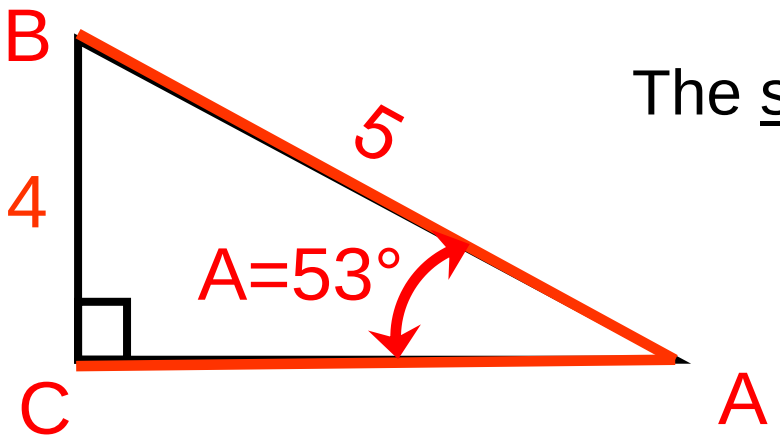
Math-2A
Lesson 9-3

Using Trigonometric Ratios
to
Solve Right Triangles

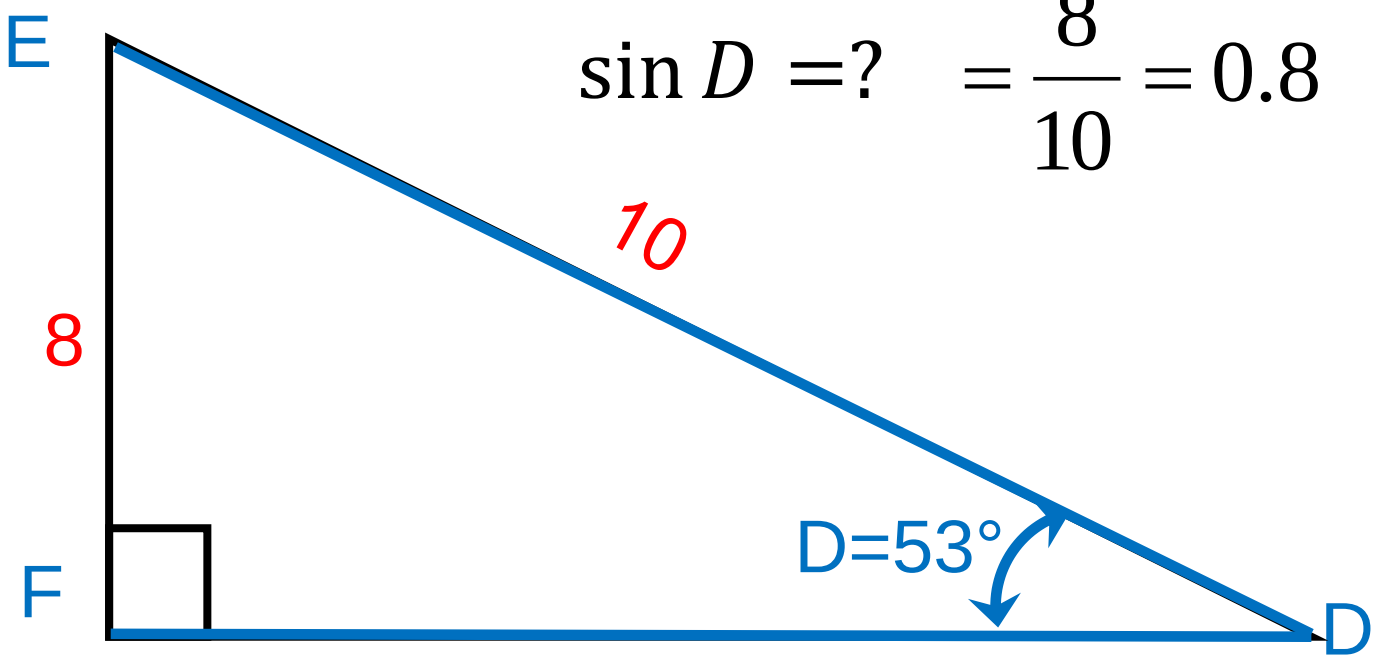
$$\sin A = ? = \frac{4}{5} = 0.8$$



The size of the triangle does not matter.

