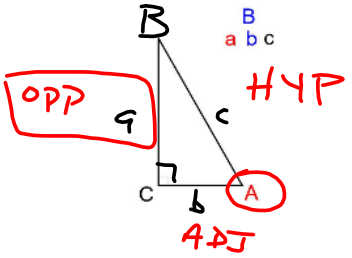
1.0 Right Triangle Review.Sept2020

Review: **Name triangle angles with Upper Case Letters and label the sides with their corresponding lower case letter.**

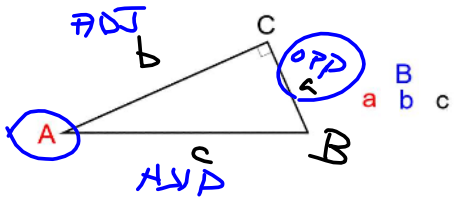
Review: **Identify the three sides of a right triangle as the hypotenuse, the side opposite the given angle, the side adjacent to the given angle.**

Examples: We often name our right angle "C".
We often use "A B C" for the angles and "a b c" for the sides.
When we refer to angle **A** we will name the sides of the triangle: **hyp**otenuse, **opp**osite of A, **adj**acent to A.

a)



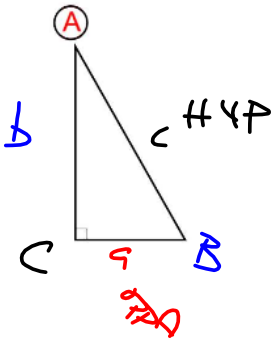
b)



Own your own:

- Name the right angle as "C".
- Write "hyp" or "hypotenuse" with side 'c'.
- Write 'a' for the side opposite A.
- Write 'b' for the side opposite B.
- Write 'opp' or "opposite of A" for the side opposite of the circled angle, A.

1.



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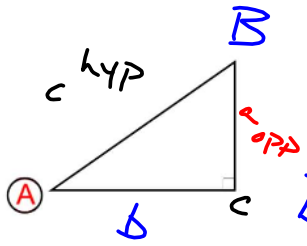

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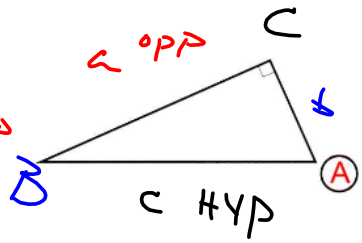

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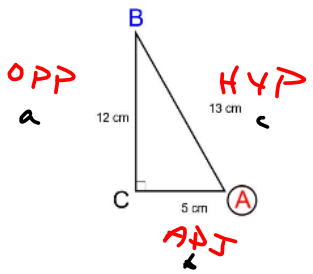
Review: Write three ratios for the indicated angle in a Right Triangle: sine (sin), cosine (cos) and tangent (tan).

Example: We will name the sides and angles of the triangle. We can name and write three ratios relative to angle X

$$sinX = \frac{opp}{hyp} \qquad cosX = \frac{adj}{hyp} \qquad tanX = \frac{opp}{adj}$$

SOH CAH TOA

1. Label the triangle (hypotenuse, opposite A, adjacent A) and write the ratios for angle A. Write the ratios as decimals, four places.

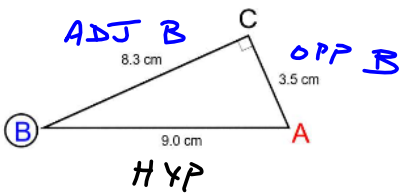


$sinA = \frac{opposite}{hypotenuse}$ $sinA = \frac{opp}{hyp}$ $sinA = \frac{12}{13} = 0.9231$

$cosA = \frac{adjacent}{hypotenuse}$ $cosA = \frac{adj}{hyp}$ $cosA = \frac{5}{13} = 0.3846$

$tanA = \frac{opposite}{adjacent}$ $tanA = \frac{opp}{adj}$ $tanA = \frac{12}{5} = 2.4$

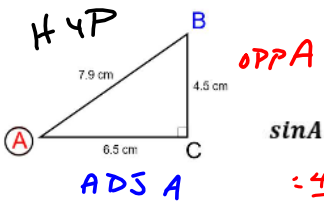
2. Label the triangle (hypotenuse, opposite B, adjacent B) and write the ratios for angle B. Write the ratios as decimals, four places.



