A complex number has two parts:

1. A real part
2. An imaginary part

It is often expressed in the form $a+bi$, where:

a is the real part
b is the coefficient of the imaginary part
i is $\sqrt{-1}$

Solving complex equations is a matter of manipulating i. Treat i the same as you do π, it is simply a letter representing a numeric value. In both cases, you carry that letter around like a variable, whether you are factoring or combining like terms.

Converting to i

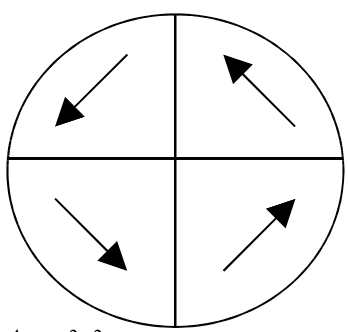
The i appears when you want to take an even root of a negative number:

1.	$\sqrt[4]{-16}$	Term to simplify
2.	$\sqrt[4]{(-1)(16)}$	Factor out the -1
3.	$i\sqrt[4]{16}$	The -1 comes out as i
4.	$2i$	The 4th root of 16 is 2

The Circle of i

$i^2 = (\sqrt{-1})^2 = -1$

$i^3 = i^2 i = (-1)i = -i$



$i = \sqrt{-1}$
$i^5 = i^4 i = 1i = i$

$i^4 = i^2 i^2 = (-1)(-1) = 1$

Powers of i

The Circle of i above shows how to reduce powers of i up to the 5th power. If you have a power of i that is higher than 5, you can reduce it quickly by taking the remainder of the exponent after dividing by 4.

1.	i^{35}	Original problem
2.	$35 \div 4 = 8R3$	Calculate the remainder of the exponent after dividing by 4
3.	i^3	Replace the original exponent with the remainder
4.	$-i$	Use Circle of i to reduce further

Complex Conjugate

A complex conjugate is a binomial that is the mate of the original binomial. All you do is change the sign in the middle. The two binomials together are the factored form of the difference of two squares.

With radicals, multiplying by the conjugate got rid of the radical:

$$(3+\sqrt{5})(3-\sqrt{5}) = 9 - 3\sqrt{5} + 3\sqrt{5} - 5 = 9 - 5 = 4$$

With complex numbers, a similar thing happens, you get rid of the i:

$$(3+5i)(3-5i) = 9 - 3i + 3i - 25i^2 = 9 - 25i^2 = 9 - 25(-1) = 9 + 25 = 34$$

You could actually eliminate some work by using the fact that it is the factored form of the difference of two squares:

$$(3+5i)(3-5i) = 9 - 25i^2 = 9 - 25(-1) = 9 + 25 = 34$$

The middle term always drops out.