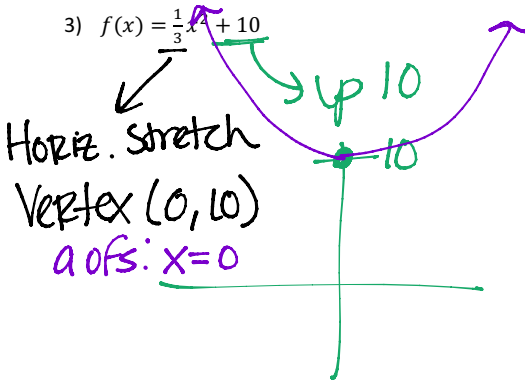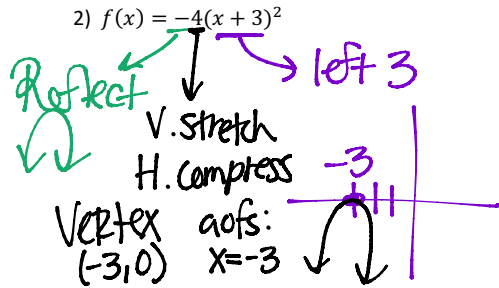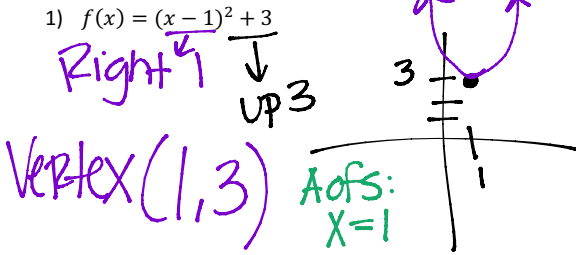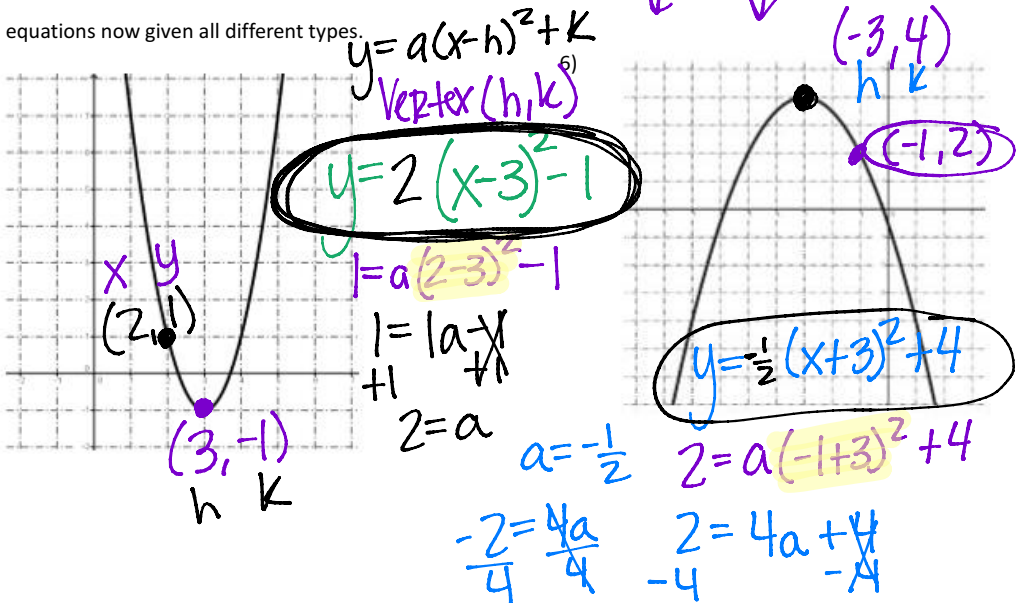We are going to practice writing equations in vertex form using all different pictures.

Let's talk about how these have moved on the graph.