$sinB = \frac{3.5}{9.0} = 0.3889$ $cosB = \frac{8.3}{9.0}$ 0.9222 $tanB = \frac{3.5}{8.3} = 0.4217$

$sinB = \frac{opp}{hyp}$ $cosB = \frac{adj}{hyp}$ $tanB = \frac{opp}{adj}$

3. Label the triangle (hypotenuse, opposite A, adjacent A) and write the ratios for angle A. Write the ratios as decimals, four places.



$sinA = \frac{opp}{hyp} = \frac{4.5}{7.9} = 0.5696$ $cosA = \frac{adj}{hyp} = \frac{6.5}{7.9} = 0.8228$ $tanA = \frac{opp}{adj} = \frac{4.5}{6.5} = 0.6923$

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Calculators: Our calculators will give us the decimal ratio for any angle in a triangle.

- We need to make sure we have our calculators in "**DEGREE**" mode.
- Find the ratios for the following (four decimal places) angles in degree mode:

a) sin 25 = 0.4226 = $\frac{opp}{hyp} = \frac{0.4226}{1}$

b) cos 33 = 0.8387 = $\frac{adj}{hyp} = \frac{0.8387}{1}$

c) tan 48 = 1.1106 = $\frac{opp}{adj}$

Review: Finding sides in a Right Triangle when you know an acute angle and a side.

Similar Skills - using ratios to solve problems.

You pay $3.75 for 25 pieces of candy.

- How much would you pay for one piece of candy? $\frac{\$3.75}{25} = \frac{x}{1}$ $x = \$0.15$
- How many pieces of candy could you purchase with $9.00? $\frac{\$3.75}{25} = \frac{\$9.00}{x}$ $x = 60$

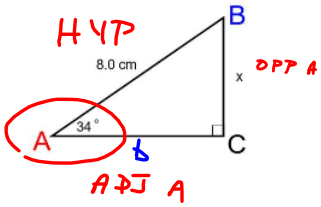
We will use the skill of cross multiplying to solve our triangle problems.

Examples: Determine the length of side 'x' in our triangle, rounded to the nearest tenth.

What do we know from past work:

- Label the sides (hyp, opp, adj) relative to the given angle (circle the given angle).
- Write the three ratios (SIN, COS, TAN)
  - Fill in the numbers that we know.
  - Choose the ratio that works for cross multiplying.
- Solve

a)



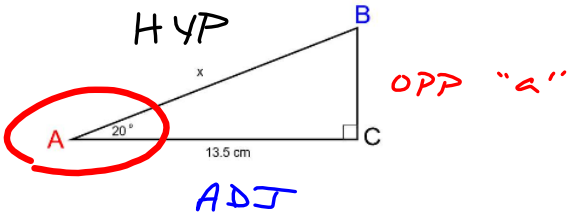
$\sin A = \frac{opp}{hyp}$ $\cos A = \frac{adj}{hyp}$ $\tan A = \frac{opp}{adj}$

$\boxed{\sin 34 = \frac{x}{8.0}}$ $\cos 34 = \frac{b}{8.0}$ $\tan 34 = \frac{x}{b}$

$\frac{0.5592}{1} = \frac{x}{8.0}$

$x = 4.5$

b)



$\sin A = \frac{opp}{HYP}$ $\cos A = \frac{ADJ}{HYP}$ $\tan A = \frac{opp}{adj}$

$\sin 20 = \frac{a}{x}$ $\boxed{\cos 20 = \frac{13.5}{x}}$ $\tan 20 = \frac{a}{13.5}$

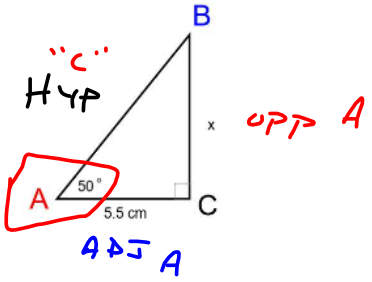
$\frac{0.9397}{1} = \frac{13.5}{x}$

$x = 14.4$

$\sin A = \frac{opp}{hyp}$ $\cos A = \frac{adj}{hyp}$ $\tan A = \frac{opp}{adj}$

$\sin 50 = \frac{x}{c}$ $\cos 50 = \frac{5.5}{c}$

c)



$\boxed{\tan 50 = \frac{x}{5.5}}$

$\frac{1.1918}{1} = \frac{x}{5.5}$

$x = 6.6$

Review: Finding sides in a Right Triangle when you know an acute angle and a side.