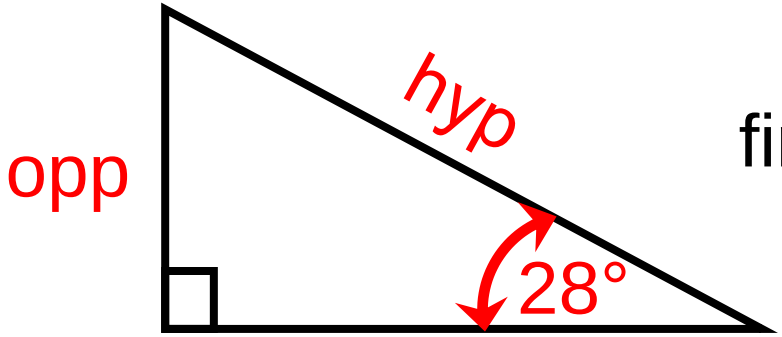
Each angle measure has its own unique ratio.

$$\sin D = ? \quad = \frac{8}{10} = 0.8$$



What does this mean? $\sin 28^\circ$ SOH-CAH-TOA

(the opposite/hypotenuse ratio of the 28 degree angle in a 28-62-90 triangle)



Use your calculator to find the decimal value of: $\sin 28^\circ$

$\sin 28 = 0.4695$

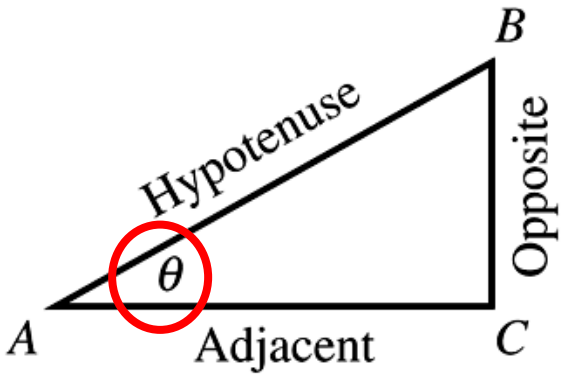
$\sin 28 = 0.2709$

Which is correct?

Must be in degree mode!

Radian	Degree	Sine
0.000	0	0.000
0.017	1	0.017
0.035	2	0.035
0.052	3	0.052
0.070	4	0.070
0.087	5	0.087

The ratio is a property of the angle. We must know which of the two acute angles we are referring to in order to find the correct ratio.



$$sin = \frac{opp}{hyp}$$ **NO!!!**

$$\sin\theta = \frac{opp}{hyp}$$ **YES**

SOH-CAH-TOA

$$\sin\theta = \frac{o}{h}$$

$$cos\,\theta = \frac{a}{h}$$

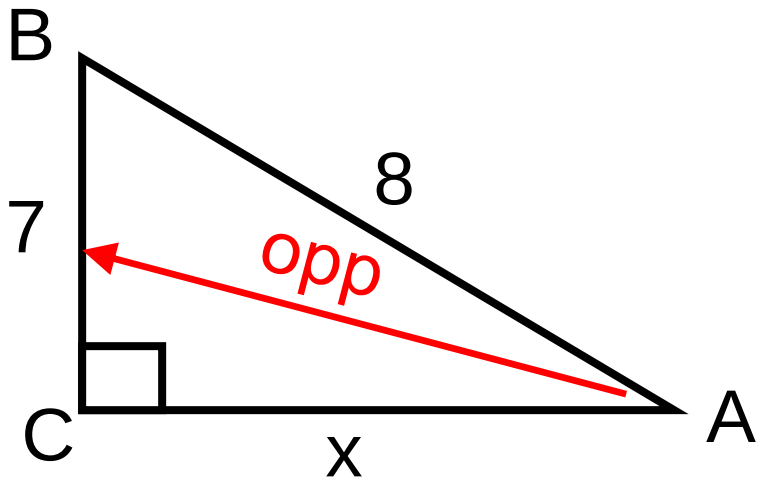
$$tan\,\theta = \frac{o}{a}$$

The easy way to remember what sides of the triangle to use in ratios.

These ratios only work for right triangles!!!

Sine Ratio

What is the sine ratio of angle A?



