theta$; then find the third side use $a^2 + b^2 = c^2$.

1. Solve a right triangle that has legs with lengths of 18 and 24.



2. Solve the right triangle





$$x = 11.5$$

$$\textcircled{3} \quad 11.5^2 + b^2 = 15^2$$

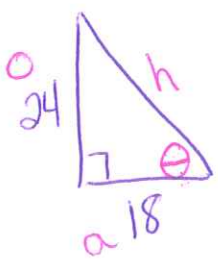
$$132.25 + b^2 = 225$$

$$b^2 = 92.75$$

$$b = 9.6$$

To solve a right triangle with 2 sides first label the triangle and choose soh
Can Toe; write an equation; then take the inverse of both sides.
 Then find the third angle of the triangle, $90 - \theta$; then find the third side use $a^2 +$
 $b^2 = c^2$.

1. Solve a right triangle that has legs with lengths of 18 and 24.



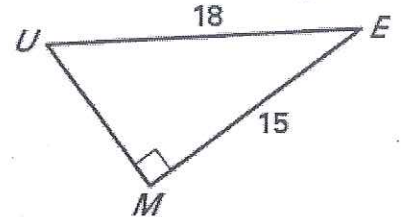
$$\tan^{-1}\left(\frac{24}{18}\right) = 53.1^\circ$$

$$90 - 53.1 = 36.9^\circ$$

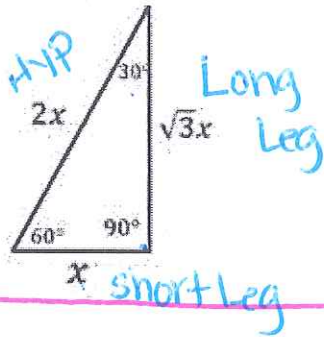
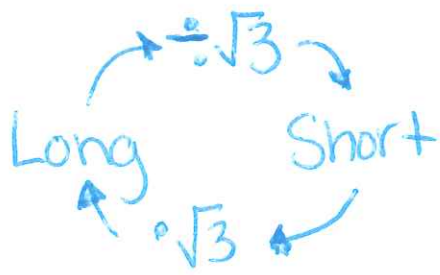
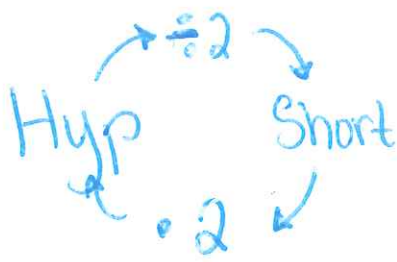
$$18^2 + 24^2 = c^2$$

$$30 = c$$

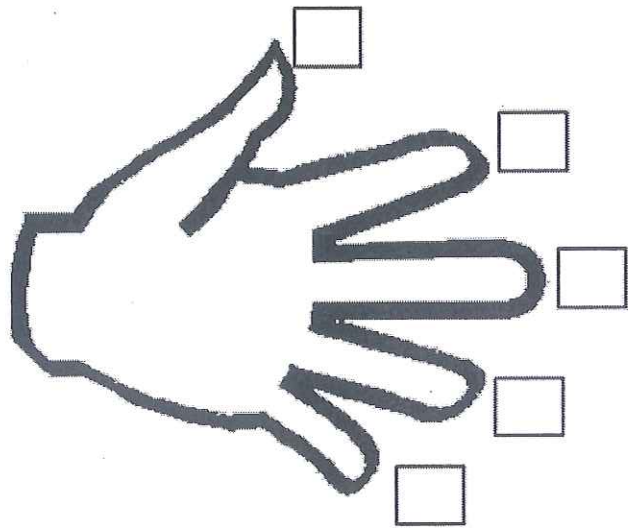
2. Solve the right triangle



Solving Right Triangles



$\tan \theta$	
$\cot \theta$	



Right Triangles