Previous Skill: Find the SIN, COS, or TAN ratio for angles:

Examples:

- sin 33 = 0.5446
- cos 55 = 0.5736
- tan 77 = 4.3315

If we know the ratio (decimal value) how do we determine the angle?

Examples:

a) sin A = 0.6947
b) cos B = 0.4067
c) tan X = 0.8391

Our calculators work forwards and backwards… we need to use 'reverse' to find an angle when we know the ratio. Each of our calculators have the ratios with the -1 sign:

Often we need to use 'shift' or '2nd' key to

the get the -1 with the ratio to appear.

When we know the ratio, we use the ratio with -1 to find the angle:

Online Calculator: Desmo Scientific

Using Desmos, we enter the decimals and get the angle in degrees:

$\sin^{-1}(0.6947)$	$= 44.00331591$
$\cos^{-1}(0.4067)$	$= 66.00229816$
$\tan^{-1}(0.8391)$	$= 40.0000124$

If we round our answers to the nearest degree we know:

a) A = 44
b) B = 66
c) X = 40

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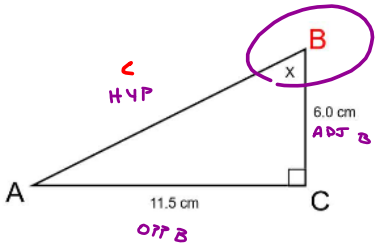
Examples:

- Label the sides (hyp, opp, adj) relative to angle X (circle the given angle).
- Write the three ratios (SIN, COS, TAN)
  - Fill in the numbers that we know.
  - Determine which ratio can be written as a decimal.
- Solve for the angle.

1. Given ΔABC. Determine angle X, rounded to the nearest degree.



SOH CAH TOA

$\sin X = \frac{11.5}{c}$

$\cos X = \frac{6.0}{c}$

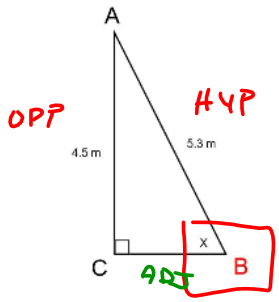
$\boxed{\tan X = \frac{11.5}{6.0}}$

$\tan X = 1.9167$

$X = \tan^{-1}(1.9167)$

$X = 62$

2. Given ΔABC. Determine angle X, rounded to the nearest degree.



$\boxed{\text{SOH}}$ CAH TOA

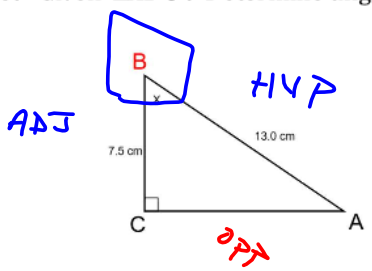
$\sin X = \frac{4.5}{5.3}$

$\sin X = 0.8491$

$X = \sin^{-1}(0.8491)$

$X = 58$

3. Given ΔABC. Determine angle X, rounded to the nearest degree.



SOH CAH TOA

$\cos X = \frac{7.5}{13.0}$

$X = \cos^{-1}(0.5769)$

$X = 55$

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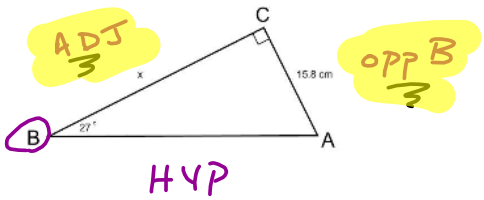
Own your own: Finding an angle or a side in a Right Triangle.

1. Find the missing side, rounded to nearest tenth.



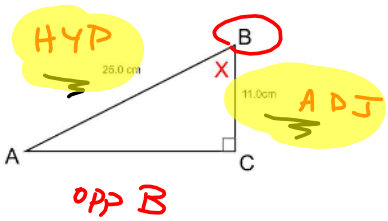
SOH CAH $\boxed{\text{TOA}}$

$\tan 27 = \frac{15.8}{x}$

$\frac{0.5095}{1} = \frac{15.8}{x}$

$x = 31.0$

2. Find the missing angle, rounded to the nearest degree.



SOH $\boxed{\text{CAH}}$ TOA

$\cos X = \frac{11.0}{25.0}$

$\cos X = 0.44$

$X = \cos^{-1}(0.44)$

$X = 64$

Skill Building Practice and Answer Key