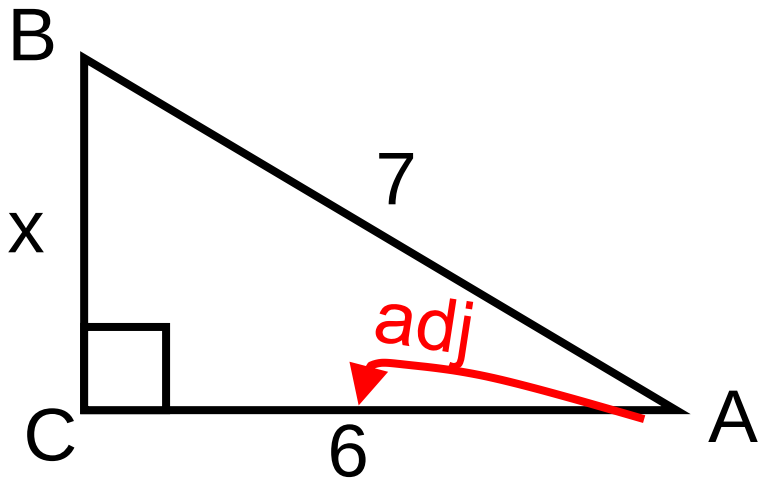
$$\sin A = \frac{opp}{hyp}$$

$$\sin A = \frac{7}{8}$$

Sine ratio of angle A is $\frac{7}{8}$

Cosine Ratio

What is the cosine ratio for angle A?

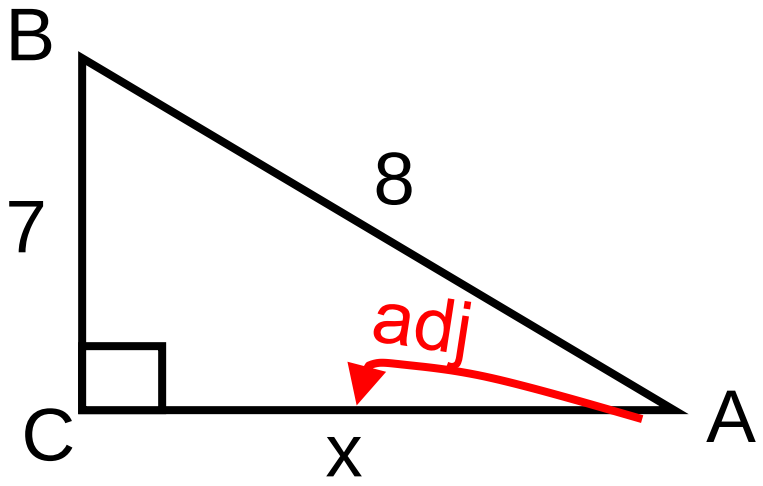


$$\cos A = \frac{adj}{hyp}$$

$$\cos A = \frac{6}{7}$$

Cosine ratio for angle A is $\frac{6}{7}$

What is the cosine ratio of angle A?



$$\cos A = \frac{Adj.}{hyp.}$$

$$\cos A = \frac{x}{8}$$

How do we find the value represented by ‘x’?

IF (right triangle) THEN $a^2 + b^2 = c^2$

$$7^2 + x^2 = 8^2$$

$$x^2 = 8^2 - 7^2$$

$$x = \sqrt{64 - 49}$$

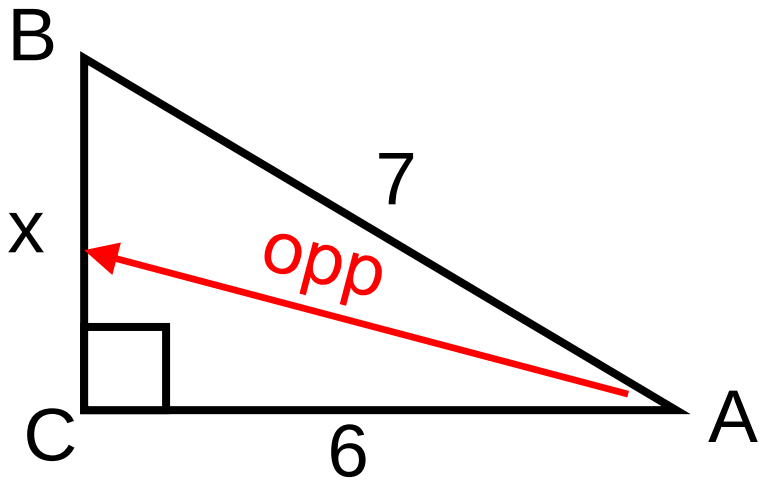
$$x = \sqrt{15}$$

$$\cos A = \frac{\sqrt{15}}{8}$$

What is the sine ratio of angle A?

