

Module 13: Absolute Value Introduction

The absolute value of x , denoted by $|x|$ is the distance between x and 0 on a number line.

Therefore, $|4| = \underline{4}$ and $|-4| = \underline{4}$.

Simplify the following absolute value expressions:

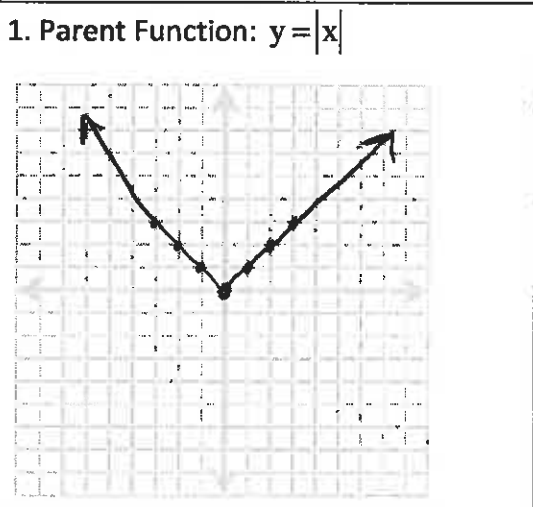
1. $|-5+3|$
 $|-2| = 2$

2. $|7-1|-10$
 $|6|-10 = -4$
 $6-10 = -4$

3. $-|-3|+2$
 $-(3)+2 = -1$

Complete each table of values by plugging in the given values and simplifying. Plot the points and complete the graph. Answer the given questions.

x	y
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3

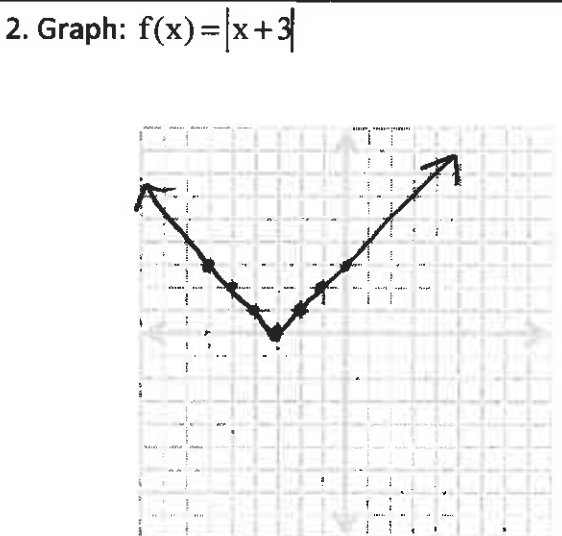


What do you observe about the shape of the absolute value function?
V-shape

Why do you think the function has this shape?
Absolute value cannot have negative output values

The turning point of the absolute value function is called the vertex. What is the vertex of the parent function?
(0,0)

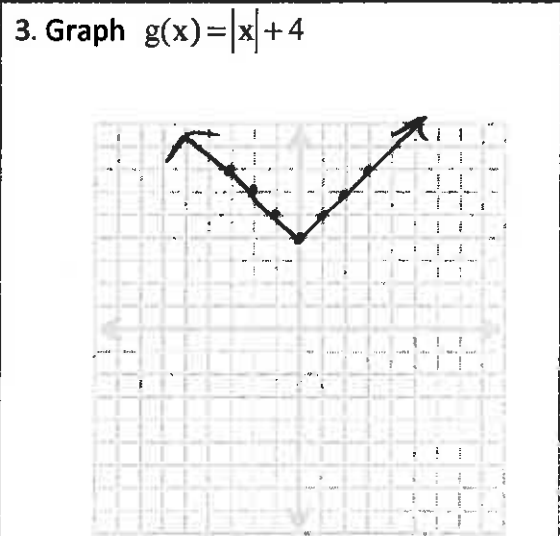
x	y
-6	3
-5	2
-4	1
-3	0
-2	1
-1	2
0	3



How does the graph of $f(x)$ compare to the graph of the parent function?
Shifted left 3

