

Factoring Reference Sheet

GCF

1. Look for the largest common number to divide out. Ex. $24x^3y^2 + 18xy^5 - 6xy^2$
2. Look for a common letter. Divide out the lowest exponent. $\div 6xy^2$
3. Write GCF in front of brackets.
4. Fill in brackets with what is left. $6xy^2(4x^2 + 3y^3 - 1)$

Difference of Squares

1. Must have two terms and a **minus** sign between terms. Ex. $25x^2 - 49$
2. Write the square roots on the ends. $(5x)^2 - (7)^2$
3. Write out two brackets, one with a plus and one a minus.
4. Fill in the brackets with the square roots. $(5x + 7)(5x - 7)$

Perfect Trinomial Squares

1. Must have 3 terms. Ex. $36x^2 - 84x + 49$
2. First and last terms must have a plus sign and be perfect squares. $(6x)^2 - (7)^2$
3. Must have double in the middle. $(6 * 7 = 42)(42 * 2 = 84)$
4. Write single bracket squared.
5. We only use the sign from the middle term. $(6x - 7)^2$

Sum and Product

1. Sum is the middle term number. Ex. $x^2 - 6x + 8$
2. Product is the outside two term numbers. $(x - 4)(x - 2)$ product $-4 * -2 = +8$
sum $-4 + -2 = -6$
3. Find the two numbers that make the product and sum work.
4. Do double brackets. Fill in front and back.
5. Get sign based on middle sign. Ex. $x^2 - x - 12$
- a) + on end term means both signs the same. $(x - 4)(x + 3)$ product $-4 * +3 = -12$
sum $-4 + +3 = -1$
- b) - on end term means biggest # gets sign of middle term.

Decomposition

1. Product is the outside two term numbers. Ex. $3x^2 - 10x - 8$ product $-12 * +2 = -24$
 2. Sum is the middle number. sum $-12 + +2 = -10$
 3. Make 4 terms by breaking up the middle term.
 4. Factor by grouping 2 sets of 2 terms and use GCF.
 5. Only write the duplication once.
- $$\begin{array}{l}
 3x^2 - 12x + 2x - 8 \\
 3x(x - 4) + 2(x - 4) \\
 (3x + 2)(x - 4)
 \end{array}$$

For any real numbers a and b ,

$(a + b)^2 = a^2 + 2ab + b^2$	Square of a Sum
$(a - b)^2 = a^2 - 2ab + b^2$	Square of a Difference
$a^2 - b^2 = (a - b)(a + b)$	Difference of Squares
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$	Difference of Cubes
$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$	Sum of Cubes