Sketching the following quadratic functions...

Possible strategies
- Zeros and vertex
- Partial factoring
- Completing the Square

Examples:

$y = x^2 - 2x - 8$

Zeros & Vertex

$0 = x^2 - 2x - 8$

$0 = (x-4)(x+2)$

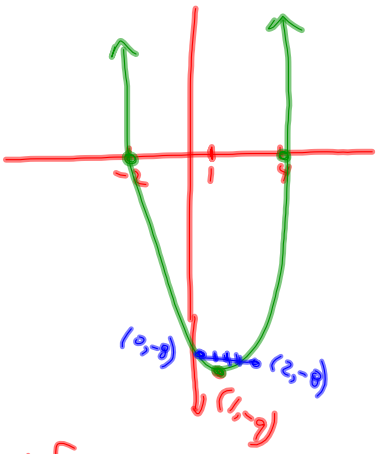
$x = 4, -2$

$MP = \frac{x_1 + x_2}{2} = \frac{2}{2} = 1$

$y = (1)^2 - 2(1) - 8$

$y = -9$

Vertex $(1, -9)$




Strategy #2 : Partial factoring

$y = x^2 - 2x - 8$

$y = x(x-2) - 8$

"0"

$x = 0$ and $x = 2$

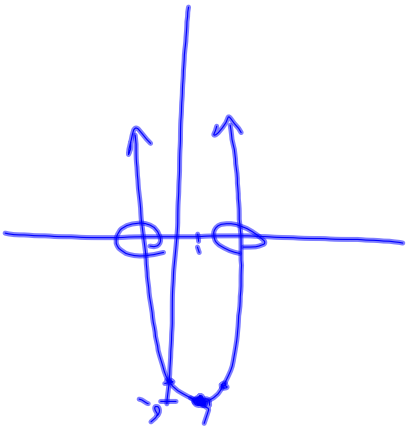
$(0, -8)$ $(2, -8)$

$x = \frac{0+2}{2} = 1$

$y = (1)^2 - 2(1) - 8$

$y = -9$

$(1, -9)$




Strategy #3 : Completing the Square.

$y = x^2 - 2x - 8$

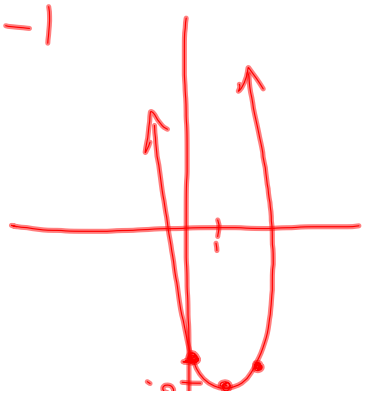
$y = (x^2 - 2x + 1) - 8 - 1$

$y = (x-1)^2 - 9$

$V(1, -9)$

y-Int: $y = 0 - 0 - 8$

$y = -8$



Sketch:

$$y = \left| -x^2 + 4x + 5 \right|$$

$$y = -x^2 + 4x + 5$$

$0 = -x^2 + 4x + 5$ :

$0 = x^2 - 4x - 5$

$0 = (x-5)(x+1)$

$x = 5, -1$

x-coordinate of vertex:

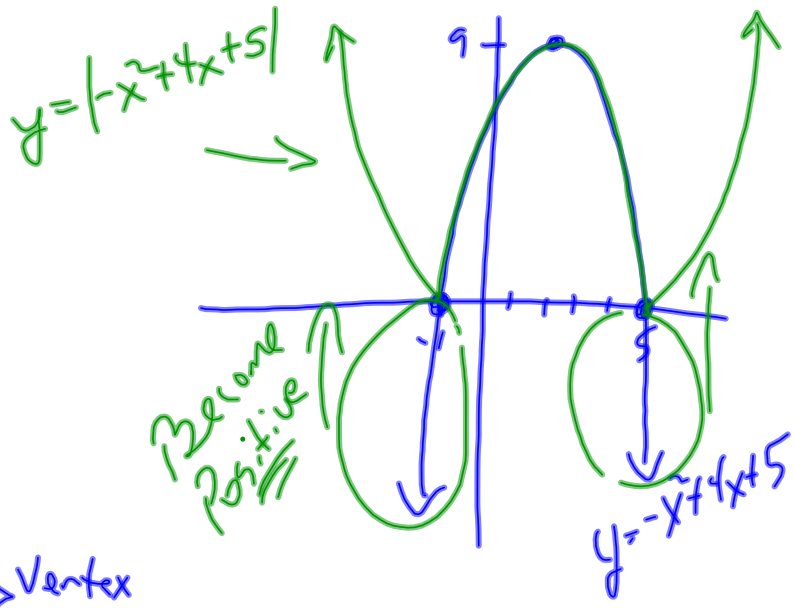
$x = \frac{-1+5}{2} = 2$

y-coord. :