How were the table values affected by this change?
Subtracted 3 from x-values

x	y
-3	7
-2	6
-1	5
0	4
1	5
2	6
3	7

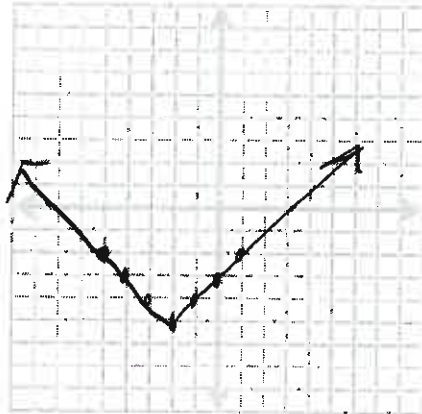


How does the graph of $g(x)$ compare to the graph of the parent function?
shifted up 4

How were the table values affected by this change?
Added 4 to y-values

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

4. Graph: $h(x) = |x+2| - 5$

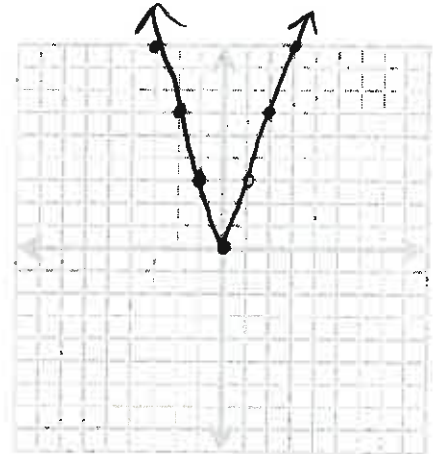


How does the graph of $h(x)$ compare to the graph of the parent function? Shifted left 2 and down 5

How were the table values affected by this change? Subtracted 2 from x 's and subtracted 5 from y 's

x	y
-3	9
-2	6
-1	3
0	0
1	3
2	6
3	9

5. Graph $p(x) = 3|x|$

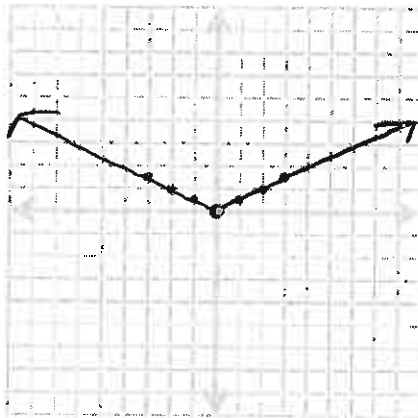


How does the graph of $p(x)$ compare to the graph of the parent function?

Less wide; vertically stretched
How were the table values affected by this change? Multiplied y -values by 3

x	y
-3	1.5
-2	1
-1	1/2
0	0
1	1/2
2	1
3	1.5

6. Graph: $q(x) = \frac{1}{2}|x|$

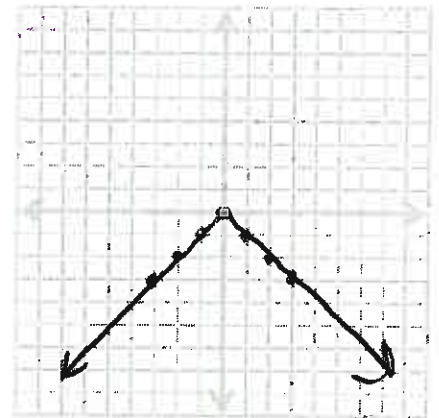


How does the graph of $q(x)$ compare to the graph of the parent function? More wide;

Vertically compressed
How were the table values affected by this change? y 's were multiplied by $\frac{1}{2}$

x	y
-3	-3
-2	-2
-1	-1
0	0
1	-1
2	-2
3	-3

7. Graph $r(x) = -|x|$



How does the graph of $r(x)$ compare to the graph of the parent function? Flipped over x -axis

How were the table values affected by this change? Multiplied y -values by -1 .

Summary: Given the function $y = a|x-h|+k$ discuss the effects of a , h , and k on the parent function.

- a : vertical stretch or shrink, negative a causes reflection over x -axis.
- h : horizontal shift
- k : vertical shift