$y = (x - p)^2 + q$

$+q \rightarrow$ shifts ↑

$-q \rightarrow$ shifts ↓

$+p \rightarrow$ shifts (L)

$-p \rightarrow$ shifts (R)

Name: Key

Math 20-1

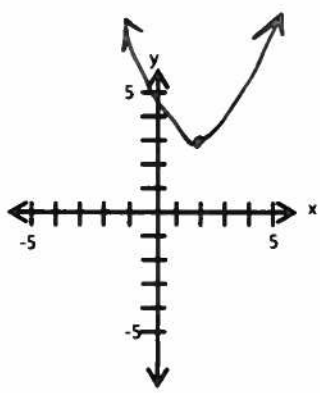
Quadratic Functions and Equations

Assignment 2: Analyzing Quadratic Functions- Part 1

1. Describe how the graphs of the following functions relate to the graph of $y = x^2$

a. $y = (x+5)^2$ + p, 5 units left horizontal translation	b. $y = x^2 - 7$ −q, 7 units ↓ vertical translation	c. $y - 8 = x^2$ $y = x^2 + 8$ +q vertical translation 8 units up
d. $y = 5 + (x-2)^2$ vertical translation 5 units up + horizontal translation	e. $y + 7 = (x+1)^2 - 10$ $y = (x+1)^2 - 17$ vertical translation 17 units down, horizontal translation 1 unit left.	f. $y = (x-a)^2 - b$ vertical translation "b" units down, horizontal translation "a" units right

2. Consider the graph of the function $f(x) = (x-2)^2 + 3$



a. Without using a graphing calculator, sketch the graph on the grid.

b. State the coordinate of the vertex.

(2, 3)

c. State maximum or minimum value of the function.

min value of 3

d. State the domain and range of the function.

domain: $\{x \in R$

range: $\{y \mid y \geq 3, y \in R$.

$y = (x - p)^2 + q$ ← vertical.
horizontal

3. The following transformations are applied to the graph $y = x^2$. Write the equation of the image function for each.

a. A horizontal translation of 7 units right

$y = (x-7)^2$

b. A vertical translation of 2 units down

$y = x^2 - 2$

c. A translation 3 units left and 8 units up

$y = (x+3)^2 + 8$

d. A translation c units down and d units right

$y = (x-d)^2 - c$

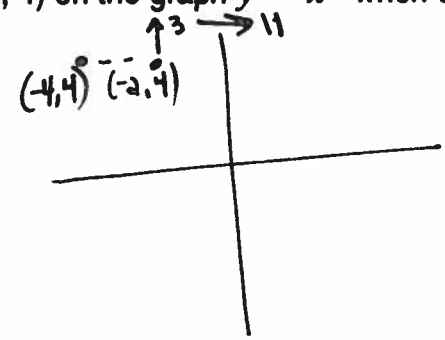
4. Write the coordinates of the image of the point (-2, 4) on the graph $y = x^2$ when each of the following transformations is applied:

a. A horizontal translation if 2 units to the left

$-2-2, 4 \rightarrow (-4, 4)$

b. A translation of 3 units up and 11 units right

$-2+11, 4+3 \rightarrow (9, 7)$



5. Complete the following table.

Function	$y = x^2 + 5$	$y = (x+3)^2 - 4$	$y + 9 = (x-6)^2 + 1$ -9 $y = (x-6)^2 - 8$ -9	$y - w = (x+r)^2 + w$ $+w$
Coordinates of Vertex	(0, 5)	(-3, -4)	(6, -8)	(-r, w)
Max/Min Value	min 5	min -4	min -8	min w
Equation of Axis of Symmetry	$x = 0$	$x = -3$	$x = 6$	$x = -r$
Domain	$x \in R$	$x \in R$	$x \in R$	$x \in R$
Range	$y \mid y \geq 5, \in R$	$y \mid y \geq -4, y \in R$	$y \mid y \geq -8, y \in R$	$y \mid y \geq w, y \in R$