# Using the Sum and Difference Formulas for Cosine and Sine

Finding the exact value of the sine, cosine, or tangent of an angle is often easier if we rewrite the given angle in terms of two angles that have known trigonometric values. Given an angle, we can break it up into the sum or difference of two of the special angles.

**Sum and Difference Formulas for Cosine**

**Sum and Difference Formulas for Sine**

Given two angles, find the sine or cosine of the sum or difference between angles by

1) Choosing the correct formula.

2) Substituting the values of the given angles into the formula.

3) Simplifying.

Examples: Using the formulas for sine/cosine, find the exact values of each of the following.

For each of the following, rewrite in terms of and .

# Using the Sum and Difference Formulas for Tangent

Finding the sum or difference formulas for tangent involves taking the quotient of the sum or difference formulas for sine and cosine and simplifying.

**Sum and Difference Formulas for Tangent**

Given two angles, we can find the tangent of the sum/difference between angles by

1) Choosing the correct formula.

2) Substituting the values of the given angles into the formula.

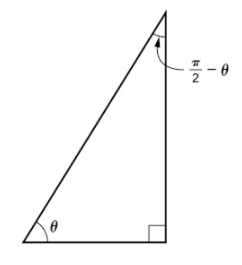
3) Simplifying.

Examples: Using the formulas for sine/cosine, find the exact values of each of the following.

1. Given , , , , find

# Using Sum and Difference Formulas for Cofunctions

Recall that if the sum of two acute angles in a right triangle is , they are called complements. So, if one of the acute angles is labeled as , then the other acute angle must be labeled , as shown below.



Notice that . Thus, when two angles are complementary, we can say that the sine of equals the cofunction of the complement of . These relationships form the cofunction identities.

**Cofunction Identities**

Examples

1. Write in terms of its cofunction.
2. Write in terms of its cofunction.
3. Find the exact value of the expression