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AP Physics

7 December 2015

Trig Functions

Trigonometry is a branch of mathematics that studies relationships involving lengths and angles of triangles. (Wikipedia) Trigonometry can be used in mathematics when we have a right triangle (One angle with 90 degrees), and one other angle is known. If you have all of this, the problem would be considered **Fixed**. because the three angles of any triangle add up to 180 degrees. Meaning, the other two acute angles will add up to 90 degrees. Now, by only having the degrees, you do not know the lengths of the sides of the triangle. The way to find the lengths, is to find the **ratios** in the degrees. Once you found all of the ratios, you can determine all of your lengths and get the product.

Tips and Tricks:

1st. SOHCAHTOA, this is a way you could remember the equations to Trigonometry.

SOH- Sine= Opposite/Hypotenuse

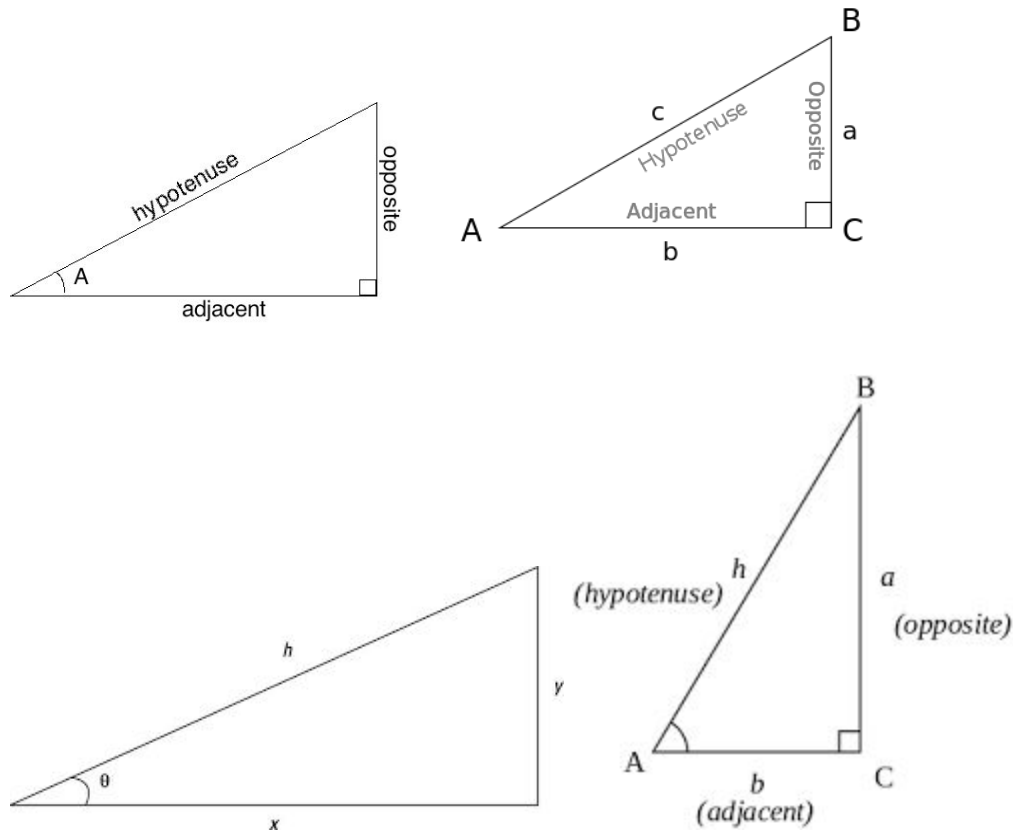
CAH- Cos= Adjacent/Hypotenuse

TOA- Tan= Opposite/Adjacent

You could even make up your own saying, for example,

Some Of Her Children Are Having Trouble Over Algebra.

By doing this, you use can remember to take the first letter of every word, and it will remind you of SOHCAHTOA.

Pictures, Drawings, Graphs, and DiagramsFunction Formulas:

Sine = Opposite/hypotenuse

Cos = Adjacent/hypotenuse

Tan = Opposite/Adjacent

Pythagorean Theorem formula: $A^2 + B^2 = C^2$

EX: The Hypotheses of a right triangle is 115ft and it inclines at 45 degrees Find the Cos and the Sin the find C^2 once you've found the Adjacent and Opposite side. Please Take note that the Opposite side is equal to A^2 and B^2 equals the Adjacent side. $\sin(45)(115) = 81.32\text{ft}$ which is the opposite side $\cos(45)(115) = 81.32\text{ft}$ which is the Adjacent side of the triangle. Plug in the

numbers into the Pythagorean Theorem formula to find your C^2 which should be equal to your hypotheses which is 115 ft^2

EX2: Billy decides to skateboard down a high with an incline of 25 degrees for a total of 5 meters. What is the height of billy and the skateboard? 5 meters represents your hypotenuse and your degree to your 25 degrees

$$\sin(25) = y/5$$

$$\sin(25)(5) = y$$

$$y = 2.11\text{m}$$

Practice Problems

Practice Problem #1: Ezio road his bike down a ramp that has an incline of 52 degrees the hypotenuse is 20 ft^2 how high was the ramp?

$$\sin(52)(20) = \text{Opposite Side}$$

$$\text{Opposite side} = \text{height} = 15.76\text{ft}$$

Practice Problem #2: Amy drove her 2000 white lexus down the main street bridge which had an incline of 70 degrees and a hypotenuses of 37 ft^2 . Before Amy was about to turn at the light at the end of the bridge turned red which caused Amy to come to a stop. At this point what is Amy's constant height or in other words what is the adjacent side of the bridge?

$$\cos = \text{Adjacent} / \text{Hypotenuse}$$

$$\cos(70) = \text{Adj} / 37\text{ft}^2$$

$$\cos(70)(37) = \text{Adj}$$

$$\text{Adj} = 12.66\text{ft}$$

Practice Problem #3: A ship travels 10 km on a course heading 50° east of north.

How far north, and how far east has the ship travelled at this point?

$$\sin = \tan(40) = \text{Opposite/Hypotenuse}$$

$$\sin(40) = y/10$$

$$0.6428 = y/10$$

$$y = 0.6428 \times 10$$

$$y = 6.43 \text{ km}$$

$$\sin(50) = \text{Opposite/Hypotenuse}$$

Practice Problem #4: A flat 12 foot plank rests with one end on the ground and the other end upon a 4 foot ledge. How far from the base of the ledge is the far end of the plank? What is the Level of Elevation?

$$(A) \quad 4^2 + b^2 = 12^2 \Rightarrow b = (\text{Square Root } 12^2 - 4^2) \approx 11.3 \text{ ft}$$

$$(B) \quad \sin A = 4/12 = A \sin^{-1}(4/12) = 19.47$$