

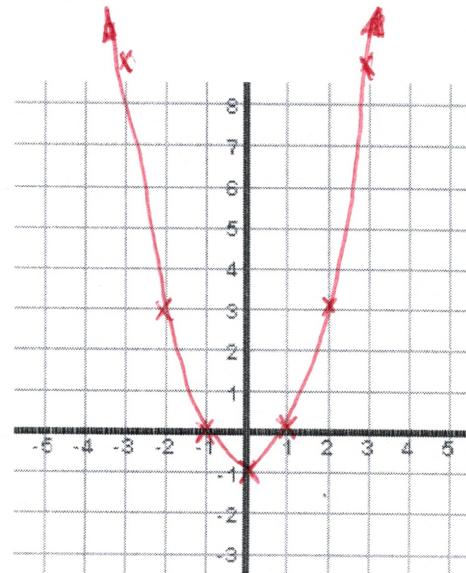
Exploration: Graphs of quadratic equations

No Desmos

- I. Create a table of values, and then graph the function

$$f(x) = x^2 - 1 \quad \text{for} \quad -3 \leq x \leq 3.$$

x	$f(x)$
-3	8
-2	3
-1	0
0	-1
1	0
2	3
3	8



1. Where does the function intercept the y-axis?

- a. Can you obtain this from the quadratic function equation?

$$x=0 \rightarrow f(x) = 0^2 - 1 = \boxed{-1}$$

2. Where does the function intercept the x-axis?

- a. Can you find these using algebraic process?

$$0 = x^2 - 1 \Rightarrow (x+1)(x-1) = 0$$

or $\begin{cases} x=1 \\ x=-1 \end{cases}$

3. What is the axis-of-symmetry?

- a. Can you see it from the graph? Table? $\boxed{x=0}$

- b. Write the y-coordinate of the lowest point on the graph of $f(x)$

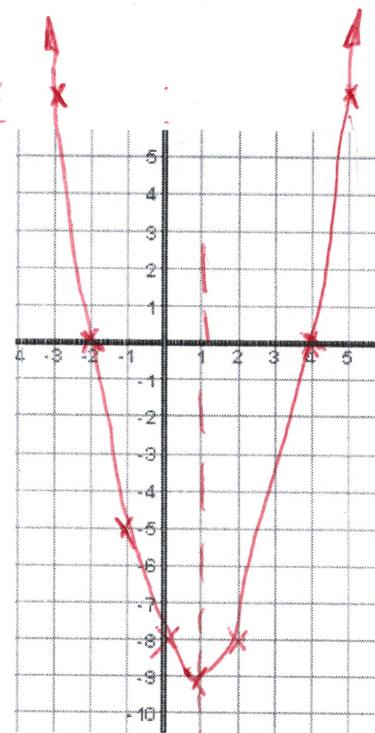
Vertex. $(0, -1)$

1/4

II. Create a table of values, and then graph the function

$$f(x) = (x - 4)(x + 2) \quad \text{for} \quad -2 \leq x \leq 4$$

x	f(x)
-3	7
-2	0
-1	-5
0	-8
1	-9
2	-8
3	-5
4	0
5	7



- For what x value(s) is $f(x)$ equal to zero? $x = -2 \text{ or } x = 4$
- What is the axis of symmetry? $x = 1$
- What is the minimum value of $f(x)$? $x = 1, y = -9$

III. Create a table of values, and then graph the function

$$g(x) = -x^2 - 2x + 8 \quad \text{for} \quad -4 \leq x \leq 4$$

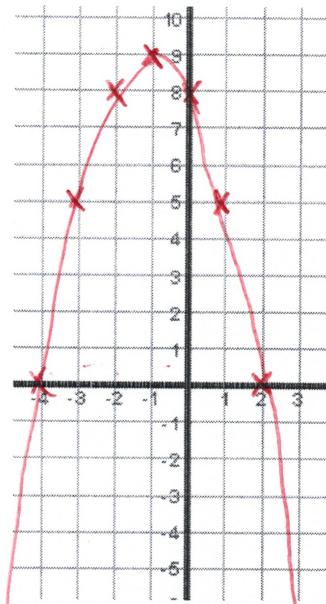
x	g(x)
-5	-7
-4	0
-3	5
-2	8
-1	9
0	8
1	5
2	0
3	-7

