

Unit 5: Graphing Quadratic Relations

Day 2: Vertical Translations

QUADRATIC TRANSFORMATIONS PART 2

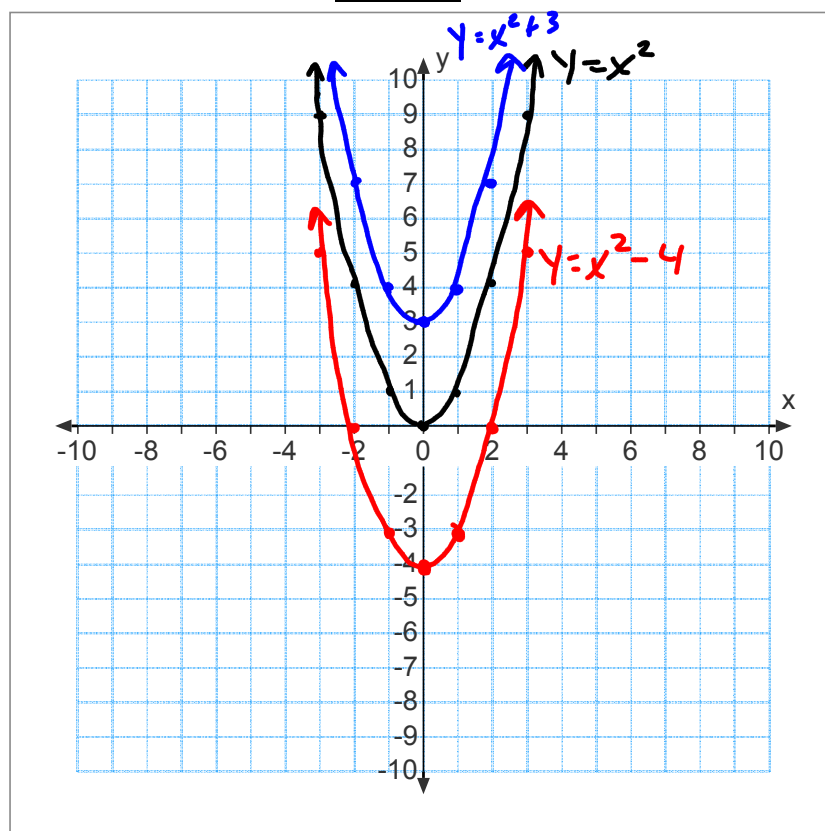
Investigation 2: The graph of $y = x^2 + k$ compared to $y = x^2$

a) Create a table of values for:

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

x	y
-3	12
-2	7
-1	4
0	3
1	4
2	7
3	12

x	y
-3	5
-2	0
-1	-3
0	-4
1	-3
2	0
3	5



Using the netbook provided,

go to the website: www.desmos.com

- Click on "Start Graphing"

- in the side menu type in $y=x^2$

- (this will give the graph of $y=x^2$)

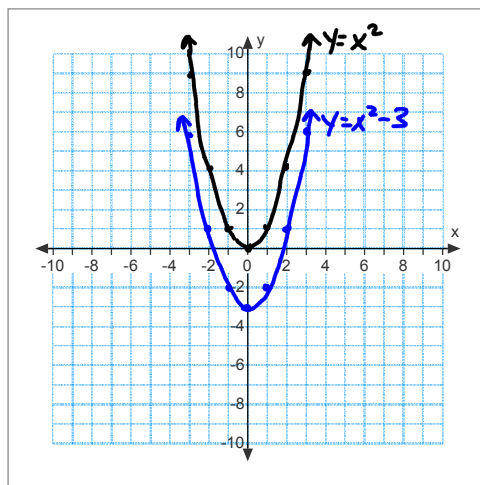
Continue to type in the rest of the equations listed at the top of your handout. Copy the table of values and the graphs from desmos to your graph (use a different colour or type of line for each different graph on the same axis).

Describe your observations

- If we add a constant, the parent graph shifts up that many units
- If we subtract a constant, the parent graph shifts down that many units.

Examples

1. For the equation $y = x^2 - 3$ state:
 - the vertex $(0, -3)$
 - the direction of opening up
 - describe the transformation shift down 3 units
 - sketch the graph using transformations (start with the parent graph, then the transformed graph)



2. Write the new equation: $a < 0$
 - the parent function, $y = x^2$ is reflected in the x-axis, compressed vertically by 2 and shifted down 5 units. → fraction between 0 and 1

$$a = -\frac{1}{2} \quad k = -5$$

$$y = ax^2 + k \quad \rightarrow \text{general equation}$$

$$\therefore y = -\frac{1}{2}x^2 - 5$$