Concept

Steps to Write a Quadratic Function in Vertex Form

- 1. Identify the vertex, (h, k).
- 2. Substitute (h, k) into vertex form: $f(x) = a(x h)^2 + k$
- 3. Identify another point on the function, (x, y).
- 4. Substitute (x, y) into vertex form and solve for $a: f(x) = a(x-h)^2 + k$
- 5. Write the final function with the values of a, h, and k.

х	f(x)	
-2	4	
-1	1	
0	0	
1	1	
2	4	

Note: To identify the vertex of a quadratic function from a table look for symmetry in the y values.

 \leftarrow The vertex is (0,0).

Ex) Write a quadratic function in vertex form using the information

in the table.

x	f(x)	_
1	20	
2	26	
3	28	,
4	26	
Ę	20	

atic function in vertex form using the information

$$f(x) = a(x-h)^{2} + k$$

1) Jertex = $(3, 28)$

$$(h, k)$$

2) $f(x) = a(x-3)^{2} + 28$

Vertex

3) another point

(a)
$$f(x) = a(x-3)^2 + 28$$

3 another point
$$point = (5,20)$$

$$(x,f(x))$$

$$f(x) = a(x-3)^2 + 28$$

 $20 = a(5-3)^2 + 28$

$$20 = 4a + 28$$
 $-28 - 28$

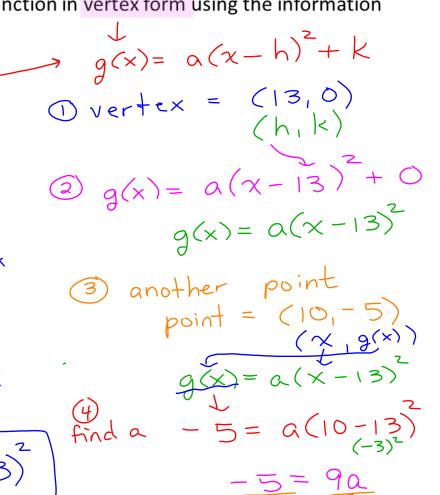
$$-8 = 4a$$

$$f(x) = -2(x-3)^2 + 28$$

Ex) Write a quadratic function in vertex form using the information

in the table.

x	g(x)	
4	-45	
7	-20	
10	-5	
13	0	vertex
16	-5	



(5) finish vertex
form
$$g(x) = \frac{-5}{9}(x-13)^{2}$$

$$-\frac{5}{9} = \frac{9a}{9}$$
 $a = -\frac{5}{9}$

<u>Closure</u>

Mike was standing on a cliff when he tossed a rock into the air. He wanted to write a function, h(t), that would model the height of the rock for any given time, t, in seconds. He knew the following:

- the height of the cliff was about 30 meters
- at 1 second the rock reached a height of about 45 meters
- at 2 seconds the rock reached its maximum height of 50 meters

Write a quadratic function in vertex form that models this situation.

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

1.
$$vertex = maximum = (2,50)$$

2. $h(t) = a(t-2)^2 + 50$

$$3.\text{point} = (0,30) \text{ or } (1,45)$$

$$4.30 = a(0-2)^2 + 50$$

$$30 = 4a + 50$$

$$-20 = 4a$$

$$a = -5$$

5.
$$h(t) = -5(t-2)^2 + 50$$