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

$$sin\, A = \frac{x}{7}$$



How do we find the value represented by ‘x’?

IF (right triangle) THEN $a^2 + b^2 = c^2$

$$x^2 + 6^2 = 7^2$$

$$x^2 = 7^2 - 6^2$$

$$x = \sqrt{49 - 36}$$

$$x = \sqrt{13}$$

$$\sin A = \frac{\sqrt{13}}{7}$$

Solve a triangle: to find the measure of the unknown angles and side lengths.

To find an unknown value you need an equation!

There are five equations that relate to right triangles.

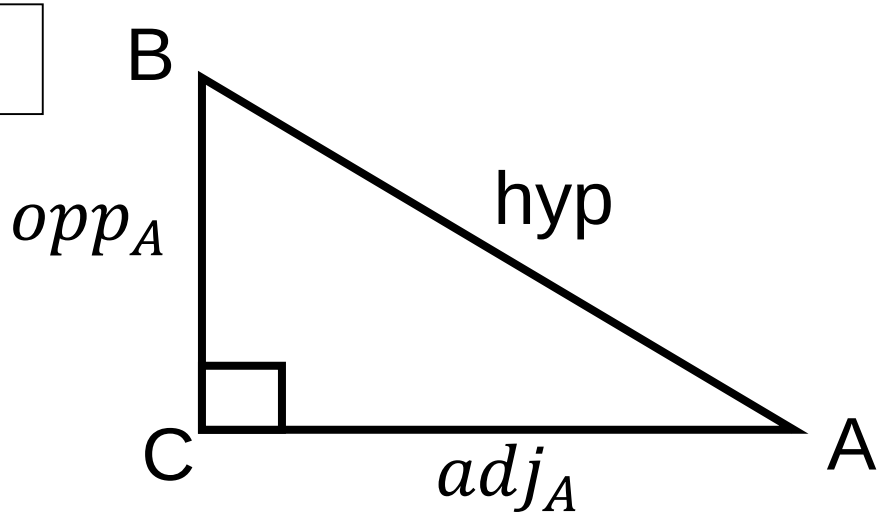
IF (right triangle) THEN

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

2) $\sin A = \frac{o}{h}$

3) $\cos A = \frac{a}{h}$

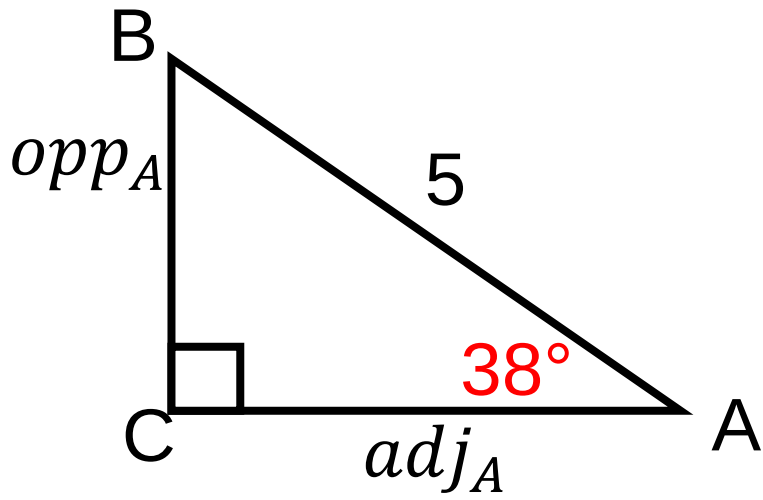
4) $\tan A = \frac{o}{a}$



and IF (any triangle) THEN

5) $m\angle A + m\angle B + M\angle C = 180^0$

Solve the triangle.



