

## 1. Combining Trig Functions and Inverse Trig Functions Part II

2. You should be familiar with the six trig functions and their inverses, as well as the angle sum formulas

In this lesson, we will find values combining these three ideas

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  - (a) Here is a typical problem. Find the sine of the inverse tangent of three-fourths plus the inverse cosine of two-thirds. In order to do this problem, we first need to understand what the various parts represent. The blue object is the angle whose tangent is three-fourths. I'll repeat, the blue object is an angle. The red object is the angle whose cosine is two-thirds, again, the red object is an angle. So we are asked to find the sin of angle plus angle.
  - (b) We will use the sin of angle plus angle formula later. For the time being, I will call the blue angle A and the red angle B. What do we know about the blue angle?
  - (c) We know the tangent value is three-fourths. From this information, we can label a right triangle, find the missing side by the Pythagorean Theorem, and read off the values for sine and cosine. Similarly, knowing the cosine of the red angle, we can label a right triangle, find the missing side, and read off values for sine and tangent.  
You may wish to pause the recording at this point to find the missing values.
  - (d) Here are the values for the sine and cosine of the blue angle A and the sin and tangent of the red angle B. We are now ready for the sin of angle plus angle formula.
  - (e) We need to look up 4 values to insert into the formula. These values are found on the middle two lines.
  - (f) After plugging in the correct values, we simplify to get the final answer.
4. Here is a second example. In this problem, we are asked to find the cosine of angle plus angle, which requires us to know the sine and cosine of each angle. We are given one of the reciprocal functions, the secant of the blue angle A. The first step is to find the cosine of the blue angle. You can then proceed as in the first example by labeling right triangles. You may wish to pause the recording at this point to work out this problem. The answer to this example will appear at the end of this video.
5. Here is a third example. In this problem, we are asked to find the cosecant of angle plus angle. We don't have a cosecant formula. But we do know the cosecant is the reciprocal of the sine, so we first find the sine value, which was the first example, and then take the reciprocal to get the final answer. In the final step, we rationalized the denominator, a calculation you may wish to do by hand.
6. To recap: Inverse trig functions give information about the value of a trig function, which allows us to label two sides of a triangle. The third side can be found by the Pythagorean Theorem. Values of expression can then be found by plugging in values read from the triangles into the appropriate formula. This technique will work for angle sum problems as well as double and half angle problems.

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