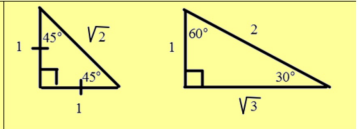


Review: Triangle Trigonometry

ESSENTIAL QUESTION:

What are 3 methods for solving triangles? How do you know which method is appropriate?

REVIEW: You can use special triangles (45-45-90 or 30-60-90) to solve problems like these!



1. A square has a perimeter of 32 in. Find the length of its diagonal.

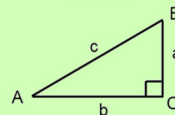
2. The altitude of an equilateral triangle is 6 cm. Find the perimeter of the Δ .

Three ways to solve triangles:

1. Right triangle trig
2. Law of Sines
3. Law of Cosines

What is right triangle trig?	Trigonometry is a way of using the ratios of certain sides in a Δ , with respect to one of the acute angles. We will be able to use these ratios to find missing sides and angles in right Δ s.						
<table style="border: none;"> <tr> <td style="padding-right: 10px;">sine</td> <td>cosine</td> </tr> <tr> <td>tangent</td> <td>cotangent</td> </tr> <tr> <td>secant</td> <td>cosecant</td> </tr> </table>	sine	cosine	tangent	cotangent	secant	cosecant	These are the names for the 6 trig functions that we use in precalculus.
sine	cosine						
tangent	cotangent						
secant	cosecant						

How do we define these trig functions?



Let A be one of the acute angles in a right Δ .

$$\sin A = \frac{\text{side opposite } A}{\text{hypotenuse}} = \frac{a}{c}$$

$$\cos A = \frac{\text{side adjacent to } A}{\text{hypotenuse}} = \frac{b}{c}$$

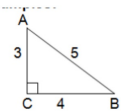
$$\tan A = \frac{\text{side opposite } A}{\text{side adjacent to } A} = \frac{a}{b}$$

How can we remember the definitions?

SOH-CAH-TOA

$$\sin A = \frac{\text{Opp}}{\text{Hyp}} \quad \cos A = \frac{\text{Adj}}{\text{Hyp}} \quad \tan A = \frac{\text{Opp}}{\text{Adj}}$$

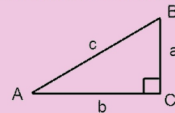
(Some Old Horse Caught Another Horse Taking Oats Away)



$$\sin A = \quad \cos A = \quad \tan A =$$

$$\sin B = \quad \cos B = \quad \tan B =$$

RECIPROCAL FUNCTIONS



$$\cot A = \frac{1}{\tan A} = \frac{\text{adjacent}}{\text{opposite}} = \frac{b}{a}$$

$$\sec A = \frac{1}{\cos A} = \frac{\text{hypotenuse}}{\text{adjacent}} = \frac{c}{b}$$

$$\csc A = \frac{1}{\sin A} = \frac{\text{hypotenuse}}{\text{opposite}} = \frac{c}{a}$$

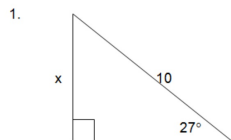
Using a calculator to evaluate trig functions

**Make sure your calculator is set to the appropriate mode. Round answers to 4 decimal places.

1. $\sin 57^\circ =$ _____ 2. $\tan 89^\circ =$ _____

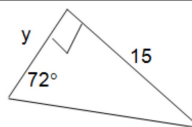
3. $\sec \frac{\pi}{6} =$ _____ 4. $\cot \frac{3\pi}{4} =$ _____

Solve for the missing sides using trig ratios.



- Identify the sides with respect to the 27° angle. (opposite, adjacent, hypotenuse)
- Choose the appropriate trig function based on how you identified the sides.
- Write and solve an equation.

2.



MORE RIGHT Δ TRIG OBJECTIVES

On your calculator, evaluate the following. Round to tenths place.

- $\sin^{-1}\left(\frac{4}{5}\right)$
- $\cos^{-1}(0.13)$
- $\tan^{-1}(1)$

Given 2 sides of a right triangle, use **inverse trig functions** to find missing angles.

*Make sure your calculator is set to **degrees**, not radians.

-
-
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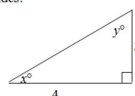
Suppose you have to find $\sec^{-1}\left(\frac{12}{13}\right)$...

You can use the reciprocal trig function with the reciprocal of what's in parenthesis!

$$\sec^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{13}{12}\right) =$$

Try this: $\cot^{-1}(231)$

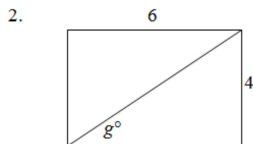
We can use INVERSE TRIG FUNCTIONS to find a missing acute angle in a right triangle if we are given 2 of the sides.



STEPS:

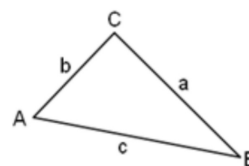
- Pick one of the unknown angles. _____
- Label the sides with respect to that angle. (opposite, adjacent, or hypotenuse)
- Choose the appropriate trig function and write an equation.
- Apply the inverse trig function to both sides of the equation. Solve for the angle.
- To find the other angle, remember that the sum of the angles in a triangle is _____.


EXAMPLES: Find the missing angles. Round your answers to tenths place.



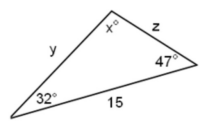
LAW OF SINES

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



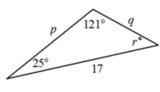
When should I use the Law of Sines?	1. The triangle is not a right triangle. 2. The pattern of given information is ASA, AAS, or SSA.
Examples: 1. Find x . 	1. The pattern of given information is _____.

2. Find x , y , and z .



2. The pattern of given information is _____.

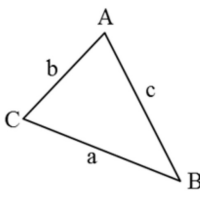
3. Solve the triangle:



"Solve the triangle" means "find all the missing sides and angles."

LAW OF COSINES

$$c^2 = a^2 + b^2 - 2ab \cdot \cos C$$



You can also use the following:

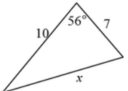
$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cdot \cos B$$

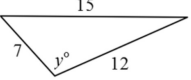
How do I know when to use the law of cosines?

Examples:

1. Find x .



2. Find y .



HINTS FOR SOLVING TRIANGLES:

1. If the given information requires you to start with Law of Sines (ASA, AAS, SSA), you should be able to complete the problem using only Law of Sines.
2. If the given information requires you to start with Law of Cosines (SSS or SAS), you will be able to find the remaining sides and angles with Law of Sines.
3. If the given info is in the SSS pattern, always **start by finding the largest angle**, which will be across from the largest side.