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

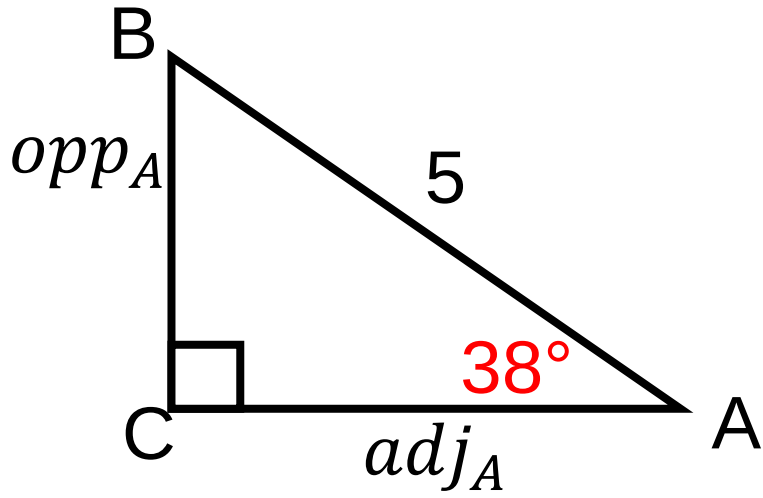
2) $\sin A = \frac{o}{h}$

3) $\cos A = \frac{a}{h}$

4) $\tan A = \frac{o}{a}$

5) $m\angle A + m\angle B + M\angle C = 180^0$ → $m\angle B = 52^0$

Solve the triangle.



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

2) $\sin A = \frac{o}{h}$ → $\sin 38^\circ = \frac{opp}{5}$

$0.616 = \frac{opp}{5}$

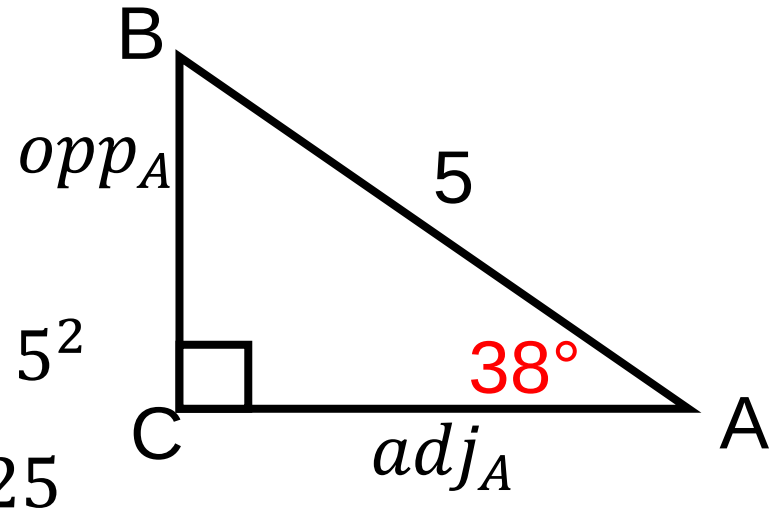
3) $\cos A = \frac{a}{h}$

$5(0.616) = \text{opp} = 3.08$

4) $\tan A = \frac{o}{a}$

5) $m\angle A + m\angle B + M\angle C = 180^0$

Solve the triangle.



1) $a^2 + b^2 = c^2$ →

2) $\sin A = \frac{o}{h}$

3) $\cos A = \frac{a}{h}$

4) $\tan A = \frac{o}{a}$

$(adj)^2 + (3.08)^2 = 5^2$

$(adj)^2 + 9.49 = 25$

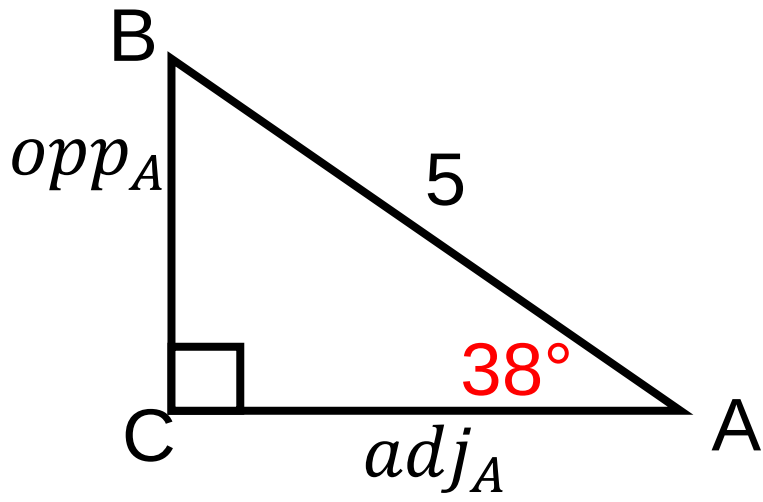
$(adj)^2 = 25 - 9.49$

$(adj)^2 = 15.51$

$adj = \sqrt{15.51} = 3.94$

5) $m\angle A + m\angle B + M\angle C = 180^0$

Solve the triangle.



