Writing Quadratics Given a Graph with a Vertex

Writing Quadratic Equations from a Graph

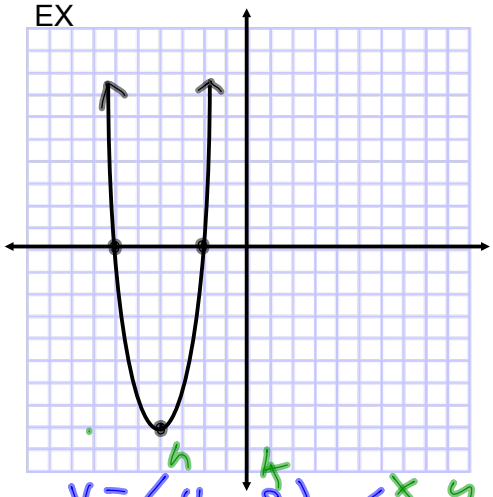
To write the equations of a quadratic function when given the graph:

1) Find the vertex (h,k) and one point (x,y)
2) Plug into Vertex Form $y = a(x - h)^2 + k$

3) Solve for a

4) Plug a and (h,k) back into vertex form

EX



$V=(-4,-8)$ $(-2,0)$

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

$0=a(-2+4)^2-8$

$0=a(2)^2-8$

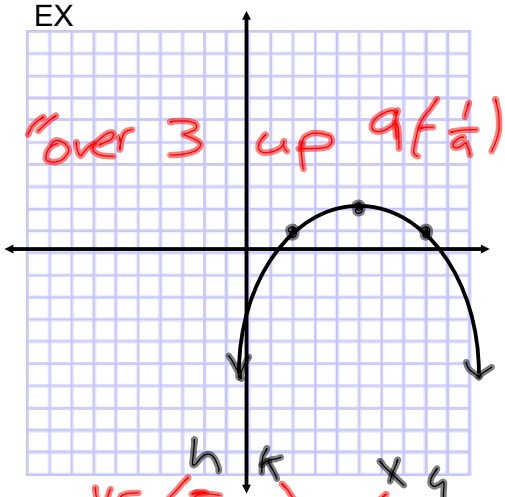
$+8 \quad +8$

$\frac{8=4a}{4}$

$a=2$

$y=2(x+4)^2-8$

EX



over 3 up 9 $(\frac{1}{a})$

$V=(5,2)$ $(2,1)$

$y=a(x-4)^2+k$

$1=a(2-5)^2+2$

$1=a(9)+2$

$-2 \quad -2$

$\frac{-1=9a}{9}$

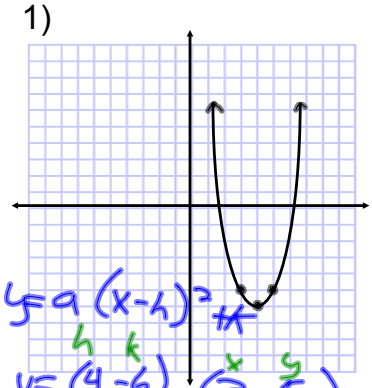
$a=-\frac{1}{9}$

$y=-\frac{1}{9}(x-5)^2+2$

Writing Quadratics Given a Graph with a Vertex

Write the equations for the following graphs in Vertex Form.

1)



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

$V=(4,-6)\quad (3,-5)$

$-5=a(3-4)^2-6$

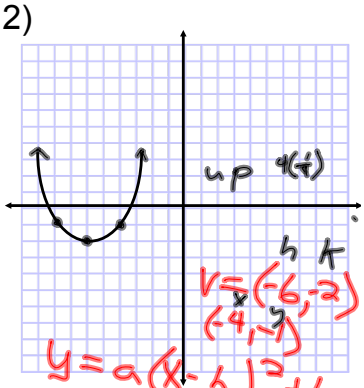
$-5=a(1)-6$

$+6\quad +6$

$1=1a\quad a=1$

$y=(x-4)^2-6$

2)



$V=(-6,-2)$

$(-4,-1)$

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

$-1=a(-4+6)^2-2$

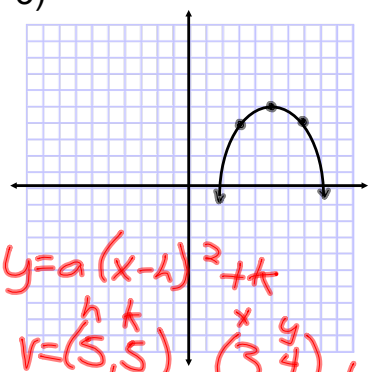
$+2\quad +2$

$1=4a\quad a=\frac{1}{4}$

$y=\frac{1}{4}(x+6)^2-2$

Write the equations for the following graphs in Standard Form.

3)



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

$V=(5,5)\quad (3,4)$

$4=a(3-5)^2+5$

$4=a(4)+5$

$-5\quad -5$

$\frac{-1}{4}=\frac{4a}{4}$

$a=-\frac{1}{4}$

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

$(x-5)(x-5)$

$x^2-5x-5x+25$

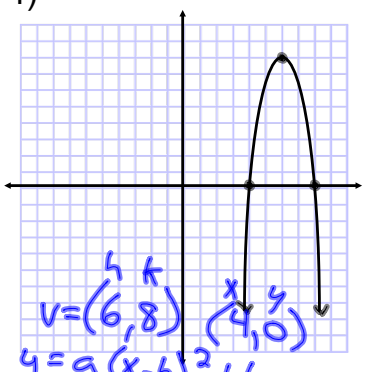
$y=-\frac{1}{4}(x^2-10x+25)+5$

$y=-\frac{1}{4}x^2+\frac{10}{4}x-\frac{25}{4}+\frac{5}{1}\cdot\frac{4}{4}$

$y=-\frac{1}{4}x^2+\frac{10}{4}x-\frac{5}{4}$

$-\frac{25}{4}+\frac{20}{4}=-\frac{5}{4}$

4)



$V=(6,8)\quad (4,0)$

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

$0=a(4-6)^2+8$

$0=a(4)+8$

$-8\quad -8$

$\frac{-8}{4}=\frac{4a}{4}$

$a=-2$

$y=-2(x-6)^2+8$

$y=-2(x^2-12x+36)+8$

$y=-2x^2+24x-72+8$

$y=-2x^2+24x-64$

Writing Quadratics Given a Graph with a Vertex

Writing Equations In Vertex Form Given the Vertex and a Point

When given a point and the vertex of a quadratic function, write an equation in Vertex Form.

1) vertex: (1, 4) point: (-1, 3)

h k x y

$y = a(x-4)^2+k$

$3 = a(-1-1)^2+4$

$3 = a(-2)^2+4$

$-4 \quad -4$

$\frac{-1}{4} = \frac{4a}{4} \quad a = -\frac{1}{4}$

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

2) vertex: (-5, -3) point: (-4, -5)

3) vertex: (-2, -1) point: (1, 8)

4) vertex: (4, -1) point: (3, 3)

Standard Form:

5) vertex: (3, -2) point: (5, 2)

h k x y

$y = a(x-3)^2+k$

$2 = a(5-3)^2-2$

$2 = a(4)-2$

$+2 \quad +2$

$\frac{4}{4} = \frac{4a}{4} \quad a = 1$

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

$y = x^2-6x+9-2$

$y = x^2-6x+7$

6) vertex: (-5, 2) point: (-3, 3)

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