12.1 Trigonometric Ratios Day 1

Purpose:

To find the missing sides and angles of right triangles.

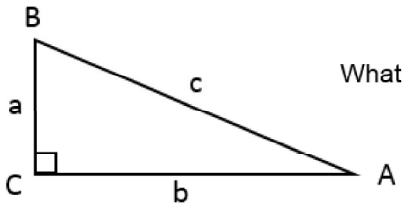
Learning Target:

a. Given a right triangle, I can define the sine, cosine, and tangent ratios from an unknown angle.

b. I can use Trigonometric Ratios to solve for unknown sides and angles in a right triangle.

Opposite/Adjacent/Hypotenuse

To understand sine, cosine, and tangent, you must be able to label sides as adjacent or opposite of an angle and hypotenuse.



What side is the hypotenuse? c

What side is opposite of $\angle A$? a

What side is adjacent to $\angle A$? b

What side is opposite of $\angle B$? b

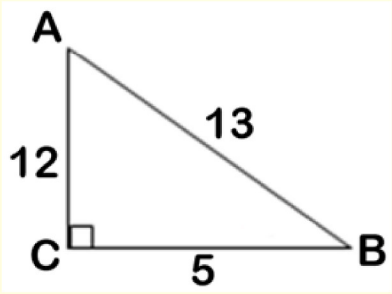
What side is adjacent to $\angle B$? a

Sine (sin)

Sin A = opp. / hyp.

The sine (or shorthand sin) is simply a ratio in a right triangle comparing the side opposite an angle to the hypotenuse.

For example, $\sin B = \frac{12}{13}$ and $\sin A = \frac{5}{13}$

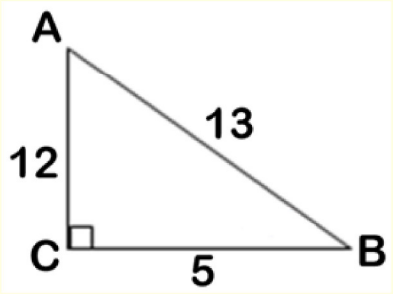


Cosine (cos)

Cos A = adj. / hyp.

The cosine (or shorthand cos) is simply a ratio in a right triangle comparing the side adjacent an angle to the hypotenuse.

For example, $\cos A = \frac{12}{13}$ and $\cos B = \frac{5}{13}$



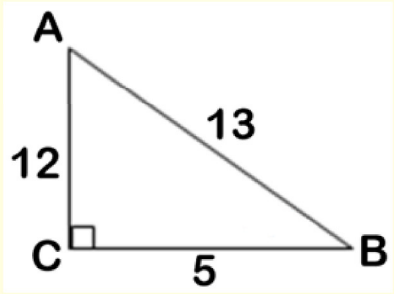
adjacent means "next to"

Tangent (tan)

Tan A = opp / adj

The tangent (or shorthand tan) is simply a ratio in a right triangle comparing the side opposite an angle to the side adjacent.

For example, $\tan A = \frac{5}{12}$ and $\tan B = \frac{12}{5}$



Sine (sin) / Cosine(cos) / Tangent(tan)

To remember the trigonometric ratio we can use the following saying:

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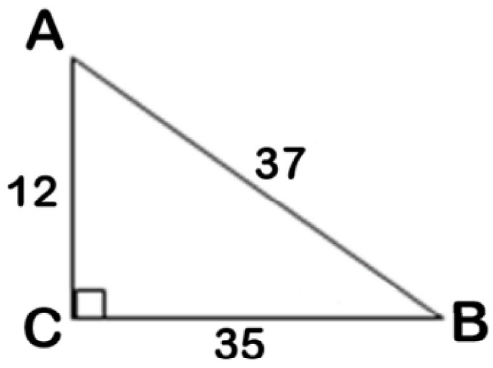
Sin (Angle) = opposite / hypotenuse Cos (Angle) = adjacent / hypotenuse Tan (Angle) = opposite / adjacent

Using the triangle below express sine-cosine-tangent.



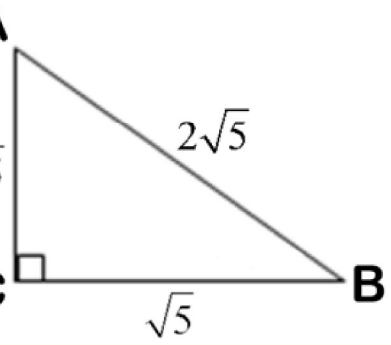
$\sin A = \frac{35}{37}$ $\cos A = \frac{12}{37}$ $\tan A = \frac{35}{12}$

$\sin B = \frac{12}{37}$ $\cos B = \frac{35}{37}$ $\tan B = \frac{12}{35}$

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

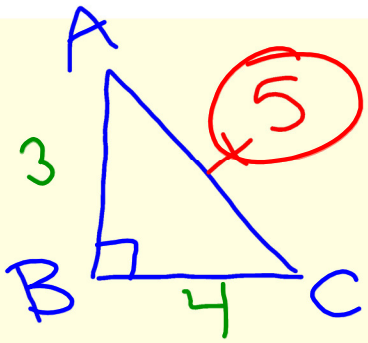
Examples: Use the triangle below to find sin, cos, tan. NO DECIMALS!

1. $\sin A = \frac{\sqrt{5}}{2\sqrt{5}}$
2. $\sin B = \frac{\sqrt{15}}{2\sqrt{5}}$
3. $\cos A = \frac{\sqrt{15}}{2\sqrt{5}}$
4. $\cos B = \frac{\sqrt{5}}{2\sqrt{5}\sqrt{15}}$
5. $\tan A = \frac{\sqrt{5}}{\sqrt{15}}$
6. $\tan B = \frac{\sqrt{15}}{\sqrt{5}}$



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

7. In ΔABC, $\angle B$ is the right angle. Suppose $\tan C = \frac{12}{16} = \frac{3}{4}$. Find $\sin A$.



$\tan C = \frac{3}{4}$

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

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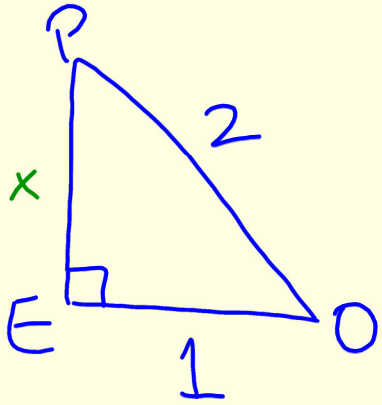
$3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$\sqrt{25} = \sqrt{x^2}$

8. In ΔPOE, $\angle E$ is the right angle. Suppose $\cos O = \frac{7}{14} = \frac{1}{2}$. Find $\tan O$.



$\cos O = \frac{1}{2}$

$\tan O = \frac{\sqrt{3}}{1}$

$1^2 + x^2 = 2^2$

$1 + x^2 = 4$

$\sqrt{x^2} = \sqrt{3}$

$x = \sqrt{3}$

12.1 Day 1 Practice