Strategies for Factoring Special Polynomials:

UVU Math Lab

1. Always check 1st whether a GCF (Greatest Common Factor) can be factored out.
2. What is the form of the polynomial after checking for a GCF?

Name:	Form:	Approach:
Difference of Squares	$a^2 - b^2$	$= (a+b)(a-b)$
Sum of Cubes	$a^3 + b^3$	$= (a+b)(a^2 - ab + b^2)$
Difference of Cubes	$a^3 - b^3$	$= (a-b)(a^2 + ab + b^2)$
Quadratic Trinomial $a = 1$	$x^2 + bx + c$	i. Find two integers*, m & p, whose product is c ($mp = c$), and whose sum is b ($m + p = b$). ii. Factor as $=(x + m)(x + p)$.
Quadratic Trinomial $a \neq 1,0$	$ax^2 + bx + c$	i. Find two integers, m & p, whose product is ac ($mp = ac$), and whose sum is b ($m + p = b$). ii. Rewrite the expression as $ax^2 + mx + px + c$ & see below for 4-term polynomials.
Perfect Square Trinomial	$(a)^2 + 2ab + (b)^2$	$= (a+b)(a+b) = (a+b)^2$
Perfect Square Trinomial	$(a)^2 - 2ab + (b)^2$	$= (a-b)(a-b) = (a-b)^2$
Four Term Polynomial	4-terms or more	Use grouping* to factor and rewrite the expressions as the product of two binomials.

3. Has the factoring produced another polynomial which can be further factored, such as $a^2 - b^2 = (a+b)(a-b)$?
4. Polynomials that cannot be factored are called **prime**.

*See back for examples.

Finding Pairs of Factors:

Given $ax^2 + bx + c$, find m and n so that $mn = ac$ and $m + n = b$.

For example, given $12x^2 - x - 6$, find m and n so that $mn = 12 \cdot -6 = -72$ and $m + n = -1$

Make a t-table and list all possible pairs of factors of ac on one side and check if their sum is b on the other side:

Product: $ac = -72 = mn$	Sum: $b = -1 = m + n$
$1 \cdot -72$	$1 + (-72) = -71$
$2 \cdot -36$	$2 + (-36) = -34$
$3 \cdot -24$	$3 + (-24) = -21$
$4 \cdot -18$	$4 + (-18) = -14$
(5 is not a factor of -72)	
$6 \cdot -12$	$6 + (-12) = -6$
(7 is not a factor of -72)	
$8 \cdot -9$	$8 + (-9) = -1$

Factoring Four Term Polynomials Using Grouping:

$$3x^2 - 5x - 6x + 10$$

1. Group pairs of terms with common factors. $= (3x^2 - 5x) + (-6x + 10)$
2. Factor out the GCF from each grouping. $= x(3x - 5) - 2(3x - 5)$
3. Factor out the new GCF which will be the binomial in parentheses & rewrite as the product of two binomials. $= (3x - 5)(x - 2)$