Right Triangles and Trigonometry Unit

Oct 12-10:24 AM

Working with Radicals

Simplified Radical Form

This means simplifying a radical so that there are no more square roots left under the radical sign. It also means removing any radicals in the denominator of a fraction.

To do this, follow these steps:

1. Complete the prime factorization for the number.
2. Locate the perfect squares. (Once factored, perfect squares will have two of the same numbers.)
3. Place the number that represent the perfect squares outside the radical sign.
4. Once all perfect squared numbers are outside the radical, multiply them back together.
5. Multiply the remaining numbers back together to determine what the number under the radical sign should be.
6. Make sure there are no radicals in the denominator of a fraction. If there are, follow these steps:
   a. Multiply the fraction by the radical over the radical.
   b. Simplify.

Simplify the radicals below:

$\sqrt{50}$ $\sqrt{90}$ $\frac{2}{\sqrt{3}}$ $\frac{10}{\sqrt{3}}$

Multiplying Numbers with Radicals

1. Multiply the numbers outside the radicals together. That's the new number outside the radical.
2. Multiply the numbers under the radicals together. That's the new number under the radical.
3. Simplify if needed.

Multiply the following expressions:

$3\sqrt{5} * 2\sqrt{2}$ $3\sqrt{10} * \sqrt{6}$ $3\sqrt{2} * 2\sqrt{2}$

Dividing Radicals

1. Follow the directions for simplifying a fraction with a radical in the denominator!

Divide the following expressions:

$\frac{10}{\sqrt{5}}$ $\frac{3}{\sqrt{7}}$

8-1 Pythagorean Theorem and Its Converse

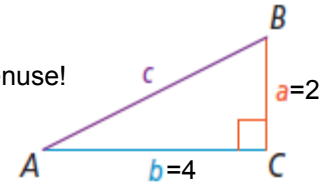
Vocabulary

-Pythagorean Theorem, Pythagorean Triple

Pythagorean Theorem

If $\triangle ABC$ is a right triangle, then $a^2 + b^2 = c^2$. C must be the hypotenuse!

Find the value of c in the triangle at the right.



Pythagorean Theorem Converse

If $a^2 + b^2 = c^2$, then $\triangle ABC$ is a right triangle.

If the sum of the legs squared is EQUAL, then it is a right triangle.
If the sum of the legs squared is GREATER, then it is an acute triangle.
If the sum of the legs squared is LESS THAN, then it is an obtuse triangle.

Identify the following triangle as acute, right, or obtuse: side lengths of 8,5,and 9.

Pythagorean Triple

A set of nonzero WHOLE numbers that satisfy $a^2 + b^2 = c^2$.
If you multiply each number in a Pythagorean triple by the same number, you will get another triple.
Some common Pythagorean triples:

3,4,5 5,12,13 8,15,17 7,24,25

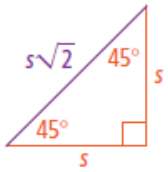
8-2 Special Right Triangles

Vocabulary

30-60-90 Triangle, 45-45-90 Triangle

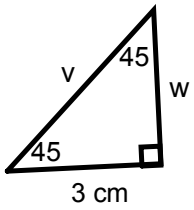
45-45-90 Triangle Theorem

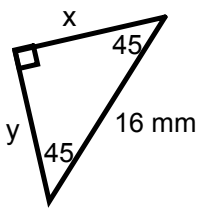
In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.



H = L$\sqrt{2}$

Find the missing values in the 45-45-90 triangles below.

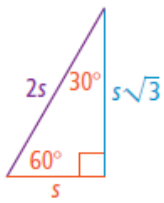




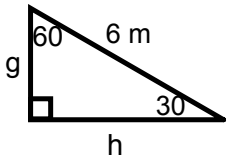
30-60-90 TriangleTheorem

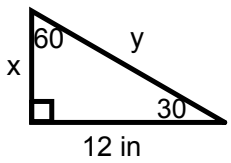
In a 30°-60°-90° triangle, the length of the hypotenuse is twice the length of the shorter leg. The length of the longer leg is $\sqrt{3}$ times the length of the shorter leg.

H = 2 * SL and LL = SL $\sqrt{3}$



Find the missing values in the 30-60-90 triangles below.





8-3 Trigonometry

Vocabulary

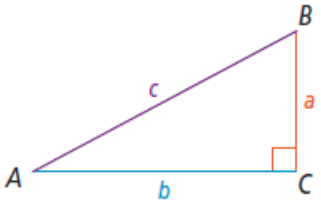
-Sine, Cosine, Tangent

CHANGE YOUR CALCULATORS TO DEGREE MODE!

Trigonometric Ratios

The ratios of two sides of a right triangle and a related angle.
They can be remembered using **SOH CAH TOA!**

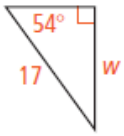
SOH - sine of angle = **opposite** over **hypotenuse**
CAH - cosine of angle = **adjacent** over **hypotenuse**
TOA - tangent of angle = **opposite** over **adjacent**

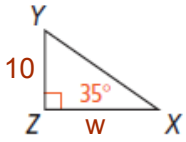


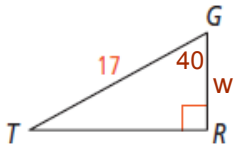
Solving for a Missing Side Using Trig Ratios

1. Pick an angle with a known measurement to focus on. It can NOT be the right angle!!!
2. Identify the sides according to the angle you are focused on.
3. Identify if you should use SOH, CAH, or TOA.
4. Substitute the values.
5. Solve.

Find the value of w to the nearest hundredth.







Solving for a Missing Angle Using the Inverse

1. Choose the angle you need to find. It can NOT be the right angle!!!
2. Identify the sides according to the angle you are focused on.
3. Identify if you should use SOH, CAH, or TOA.
4. Substitute the values.
5. Use the inverse buttons on your calculator to solve.

Find the missing angles in the diagram below.