Quadratic Transformations

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

$+h$ left $+k$ up
$-h$ right $-k$ down

$|a| > 1$ vertical stretch (narrower)

$0 < |a| < 1$ vertical shrink / compression (wider)

$a < 0$ (in other words, if there's a negative in front)
↳ then reflection over x-axis

List the transformations from $y = x^2$

① $y = 4(x+2)^2$

- Vertical stretch by 4
- Left 2 units (shift)

② $y = -8(x-5)^2 + 4$

- shift right 5 units
- shift up 4 units
- Reflection over x axis
- vertical stretch by 8

③ $y = -\frac{1}{2}x^2 + 2$

- Vertical shrink by $\frac{1}{2}$
- shift up 2 units
- Reflection over x axis

④ $y = \frac{4}{3}(x+4)^2 - 11$

- shift down 11 units
- shift left 4 units
- vertical stretch by $\frac{4}{3}$

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Write an equation w/ the following transformations: from $y = x^2$

① • shift left 4
• vertical shrink by ½
• reflect over x axis

$y = -\frac{1}{2}(x+4)^2$

② • shift up 10
• shift right 8
• vertical stretch by 9

$y = 9(x-8)^2 + 10$

Write an equation given the vertex:

① $(-4, 2) \rightarrow y = (x+4)^2 + 2$

② $(\overset{h}{\frac{1}{2}}, \overset{k}{-4}) \rightarrow y = (x - \frac{1}{2})^2 - 4$

* inside, opp
outside, same

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Graphs of Quadratic Functions

Forms:

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

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

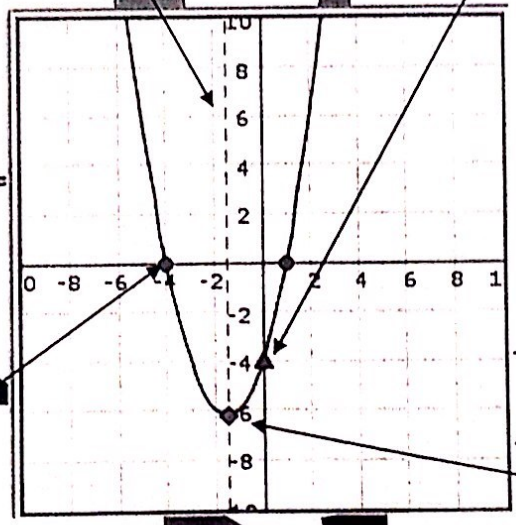
Axis of Symmetry

Vertex Form

$x = h$

Standard Form

$x = \frac{-b}{2a}$



y-intercept

Vertex Form:

Plug in zero for x

Standard Form:

(0, c)

x-intercept

- factoring
- "zero" in calc.
- look @ table in calc. where y=0

Vertex

Vertex Form:

(h, k)

Standard Form:

$\left(\frac{-b}{2a}\right.$, Plug in $-b/2a$ to the eqn.$)$

Write how you will find each of the characteristics of a quadratic function in each form.

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