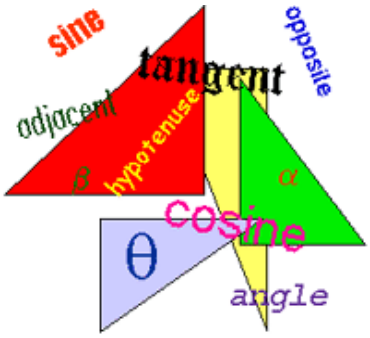
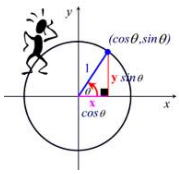
Trigonometry: The branch of mathematics that deals with the relationships between the sides and the angles of triangles and the calculations based on them

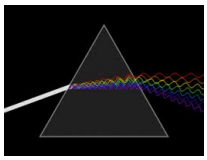


Why are triangles interesting?

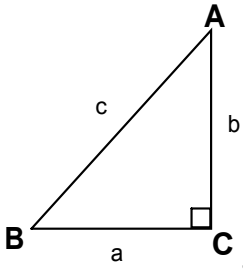
the study of triangles leads to the understanding of:

- waves
- circles
- distance
- light
- sound
- motion





Review of Triangles



The sum of the angles in a triangle is: 180°

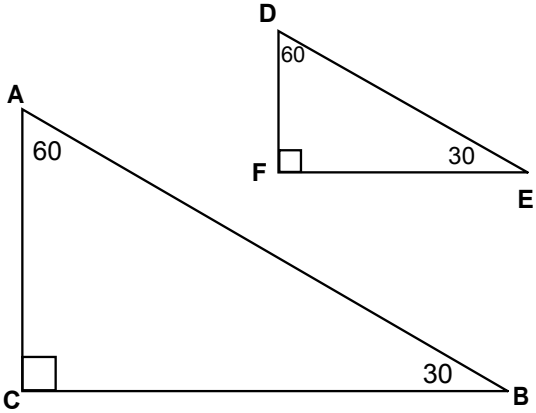
Pythagorean Theorem tells us:

$a^2+b^2=c^2$

Hypotenuse:

the longest side - opposite the right ∠

Review of Similar Triangles



Similar Triangles: Same shape but different size

Similar Triangles Have:

1. Equal Corresponding Angles

$\angle A = \angle D$

$\angle B = \angle E$

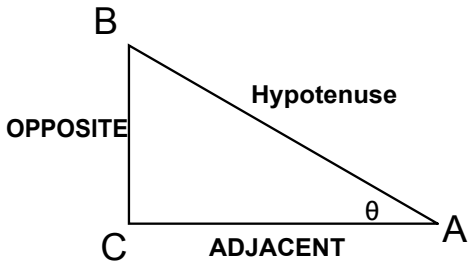
$\angle C = \angle F$

2. Equal Ratios of Corresponding Sides

$$\frac{AC}{DF} = \frac{AB}{DE} = \frac{BC}{EF}$$

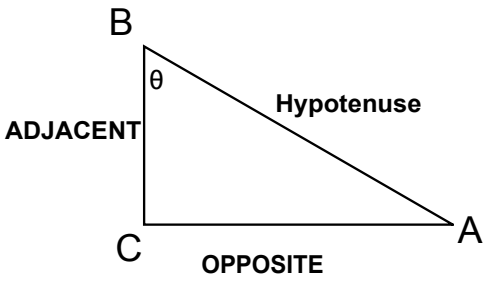
Labelling a Triangle

If $\angle A$ is the reference angle:



Labelling a Triangle

If $\angle B$ is the reference angle:



Similar Triangle Activity:

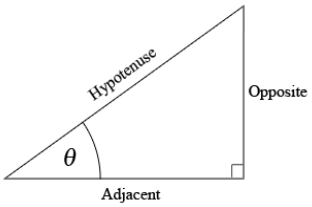
1. Find the missing angle on your triangle (remember the sum of the angles in a triangle is 180)

2. Find the other people in the class that have triangles similar to yours (all angles are equal)

3. Complete the investigation worksheet by finding the ratios indicated on your sheet.

Findings:

Each angle has its own unique sine, cosine, and tangent ratio that never changes



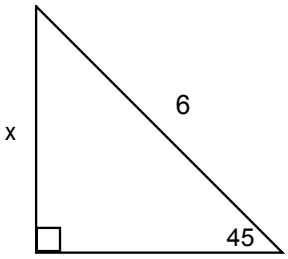
$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

For similar triangles, even though the lengths of the sides may change, the measure of the angle does not change, nor does the ratio of corresponding sides. The relationship between the sides stays the same.

