

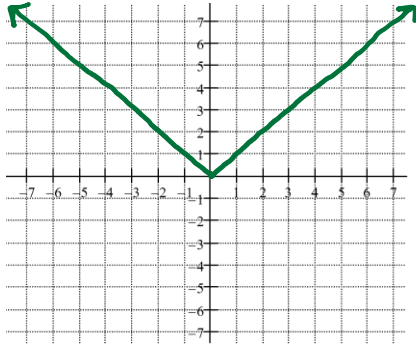
Unit 2: Solving Equations and Inequalities

Lesson 5: Graphing Absolute Value

VOCAB:

Absolute value: **Distance**

What does the parent graph of $y = |x|$ look like?



Graphing Absolute Value

Standard form of absolute value

$$y = a|x - h| + k$$

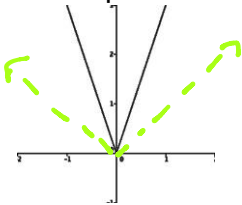
rise / run opposite same

1. The **h** is the horizontal shift (opposite)
2. The **k** is the vertical shift (so the vertex is (h,k))
3. The **a** is the slope and direction of opening

Examples:

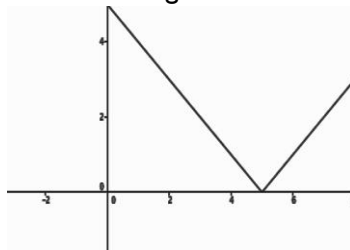
$$f(x) = 3|x|$$

The slope of each leg of the v is 3.



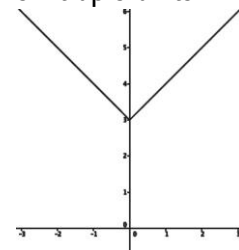
$$f(x) = |x - 5|$$

Shift to the right 5 units.



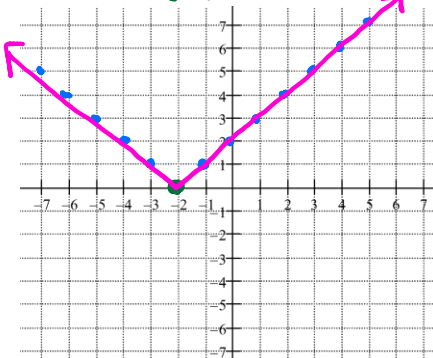
$$f(x) = |x| + 3$$

Shift up 3 units

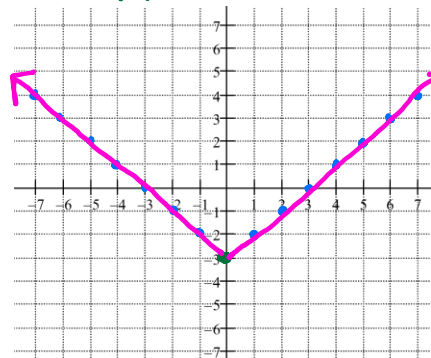


PRACTICE: Graph by first starting with the parent graph

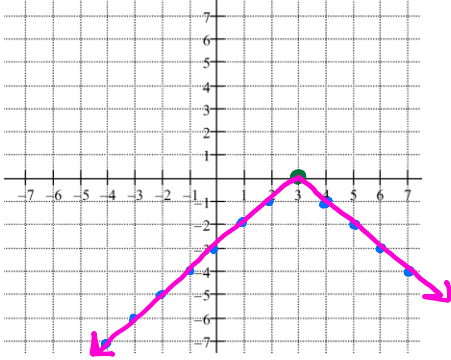
1. $y = |x + 2| + 0$ $m = 1 = \frac{1}{1}$
 Vertex: **(-2, 0)**



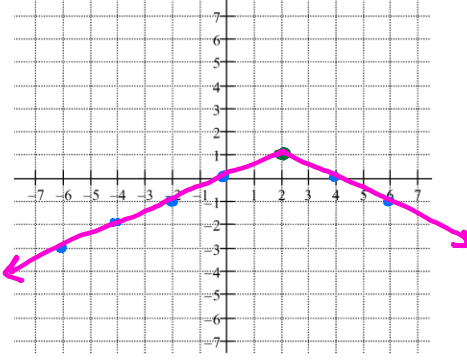
2. $y = |x| - 3$ $m = 1 = \frac{1}{1}$
 Vertex: **(0, -3)**



