Factoring Flow Chart

Start Here!

How many terms are in your polynomial?

2

Factor out the Greatest Common Factor (GCF):
Ex: $2x^2 + 6x$ → GCF = $2x$
Once we factor out the GCF = $2x$, we're left with $(x + 3)$.
$2x^2 + 6x = 2x(x + 3)$

4

Factor by Grouping: Group in groups of two terms → factor GCF
Ex: $t^3 + 5t^2 - 2t - 10$ → (group) → $(t^3 + 5t^2) + (-2t - 10)$
Factor GCF from each group → $t^2(\boldsymbol{t} + \mathbf{5}) - 2(\boldsymbol{t} + \mathbf{5})$
Factor common *binomial* → $(\boldsymbol{t} + \mathbf{5})(t^2 - 2)$
$t^3 + 5t^2 - 2t - 10 = (t + 5)(t^2 - 2)$

2 (Special Case)

Difference of Two Squares:
$A^2 - B^2 = (A - B)(A + B)$
Ex: $x^2 - 49 = (x - 7)(x + 7)$

3

Is the leading coefficient $a = 1$?

Yes

$ax^2 + bx + c = 0$ where $a = 1$
Binomial will be in the form: $(x \quad)(x \quad)$,
consider $(\mathrm{x} + \mathrm{d})(x + \mathrm{f})$
$= x^2 + dx + fx + df$ F-O-I-L
$= x^2 + (d + f)x + df$ distributive property
So the d and f terms must be: $(d + f) = b$ and $d * f = c$
Ex: $x^2 - 11x + 24 = 0$
Factors of 24: $1 * 24, 2 * 12, 3 * 8, 4 * 6, -1 * -24, -2 * -12, -3 * -8, -4 * -6$
Factors of 24 that add to -11 are -3 and -8
$x^2 - 11x + 24 = (x - 3)(x - 8)$

No

Is the leading Coefficient a GCF?

Yes

Factor out the GCF

No

The AC method: $ax^2 + bx + c = 0$ where $a \neq 1$
Expand bx term in the form of :
$ax^2 + dx + fx + c = 0$ where $d + f = b$ and $d * f = a * c$.
Ex: $2x^2 - 13x + 15 = 0$
Factors of $a * c = 30$: $1 * 30, 2 * 15, 3 * 10, 5 * 6, -1 * -30, -2 * -15, -3 * -10 \ -5 * -6$
Factors of 30 that add to $b = -13$ are -3 and -10.
$2x^2 - 13x + 15 = 2x^2 - 3x - 10x + 15$.
Proceed to Factor by Grouping! →
$2x^2 - 13x + 15 = (2x - 3)(x - 5)$.