Writing Equation of Quadratics

- Vertex Form (VF): * vertex : (h, k)

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

FOIL

- Standard Form (SF): * c → y-intercept

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

pre-example

$y = 2(x-1)^2 + 9$ VF

$y = 2(x-1)(x-1) + 9$

$y = 2(x^2 - 2x + 1) + 9$

$y = 2x^2 - 4x + 2 + 9$

$y = 2x^2 - 4x + 11$ SF

Given the following information find the equation in the correct form:

1. Vertex at (3,-2) & point on the graph at (2,3) ***VF***

x y

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

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

$5 = 1a$

$5 = a$

$\boxed{y = 5(x-3)^2 - 2}$

STEPS:

#1: plug in vertex

#2: plug in other pt.

#3: solve for a

opt #4: FOIL to SF

2. Vertex at (-4,-24) & a point at (-5,-25) ***SF***

$y = a(x+4)^2 - 24$

$-25 = a(-5+4)^2 - 24$

$-1 = 1a \rightarrow a = -1$

$y = -(x+4)^2 - 24$ VF

SF
$y = -(x+4)(x+4) - 24$

$y = -(x^2 + 4x + 4x + 16) - 24$

$y = -(x^2 + 8x + 16) - 24$

$y = -x^2 - 8x - 16 - 24 \rightarrow \boxed{y = -x^2 - 8x - 40}$

3. Vertex at (-2,3) & y-intercept of -1 ***SF*** → (0, -1)

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

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

$-4 = 4a$

$-1 = a$

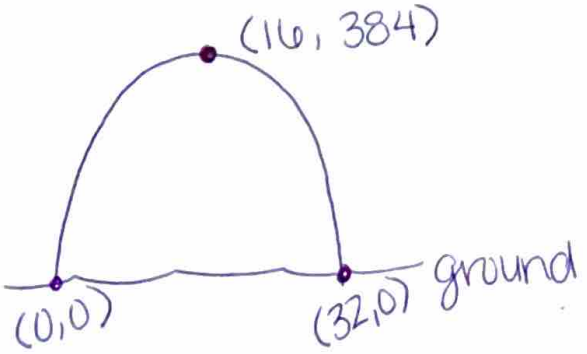
$y = -(x+2)^2 + 3$ VF

$y = -(x^2 + 4x + 4) + 3$

$y = -x^2 - 4x - 4 + 3$

$\boxed{y = -x^2 - 4x - 1}$

4. The diagram shows the path of a model rocket launched from the ground. It reaches a maximum altitude of 384 ft, 16 seconds after launching and hits the ground after 32 seconds. What quadratic function models the height of the rocket? *Hint: draw a picture*



x^2

$y = a(x-16)^2 + 384$

$0 = a(0-16)^2 + 384$

$-384 = 256a$

$-3/2 = a$

$\boxed{y = -3/2(x-16)^2 + 384}$