

Quadratic Function Introduction Worksheet

$$f(x) = ax^2$$

Complete the following table of values and plot each function on the same Cartesian plane.

parameter
"a"

when "a" is
positive \oplus
opens upwards



when "a" is
negative \ominus
opens downwards



$|a| = 1$ Mother
Function

$|a| > 1$ Skinny

$|a| < 1$ wide

$f(x) = x^2$	
x	y
-5	25
-4	16
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16
5	25

$g(x) = 2x^2$	
x	y
-5	50
-4	32
-3	18
-2	8
-1	2
0	0
1	2
2	8
3	18
4	32
5	50

$h(x) = \frac{1}{2}x^2$	
x	y
-5	12.5
-4	8
-3	4.5
-2	2
-1	0.5
0	0
1	0.5
2	2
3	4.5
4	8
5	12.5

Example:

$$h(x) = \frac{1}{2}x^2$$

$$h(-5) = \frac{1}{2}(-5)^2$$

$$= \frac{1}{2}(25)$$

$$= \frac{25}{2}$$

$$= 12.5$$

$$(-5, 12.5)$$

$j(x) = -x^2$	
x	y
-5	-25
-4	-16
-3	-9
-2	-4
-1	-1
0	0
1	-1
2	-4
3	-9
4	-16
5	-25

Example:

$$j(x) = -x^2$$

$$j(-4) = -(4)^2$$

$$= -(16)$$

$$= -16$$

$$(4, -16)$$

$k(x) = -2x^2$	
x	y
-5	-50
-4	-32
-3	-18
-2	-8
-1	-2
0	0
1	-2
2	-8
3	-18
4	-32
5	-50

$p(x) = -\frac{1}{2}x^2$	
x	y
-5	-12.5
-4	-8
-3	-4.5
-2	-2
-1	-0.5
0	0
1	-0.5
2	-2
3	-4.5
4	-8
5	-12.5

Example:

$$p(x) = -\frac{1}{2}(4)^2$$

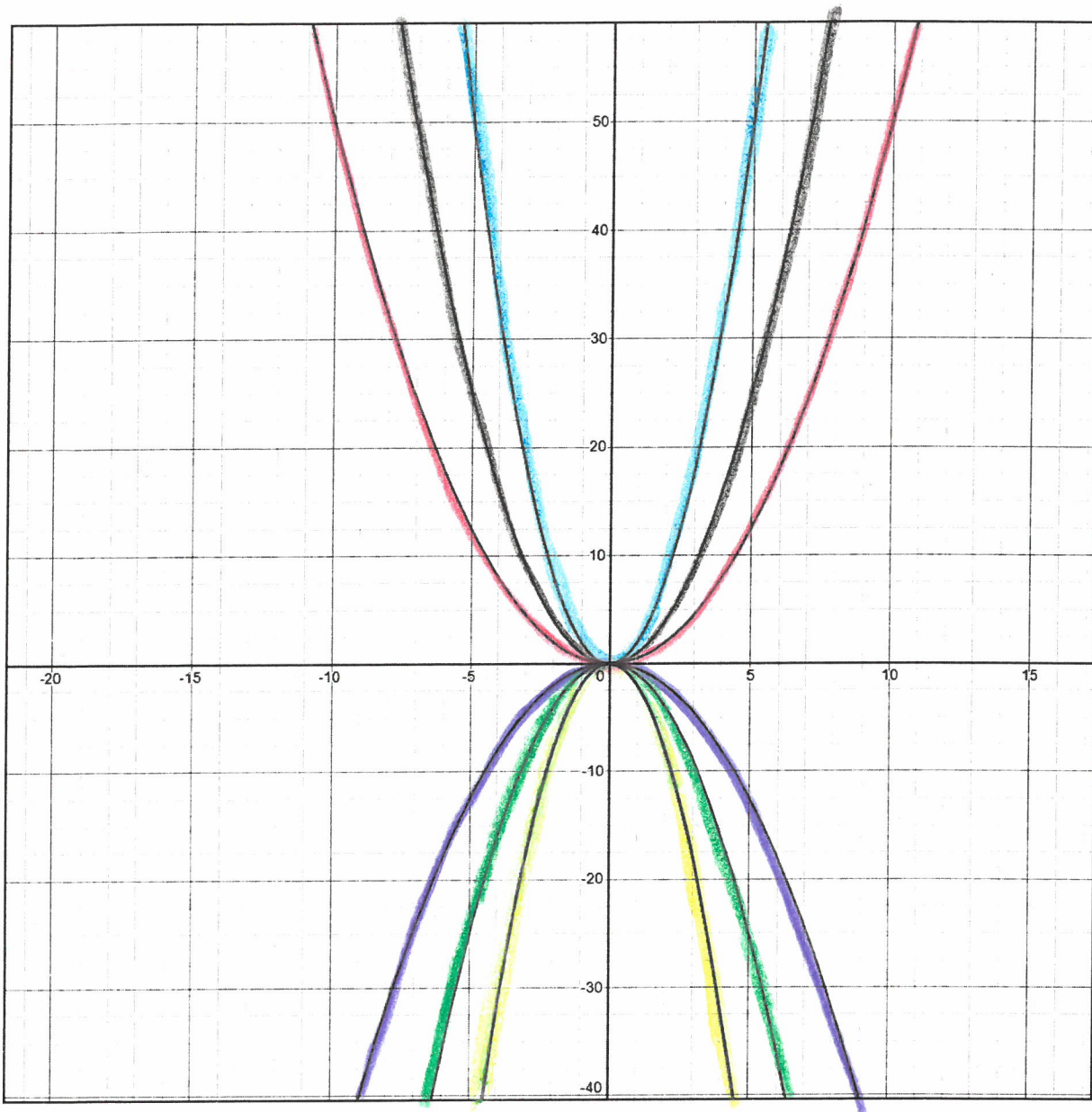
$$= -\frac{1}{2}(16)$$


$$= \frac{-1(16)}{2}$$


$$= \frac{-16}{2}$$


$$= -8$$


$$(4, -8)$$





1  $f(x) = x^2$

2  $g(x) = 2x^2$

3  $h(x) = \frac{1}{2}x^2$

4  $j(x) = -x^2$

5  $k(x) = -2x^2$

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

Quadratic Function Introduction Worksheet

$$f(x) = ax^2 + k$$

Complete the following table of values and plot each function a Cartesian plane. Record the translation of the Vertex from the original function $f(x) = x^2$

parameter
"k"

when "k" is
positive \oplus
moves k units up
the y-axis

when "k" is
negative \ominus
moves k units
down the y-axis

$k > 0$ \uparrow translates
upwards

$k < 0$ \downarrow translates
downwards

$f(x) = x^2$	
x	y
-5	25
-4	16
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16
5	25

$g(x) = x^2 + 1$	
x	y
-5	26
-4	17
-3	10
-2	5
-1	2
0	1
1	2
2	5
3	10
4	17
5	26

$h(x) = x^2 + 3$	
x	y
-5	28
-4	19
-3	12
-2	7
-1	4
0	3
1	4
2	7
3	12
4	19
5	28

Example:

$$h(x) = x^2 + 3$$

$$h(-4) = (-4)^2 + 3$$

$$= 16 + 3$$

$$= 19$$

$$(-4, 19)$$

$j(x) = x^2 + 5$	
x	y
-5	30
-4	21
-3	14
-2	9
-1	6
0	5
1	6
2	9
3	14
4	21
5	30

Example:

$$j(x) = x^2 + 5$$

$$j(-3) = (-3)^2 + 5$$

$$= 9 + 5$$

$$= 14$$

$$(-3, 14)$$

$k(x) = x^2 - 3$	
x	y
-5	22
-4	13
-3	6
-2	1
-1	-2
0	-3
1	-2
2	1
3	6
4	13
5	22

$p(x) = x^2 - 5$	
x	y
-5	20
-4	15
-3	4
-2	-1
-1	-4
0	-5
1	-4
2	-1
3	4
4	15
5	20

Example:

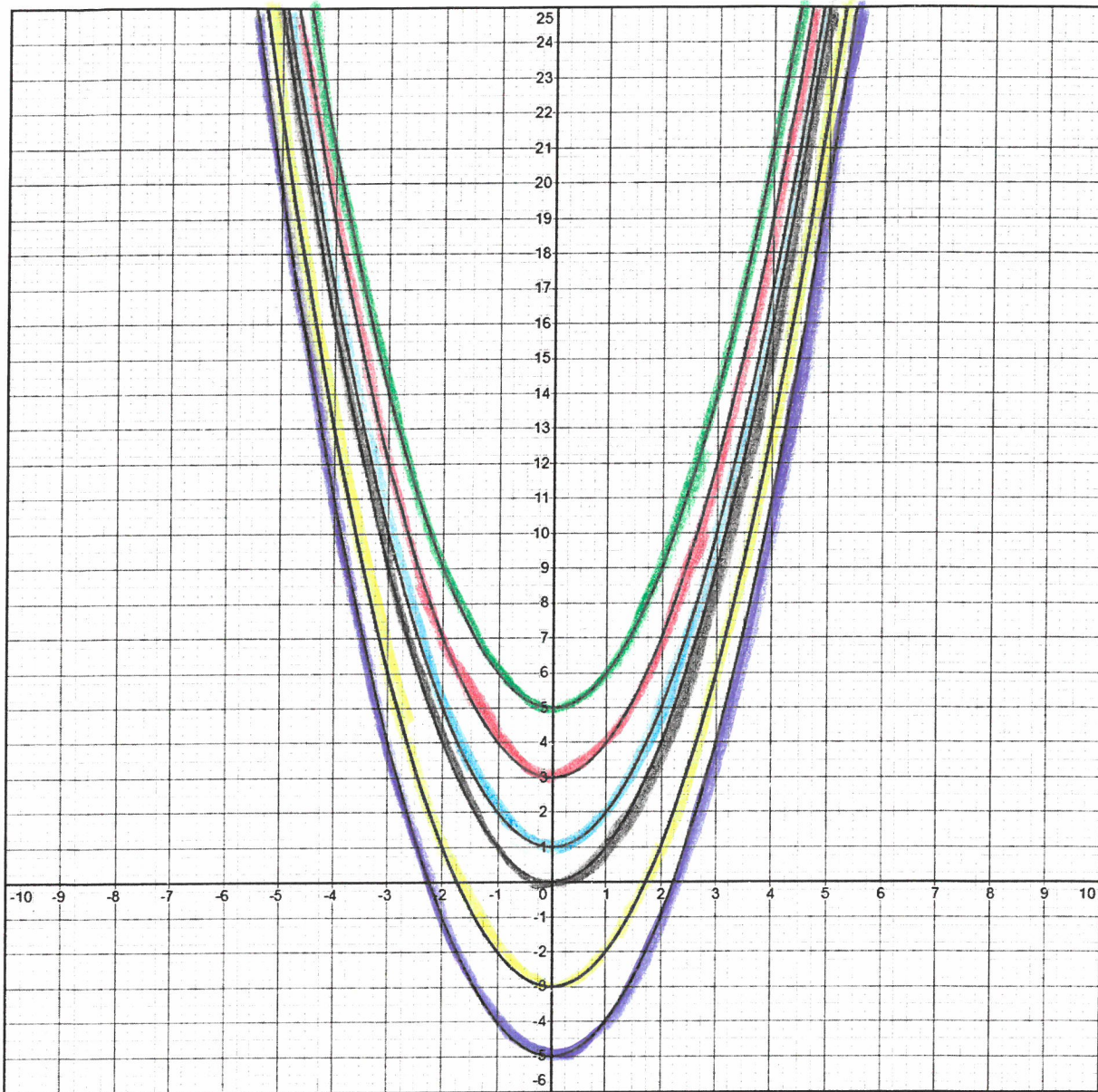
$$p(x) = x^2 - 5$$


$$p(2) = (2)^2 - 5$$


$$= 4 - 5$$


$$= -1$$


$$(2, -1)$$





1  $f(x) = x^2$

2  $g(x) = x^2 + 1$

3  $h(x) = x^2 + 3$

4  $j(x) = x^2 + 5$

5  $k(x) = x^2 - 3$

6  $p(x) = x^2 - 5$

Quadratic Function Introduction Worksheet

$$f(x) = a(x - h)^2$$

Complete the following table of values and plot each function a Cartesian plane. Record the translation of the Vertex from the original function $f(x) = x^2$

parameter
"h"

Rule is $(x-h)$
↑
always
opposite
sign

when "h" is
greater than zero
example $h=5$
written $(x-5)$
↑
opposite sign
move to the right

when "h" is
less than zero
example $h=-3$
written $(x+3)$
↑
opposite sign
moves to the left

$h > 0 \rightarrow$ translates
right

$h < 0 \leftarrow$ translates
left

Example:

$$j(x) = (x-3)^2$$

$$j(2) = (2-3)^2$$

$$= (-1)^2$$

$$= 1$$

$$(2, 1)$$

$f(x) = x^2$	
x	y
-5	25
-4	16
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16
5	25

$j(x) = (x-3)^2$	
x	y
-5	64
-4	49
-3	36
-2	25
-1	16
0	9
1	4
2	1
3	0
4	1
5	4

$g(x) = (x-1)^2$	
x	y
-5	36
-4	25
-3	16
-2	9
-1	4
0	1
1	0
2	1
3	4
4	9
5	16

$k(x) = (x+1)^2$	
x	y
-5	16
-4	9
-3	4
-2	1
-1	0
0	1
1	4
2	9
3	16
4	25
5	36

$h(x) = (x-2)^2$	
x	y
-5	49
-4	36
-3	25
-2	16
-1	9
0	4
1	1
2	0
3	1
4	4
5	9

$p(x) = (x+2)^2$	
x	y
-5	9
-4	4
-3	1
-2	0
-1	1
0	4
1	9
2	16
3	25
4	36
5	49

Example:

$$h(x) = (x-2)^2$$

$$h(5) = (5-2)^2$$

$$= (3)^2$$

$$= 9$$

$$(5, 9)$$

Example:

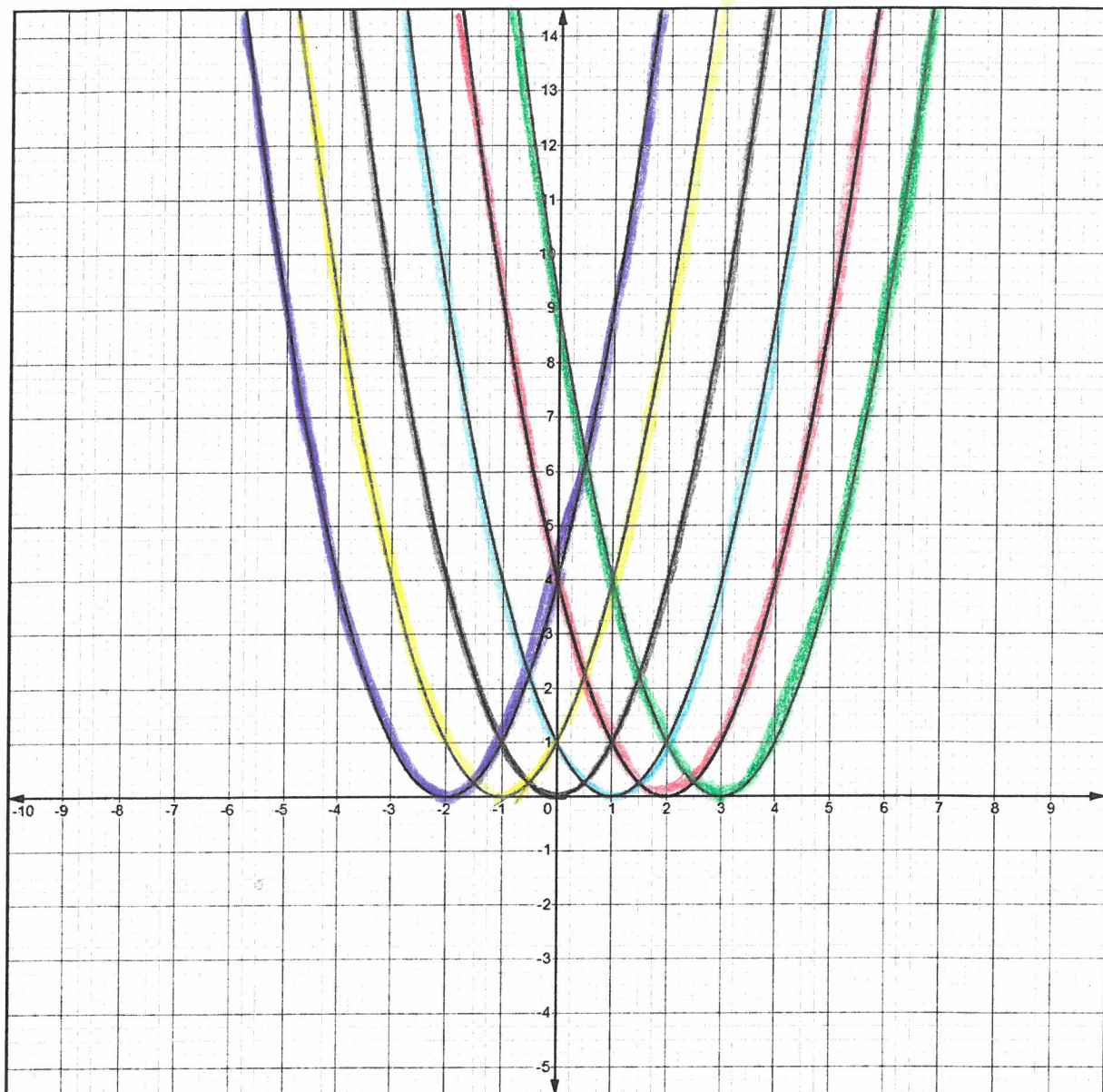
$$p(x) = (x+2)^2$$


$$p(-4) = (-4+2)^2$$


$$= (-2)^2$$


$$= 4$$


$$(-4, 4)$$





1  $f(x) = x^2$

2  $g(x) = (x - 1)^2$

3  $h(x) = (x - 2)^2$

4  $j(x) = (x - 3)^2$

5  $k(x) = (x + 1)^2$

6  $p(x) = (x + 2)^2$