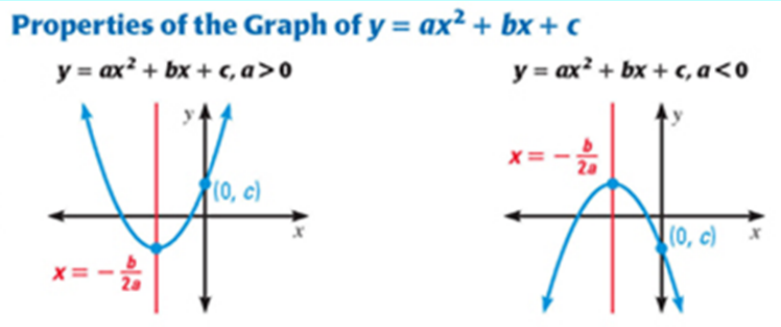
5.1 Part 1 Graphing Quadratic Functions in Standard Form

Standard (Quadratic) Form: $y = ax^2 + bx + c$

A. Identify characteristics



- The graph opens up if $a > 0$ and down if $a < 0$.
- The graph is narrower than the graph of $y = x^2$ if $|a| > 1$ and wider if $|a| < 1$.
- The axis of symmetry is $x = -\frac{b}{2a}$ and the vertex has x-coordinate $-\frac{b}{2a}$.

Determine: a) whether the graph opens up or down
b) the axis of symmetry
c) the vertex

$y = ax^2 + bx + c$

Example: $f(x) = -x^2 - 2x + 1$

(a) $a = -1$ open down

(b) $x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$

$x = -1$

(c) $y = -x^2 - 2x + 1$

$= -(-1)^2 - 2(-1) + 1$

$= -1 + 2 + 1$

$y = 2$

Vertex: $(-1, 2)$

Determine: a) whether the graph opens up or down
b) the axis of symmetry
c) the vertex

$y = ax^2 + bx + c$

Example: $f(x) = \frac{2}{3}x^2 - 3x + 6$

(a) $a = \frac{2}{3}$ open up

(b) $x = \frac{-b}{2a} = \frac{-(-3)}{2(\frac{2}{3})} = \frac{3}{4/3} = \frac{3}{1} \div \frac{4}{3}$

$= \frac{3}{1} \cdot \frac{3}{4}$

$x = 9/4$

(c) $y = \frac{2}{3}x^2 - 3x + 6$

$= \frac{2}{3}\left(\frac{9}{4}\right)^2 - \frac{3}{1}\left(\frac{9}{4}\right) + 6$

$= \frac{\cancel{2}^{1}}{\cancel{3}_{1}}\left(\frac{\cancel{81}^{27}}{\cancel{16}_{8}}\right) - \frac{27}{4} + 6$

$= \frac{27}{8} - \frac{27 \cdot 2}{4 \cdot 2} + \frac{6 \cdot 8}{1 \cdot 8} = \frac{27}{8} - \frac{54}{8} + \frac{48}{8}$

$y = \frac{21}{8}$

Vertex: $\left(\frac{9}{4}, \frac{21}{8}\right)$

Attachments

1-1 Standard Form of Quadratic Functions.doc