

Factoring Flow Chart

1. Put in standard form.
2. Any fractions in poly? Multiply both sides by least common denominator.
3. Take out GCF and -1 (if first term is negative)
Ask "Do I have 4 terms?"

Factor by grouping
(Use a box)

yes

Ask "Do I see any Special patterns?"
Look for perfect squares or cubes in the first and last terms of the polynomial.

yes

Factor using special patterns.

no

Degree 2?

Factor using the a·c and/or box method.
Find two numbers that multiply to a·c and add to b (see start of box below)

Are all the factors prime polynomials? If any of the polynomials can be factored more begin at the top of chart again. Keep going until all of the polynomial factors are completely factored.

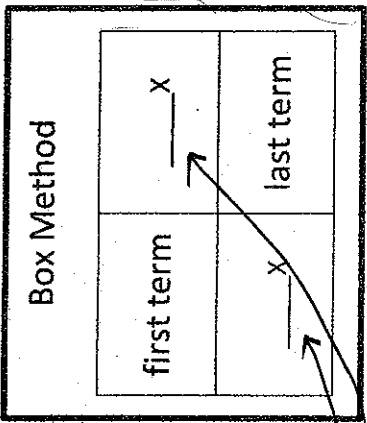
$$\begin{matrix} \cdot & = & a \cdot c \\ + & = & b \end{matrix}$$

To Solve a Polynomial Equations:

1. Set equation = 0
2. Factor polynomial using steps on chart.
3. Set factors = 0 and solve.
4. Check solutions if time.

① Difference of 2 squares
 $(a+b)(a-b) = a^2 - b^2$

② Perfect square trinomial
(Square/Double/Square)
 $(a \pm b)^2 = a^2 \pm 2ab + b^2$



To go from standard to intercept? Factor

To go from standard to vertex? Complete the square

To go from vertex or intercept to standard? FOIL and simplify

Graphing: (if $a > 0$, parabola opens \uparrow , if $a < 0$, parabola opens \downarrow)

Standard: $y = ax^2 + bx + c$

ID: a, b, c

AoS: $X = \frac{-b}{2a}$

"Freebie" y-intercept $(0, c)$

Intercept: $y = a(x-p)(x-q)$

ID: a, p, q

AoS: $X = \frac{p+q}{2}$

(also called factored form)

"Freebie" x-intercept(s) $(p, 0)$ $(q, 0)$

Vertex: $y = a(x-h)^2 + k$

ID: a, h, k

AoS: $X = h$

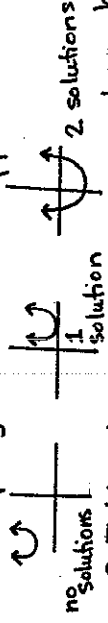
"Freebie" vertex (h, k)

Transformations: Parent $f(x) = x^2$ Transformed: $f(x) = a(x-h)^2 + k$

- if a is negative \Rightarrow REFLECTION over the x-axis
- if $|a| > 1 \Rightarrow$ VERTICAL STRETCH
- if $0 < |a| < 1 \Rightarrow$ VERTICAL COMPRESSION
- if $h < 0$ (see plus) \Rightarrow SHIFT LEFT
- if $h > 0$ (see minus) \Rightarrow SHIFT RIGHT
- if $k > 0$ (see plus) \Rightarrow SHIFT UP
- if $k < 0$ (see minus) \Rightarrow SHIFT DOWN

opens \uparrow \rightarrow Minimum $>$ y coordinate
opens \downarrow \rightarrow Maximum $<$ y coordinate
Vertex

1. Factoring - Use when factoring is easy.
 - Check using a.c method
 - Steps on opposite side of foldable
2. Graphing - Use when approximate solutions ok.



3. Taking the square root - use when $b = 0$ and $x^2 = \#$

OR $(x + \#)^2 = \#$ $X = \pm \sqrt{\#}$

4. Completing the square - use when b is even and $a = 1$

① Id "b"

② $\frac{b}{2}$ (save for later in binomial²)

③ $(\frac{b}{2})^2 = \text{new } c$ (add to both sides of equation)

④ Rewrite trinomial as binomial squared.

⑤ Solve by taking the square root.

5. Quadratic formula

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
 when $ax^2 + bx + c = 0$

Discriminant: $b^2 - 4ac$

- when...
- $b^2 - 4ac > 0$ (+) 2 real distinct solutions
 - $b^2 - 4ac = 0$ 1 real distinct solution
 - $b^2 - 4ac < 0$ (-) No real solutions