Standard Form

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

What info is found in the standard form?

1. $y=c$ is the y-intercept. For any equation (linear, quadratic, or other), find the y-intercept by setting $x=0$.

2. Use the coefficients a, b and c in the quadratic formula.

Expand (FOIL) and simplify

Complete the square.

Factor directly.
OR: find x-intercepts with quadratic formula, then sub into factored form.

1. The x value of the vertex (AKA h) is the midpoint of the x-intercepts (symmetry).
2. Find the y value of the vertex (AKA k) by subbing $x=h$ into factored form.

Vertex Form

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

Factored Form

$$y = a(x - r)(x - s)$$

What info is found in the vertex form?

1. The coordinates of the vertex are $(x,y) = (h,k)$. h has the opposite sign from the equation, k has the same sign.

2. For max/min problems the maximum or minimum value is k; the value of x where the maximum or minimum occurs is h.

3. Details about transformations from the base function $y = x^2$.

1. Set y=0.
2. Find x-intercepts by solving algebraically, then sub into factored form.
OR: difference of squares.

What info is found in the factored form?

1. The x-intercepts are $x=r$ and $x=s$ (opposite signs from the equation).

Extended method: Find x-intercepts by solving each binomial factor. For any equation, find the x-intercept(s) by setting $y=0$.

Example: $0 = -3(x - 2)(x + 7)$

$x - 2 = 0$ $\quad$ $x + 7 = 0$

$x = 2$ $\quad$ $x = -7$

The leading coefficient a is the same in all three forms of the quadratic equation.

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