3. $y = -|x - 3|$ $m = -1 = -\frac{1}{1}$
 Vertex: $(3, 0)$



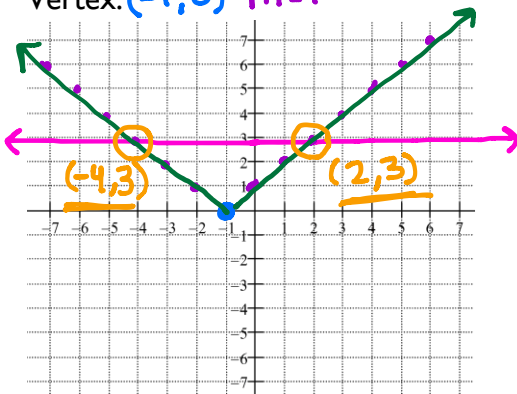
4. $y = -\frac{1}{2}|x - 2| + 1$ $m = -\frac{1}{2}$
 Vertex: $(2, 1)$



When solving an absolute value by graphing; first, graph two different equations and then look for where the two lines intersect. The solution is where the two graphs meet.

1. $3 = |x + 1|$
 Equation 1: $y = 3$
 Equation 2: $y = |x + 1|$
 Vertex: $(-1, 0)$ $m = 1$

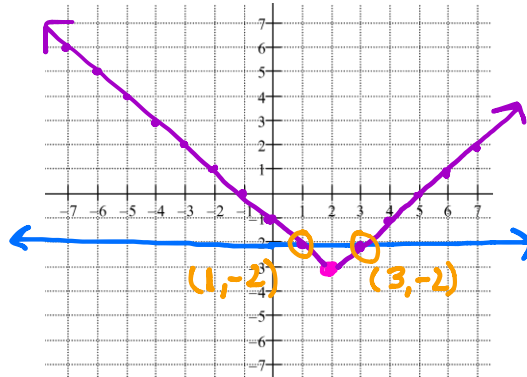
$x = 2$
 $x = -4$



Solution: $x = -4, x = 2$

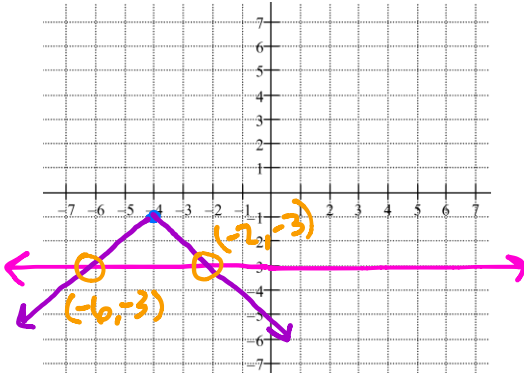
2. $-2 = |x - 2| - 3$
 Equation 1: $y = -2$
 Equation 2: $y = |x - 2| - 3$
 Vertex: $(2, -3)$ $m = 1$

$x = 1$
 $x = 3$



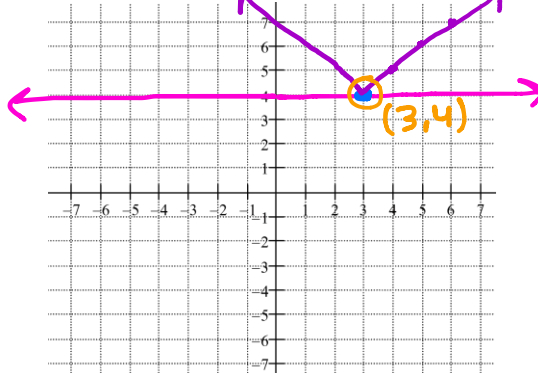
Solution: $x = 1, x = 3$

3. $-3 = -|x + 4| - 1$
 Equation 1: $y = -3$
 Equation 2: $y = -|x + 4| - 1$
 Vertex: $(-4, -1)$ $m = -1$



Solution: $x = -6, x = -2$

4. $4 = |x - 3| + 4$
 Equation 1: $y = 4$
 Equation 2: $y = |x - 3| + 4$
 Vertex: $(3, 4)$ $m = 1$



Solution: $x = 3$

HW: Solve by Graphing

1. $5 = |x+4|$

2. $8 = |x-9| + 1$

3. $-10 = -|x+2|$

4. $-4 = \frac{1}{2}|x-2| + 3$

5. $2|x-3| = 6$

6. $5 = |x-1| - 3$

7. $2 = |x-5|$

8. $1 = -|x+2| + 4$

9. $6 = |x-3| - 1$

10. $-5 = |x+2|$