A College Algebra Student’s Guide to Factoring Polynomials

Always factor out the Greatest Common Factor first.

How many terms are there?

2

Look for a difference of 2 squares first.
\[ a^2 - b^2 = (a-b)(a+b) \]
Do not try to factor \( a^2 + b^2 \).

Sum/Difference of 2 cubes
\[ a^3 - b^3 = (a-b)(a^2 + ab + b^2) \]
\[ a^3 + b^3 = (a+b)(a^2 - ab + b^2) \]

3

Look for a perfect square trinomial first.
\[ a^2 + 2ab + b^2 = (a+b)^2 \]
\[ a^2 - 2ab + b^2 = (a-b)^2 \]

For \( x^2 + bx + c \),
find 2 numbers whose product is \( c \) and whose sum is \( b \), then
\[ x^2 + bx + c = (x+\_)(x+\_) \]

For \( ax^2 + bx + c \), if \( a \) is prime,
\[ ax^2 + bx + c = (ax+\_)(x+\_) \]

For \( ax^2 + bx + c \), if \( c \) is prime,
\[ ax^2 + bx + c = (\_ x[?] c)(\_ x[?] 1) \]

4

Factor by grouping.

Otherwise, find 2 numbers whose product is \( a^*c \) and whose sum is \( b \).
Then, fill in the blanks.
\[ ax^2 + bx + c = ax^2 + \_ x + \_ x + c \]
Now, factor by grouping.

Once you have factored a polynomial, check each factor to make sure it is completely factored.
Then, use the distributive property to multiply all of the factors and check your answer.