

## Factoring Techniques

Polynomial with 2 terms	Polynomial with 3 terms	Polynomial with 4 terms
<b>1. GCF (Greatest Common Factor)</b> $ab + ac = a(b + c)$	<b>1. GCF (Greatest Common Factor)</b> This is the same technique as for polynomials for 2 terms.	<b>1. Grouping</b>
Check for something common to both terms (a number or a variable). This is called the GCF (Greatest Common Factor). Factor out (or divide) by this common factor. Remember to list your common factor first in your answer.	<b>2. Trinomials</b> Factor according to the following steps	Group your terms in to pairs according to something they have in common. Factor out the GCF for each pair and then group your final answer
Example: $2x + 6$ Divide each term by the GCF $2(x+3)$ Write the GCF first then the rest inside the parenthesis	<b>Example:</b> $x^2 + 6x + 8$	<b>Example:</b> $x^2 + 3x + 2x + 6$  The first two terms have "x" in common. The last two terms have "2" in common.
<b>2. Difference of 2 Squares</b> $a^2 - b^2 = (a + b)(a - b)$	<b>Step 1</b> Multiply the first and last terms. $1 \times 8 = 8$	$x(x + 3) + 2(x + 3)$
Check if oth of your terms are perfect squares and that they are being subtracted.	<b>Step 2</b> Find all of the factors of 8 $1 \times 8$ $2 \times 4$ Now you need to find two numbers that multiply to give you 8 and either add or subtract to five you 6. We choose $2 \times 4$ to get the second number 6.	Since $(x + 3)$ appears in both terms, you can factor out the $(x + 3)$  $(x + 3)(x + 2)$
Example: $x^2 - 9$ Both $x^2$ and 9 are perfect squares and they are being subtracted.  $(x+3)(x-3)$ Remember you will have + and - in your final answer.	<b>Step 3</b> Open your parenthesis and write down the variables $(x \quad)(x \quad)$ Fill in the +2 and the +4 $(x + 2)(x + 4)$	
<b>3. Sum/Difference of 2 Cubes</b> $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ and $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$	<b>Step 4</b> Simplify if necessary	
Check if both of your terms are perfect cubes. Example: $x^3 - 27 = (x - 3)(x^2 + 3x + 9)$ Example: $x^3 + 8 = (x + 2)(x^2 - 2x + 4)$	<b>Example:</b> $5x^2 + 22x + 8$	
	<b>Step 1</b> Multiply the first and last terms. $5 \times 8 = 40$	
	<b>Step 2</b> Find all of the factors of 40 $1 \times 40$ $2 \times 20$ $4 \times 10$ $5 \times 8$ Now you need to find two numbers that multiply to give you 40 and either add or subtract to five you 22. We choose $2 \times 20$ to get the second number 22.	
	<b>Step 3</b> Open your parenthesis and write down the variables $(5x \quad)(5x \quad)$ Fill in the +2 and the +4 $(5x + 20)(5x + 2)$	
	<b>Step 4</b> Simplify if necessary $5(x + 4)(5x + 2)$ Cancel out the 5 $(x + 4)(5x + 2)$	