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

2) $\sin A = \frac{o}{h}$

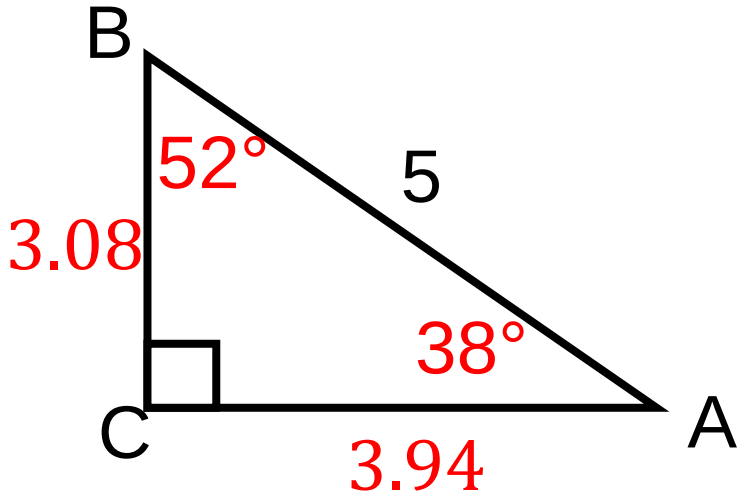
3) $\cos A = \frac{a}{h}$ → $\cos 38^\circ = \frac{adj}{5}$

$0.788 = \frac{adj}{5}$

$5(0.788) = \text{adj}$ $= 3.94$

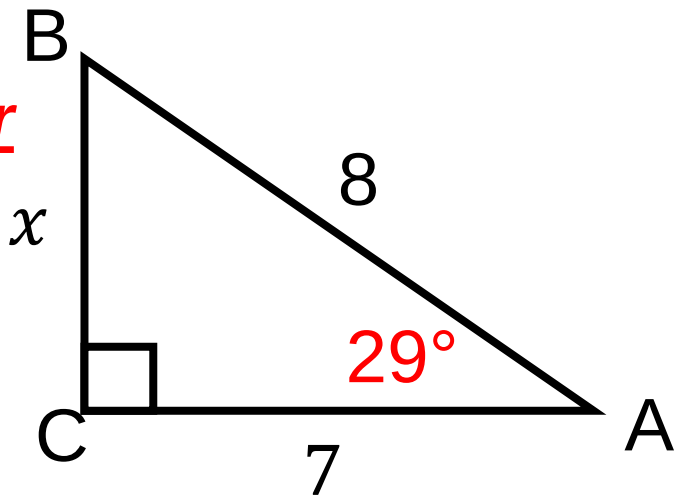
4) $\tan A = \frac{o}{a}$

5) $m\angle A + m\angle B + M\angle C = 180^0$



Usually, the problem only asks you to solve for 'x'

Change the numbers on your slide for this problem.



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

2) $\sin A = \frac{o}{h}$ → $\sin 29^\circ = \frac{x}{8}$

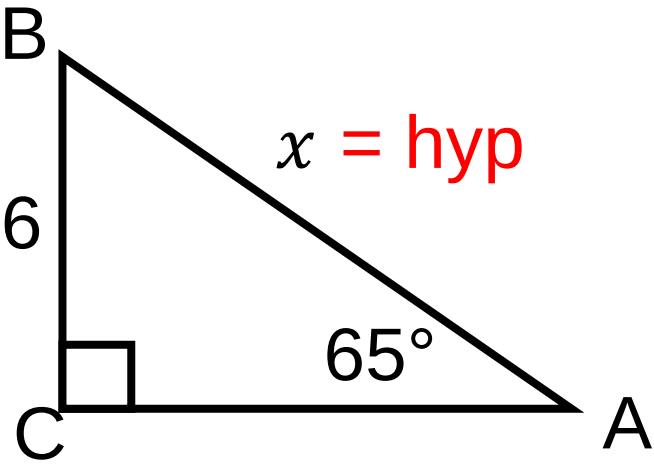
3) $\cos A = \frac{a}{h}$ $\quad 0.485 = \frac{x}{8}$

$8(0.485) = \text{opp} \quad = 3.9$

4) $\tan A = \frac{o}{a}$

5) $m\angle A + m\angle B + M\angle C = 180^0$

The Hardest problem



$$\sin A = \frac{o}{h} \qquad \sin 65^\circ = \frac{6}{x}$$

$$0.906 = \frac{6}{x}$$

'x' is in the denominator!

$$x(0.906) = 6$$

"undo" division by 'x'

$$x = \frac{6}{0.906} = 6.6$$