$$-25 + 10 + 8$$

$$-9 + 6 + 8 = 5$$

$$-4 + 4 + 8 = 8$$

$$-1 + 2 + 8 = 9$$



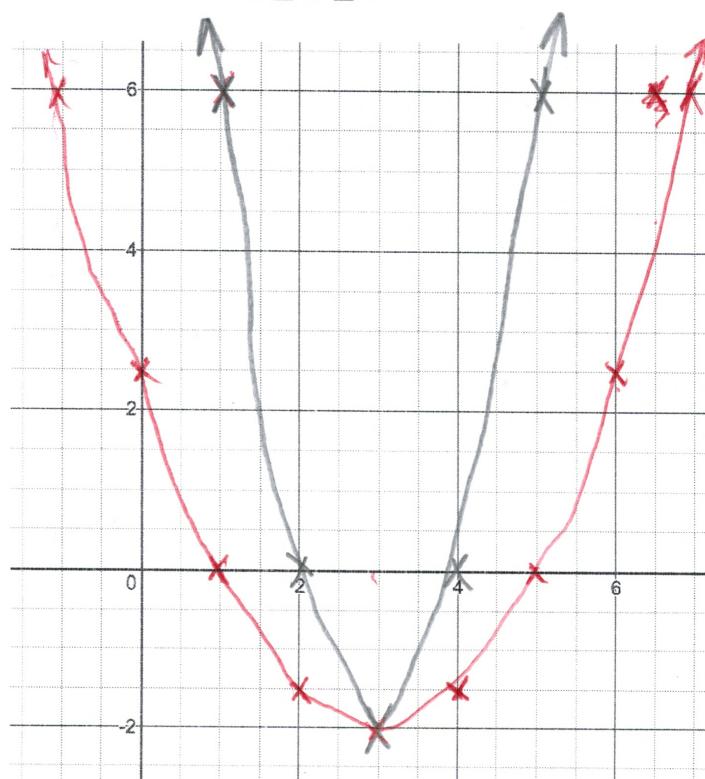
- What is the y-intercept of the function? $(0, 8)$
- How and why is this graph different compared to the previous two?

Upside down!

IV. Create a table of values, and then graph the function

$$m(x) = 0.5(x - 3)^2 - 2 \quad \text{for} \quad -1 \leq x \leq 7$$

x	m(x)
-1	6
0	2.5
1	0
2	-1.5
3	-2
4	-1.5
5	0
6	2.5
7	6
<u>w</u>	



1. What is the y-intercept of the function?

$$x=0 \rightarrow 2.5$$

2. What are the x-intercepts of the function?

$$y=0 : \boxed{x=1 \text{ or } x=5}$$

V. Draw the function q(x) on the same axes. Use different colors.

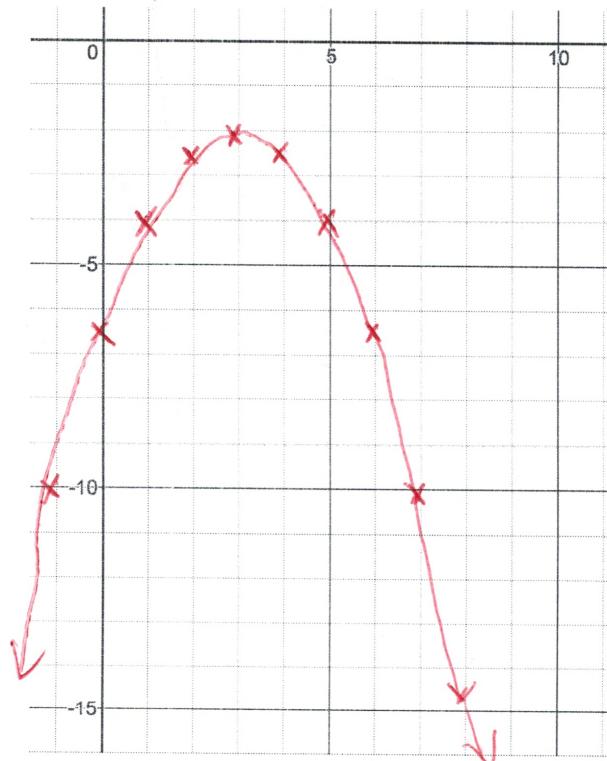
$$q(x) = 2(x - 3)^2 - 2 \quad \text{for} \quad -1 \leq x \leq 7$$

X	1	2	3	4	5
q(x)	6	0	-2	0	6

VI. Create a table of values, and then graph the function

$$h(x) = -0.5(x - 3)^2 - 2 \quad \text{for} \quad -1 \leq x \leq 8$$

x	$h(x)$
-1	-10
0	-6.5
1	-4
2	-2.5
3	-2
4	-2.5
5	-4
6	-6.5
7	-10
8	-14.5
<u><u> </u></u>	



1. What is the y-intercept of the function?

$$x=0 \rightarrow y=-6.5$$

2. What are the x-intercepts of the function?

None!!

VII. Look back at the last 3 examples. Any insights and observations?

vertex form

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

↑ ↑ ↗
 vido axis of symmetry offset

9/9

==== End ===