Why is this important:



From the investigation, we know that all right triangles with a reference angle of 45 degrees are similar. They should all have a sine ratio of 0.71

Therefore, x/6 must be equal to 0.71..... we can solve for 'x' !!!!!!!!!!!!!!!!!!!!!!

So will we have to memorize the ratios for all possible angles????

No!!!! Your calculator has stored them all for you!!!

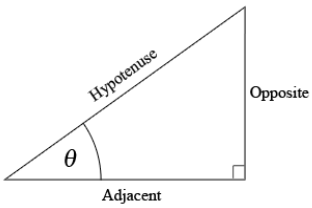
Try pressing sin --> then one of the reference angles of the triangle you were given --> then=. Does the ratio match the one you measured? (keeping in mind there may be minor measurement errors)

It should be the same because each angle has a unique sine ratio (opp/hyp) that NEVER changes.

What you should take away from today:

- There are three primary trigonometric ratios for right angled triangles.

Sine, Cosine, and Tangent



$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

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$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

If we know a right angle triangle has an angle of 'θ ', all other right angle triangles with an angle of 'θ ' are similar and therefore have equivalent ratios of corresponding sides.

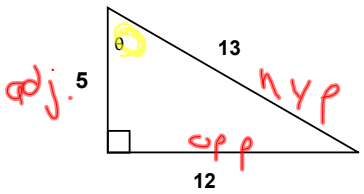
Acronym:

SOH CAH TOA

$S\frac{O}{H}\ C\frac{A}{H}\ T\frac{O}{A}$

$\sin\theta = \frac{o}{h}$ $\cos\theta = \frac{a}{h}$ $\tan\theta = \frac{o}{a}$

1 Find the following trig ratios:

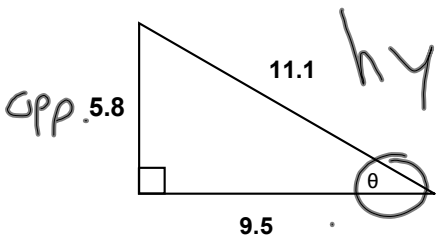


Sinθ = $\frac{opp}{hyp} = \frac{12}{13} = 0.92$

Cosθ = $\frac{adj}{hyp} = \frac{5}{13} = 0.38$

Tanθ = $\frac{opp}{adj} = \frac{12}{5} = 2.4$

2

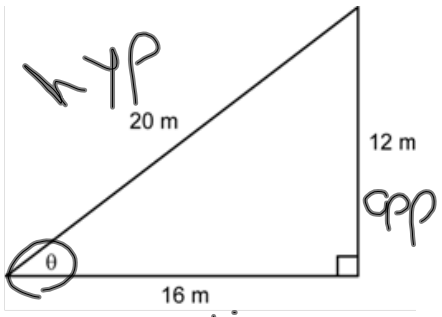


Sinθ = $\frac{5.8}{11.1} = 0.52$

Cosθ = $\frac{9.5}{11.1} = 0.86$

Tanθ = $\frac{5.8}{9.5} = 0.61$

3

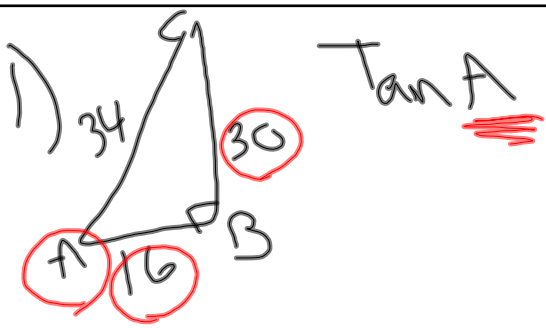


Sinθ = $\frac{12}{20} = 0.6$

Cosθ = $\frac{16}{20} = 0.8$

Tanθ = $\frac{12}{16} = 0.75$

Homework: Complete the Trig Ratios Worksheet



$$\tan A = \frac{30}{16} = 1.8$$