Jan. 25, 2017

Sect. 3-2

Quadratic Functions and Graphs

Eqn. Forms

Find Vertex

Graph

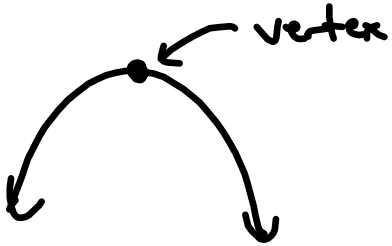
Find Eqn.

Quad. Fnct. Eqns.

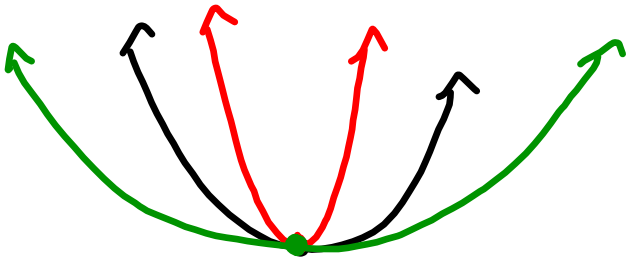
$y = ax^2 + bx + c, a \neq 0$ General Form

Graph: Parabola

a is pos.



a is neg.



"normal" $\Rightarrow a = 1$

"skinny" $\Rightarrow a > 1$

"fat" $\Rightarrow 0 < a < 1$

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

Standard Form

The vertex is at (h,k)

notice the neg. sign

$y = (x-2)^2 + 3 \Rightarrow V: (2,3)$

$y = (x+1)^2 - 3 \Rightarrow V: (-1,-3)$

$y = -2(x+5)^2 + 1 \Rightarrow V: (-5,1)$

Converting to Vertex Form

Given $y = x^2 + 6x - 3$, find the vertex

Convert to vertex form using

1. Completing the Square

or

2. Formula

Comp. the Sq.

$y = x^2 + 6x - 3$

$y = x^2 + 6x + \underline{\left(\frac{6}{2}\right)^2} - 3 - \underline{9}$

$y = (x+3)^2 - 12$

So $V: (-3, -12)$

Vertex Formula

$y = \frac{1}{3}x^2 - x + 2$

$V_x = h = \frac{-b}{2a}$

$h = \frac{-(-1)}{2\left(\frac{1}{3}\right)} = \frac{1}{\frac{2}{3}} = \frac{3}{2}$

$V_y = k \Rightarrow$ plug h back into the fnct.

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

$= \frac{1}{3}\left(\frac{9}{4}\right) - \frac{3}{2} + \frac{2}{1} = \frac{9}{12} - \frac{3}{2} + \frac{2}{1}$

$= \frac{9}{12} - \frac{18}{12} + \frac{24}{12} = \frac{15}{12} = \frac{5}{4}$ So $V = \left(\frac{3}{2}, \frac{5}{4}\right)$

So if we wanted to write the eqn. in st. form

$y = \frac{1}{3}x^2 - x + 2$ $\quad V: \left(\frac{3}{2}, \frac{5}{4}\right)$

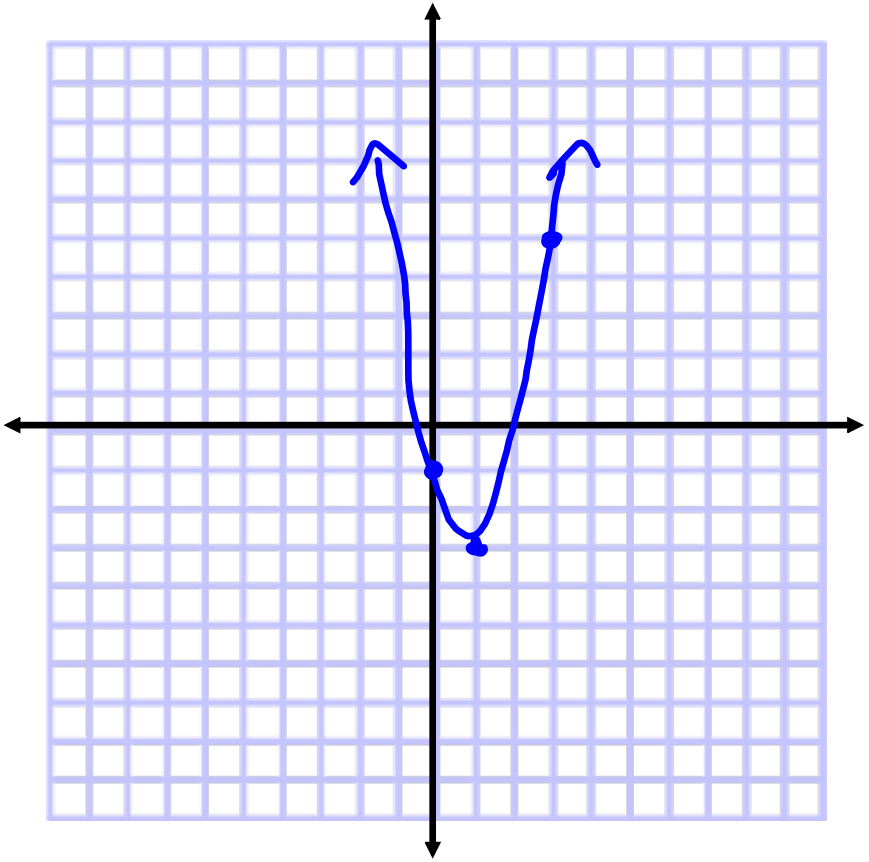
$y = \frac{1}{3}\left(x - \frac{3}{2}\right)^2 + \frac{5}{4}$

Graphing by hand

$y = 2(x-1)^2 - 3$

V: (1, -3) opens up (a > 0)

x	y
0	-1
1	-3
3	5



Finding the eqn. with vertex and another point

V: $(\overset{h}{2}, \overset{k}{3})$ Pt $(\overset{x}{0}, \overset{y}{1})$ * required

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

$1 = a(0-2)^2 + 3$

$-2 = 4a$

$a = -\frac{1}{2}$

So $y = -\frac{1}{2}(x-2)^2 + 3$