1) $f(x) = (x-1)^2 + 3$

Right 1

Up 3

Vertex $(1, 3)$

Aofs: $x = 1$

3

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

Reflect   left 3

V. stretch

H. compress   -3

Vertex   aofs:
$(-3, 0)$ $x = -3$

3) $f(x) = \frac{1}{3}x^2 + 10$

Horiz. stretch   up 10

Vertex $(0, 10)$

a ofs: $x = 0$

4) $f(x) = -(x+5)^2 - 7$

Reflect   left 5   Down 7

Vertex $(-5, -7)$

a ofs: $x = -5$

-7
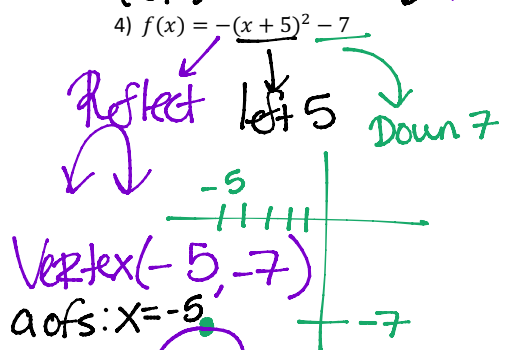
Let's make equations now given all different types.

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

Vertex (h, k)

5)

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

x y
$(2, 1)$

$(3, -1)$
  h   k

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

$1 = 1a$
$+1 \quad +1$

$2 = a$

6)

$(-3, 4)$
  h   k

$(-1, 2)$

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

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

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

$\frac{-2}{4} = \frac{4a}{4}$

$2 = 4a + 4$
$-4 \qquad -4$

7)

x	f(x)
-4	7
-3	2
-2	-1
-1 h	-2 k
0	-1
1 x	2 y
2	7
3	14
4	23

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

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

$2 = 4a - 2$
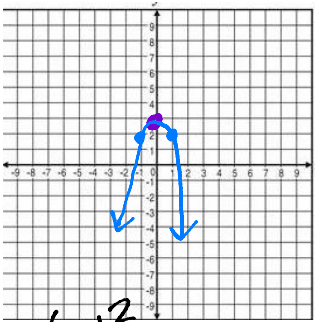$+2 \quad +2$

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

$a = 1$

8) The area of a square with side length x, where the side length is decreased by 3, the area is multiplied by 2 and then 4 square units are added to the area.
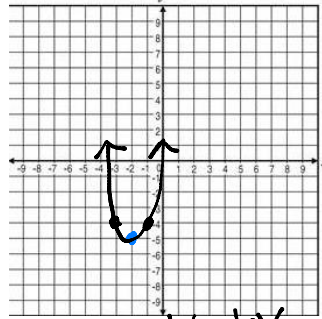
$l \cdot w$

$(x-3)(x-3)$

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

Let's graph the following in vertex form based off the knowledge you have.
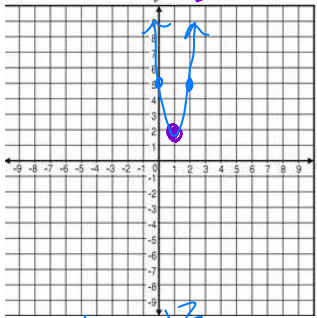
9) $f(x) = -x^2 + 3$

Reflect
Up 3
Vertex (0,3)

X	Y	aofs x=0
-1	2	
0	3	
1	2	

$-(-1)^2 + 3$
$-(1)^2 + 3$

10) $f(x) = (x+2)^2 - 5$

left 2
Down 5

X	Y
-3	-4
-2	-5
-1	-4

Vertex (-2,-5) Aofs: x = -2

11) $f(x) = 3(x-1)^2 + 2$

Vertical stretch
Right 1
Up 2
Vertex (1,2)

X	Y
0	5
1	2
2	5

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

12) $f(x) = \frac{1}{2}x^2 - 6$
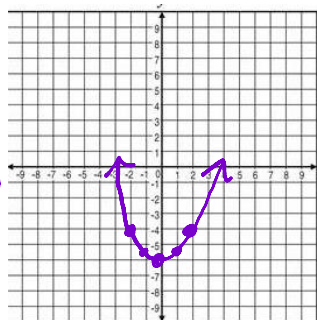
HORIZ. stretch
Down 6
Vertex (0,-6)

X	Y
-1	-5.5
0	-6
1	-5.5
2	-4

$\frac{1}{2}(-1)^2 - 6$
$\frac{1}{2}(2)^2 - 6$

$(x-3)^{\textcircled{2}} = \quad x^2 - 6x + 9$

$(x-3)(x-3)$

$\times$	x	-3
x	x^2	$-3x$
-3	$-3x$	9