$y = -(2)^2 + 4(2) + 5$

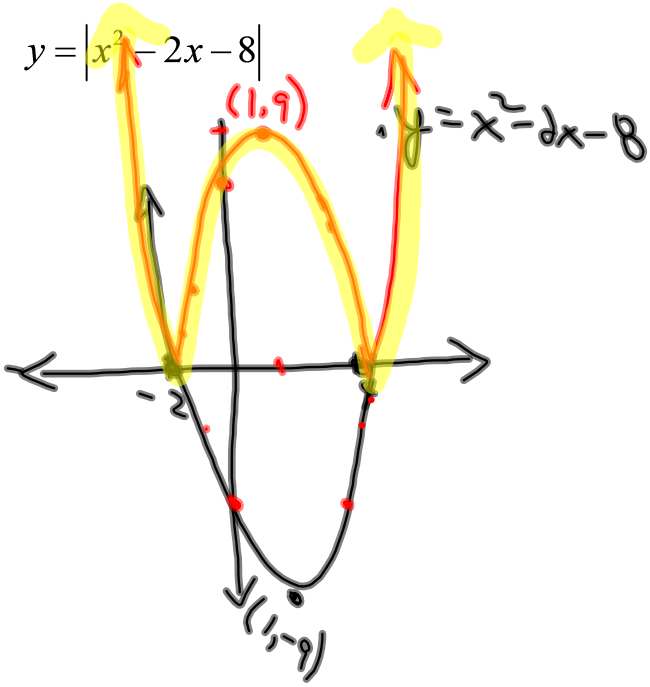
$y = 9$

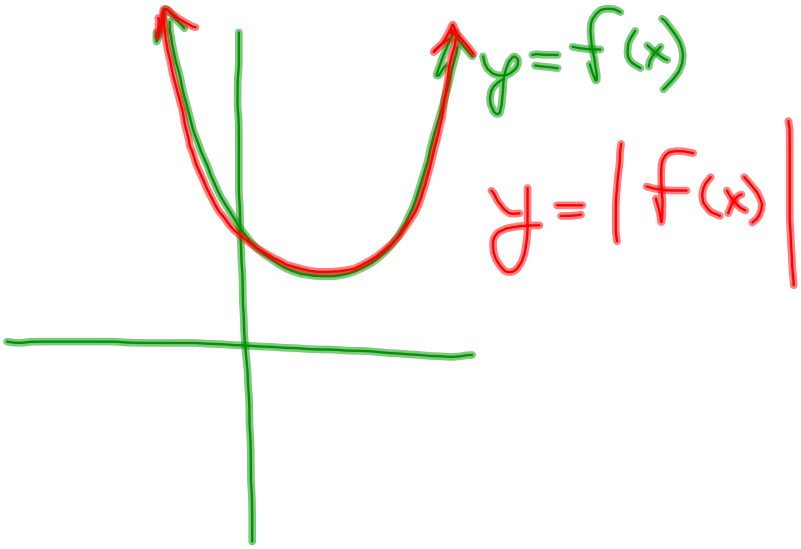
Vertex $(2, 9)$

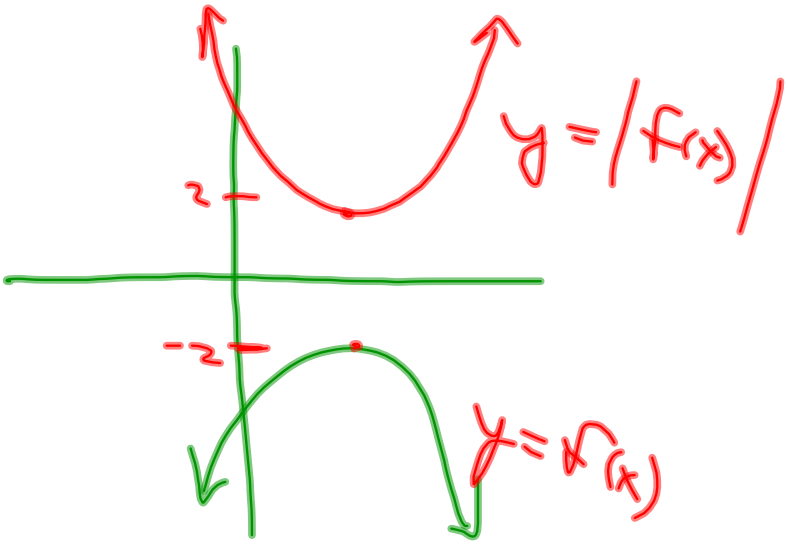


Now use your results to sketch the following:

$y = |x^2 - 2x - 8|$




y = f(x)
y = |f(x)|


y = |f(x)|
2
-2
y = f(x)

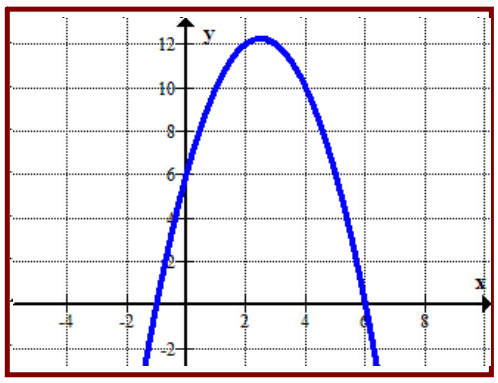
Chapter 7

# Graphing an Absolute Value Function

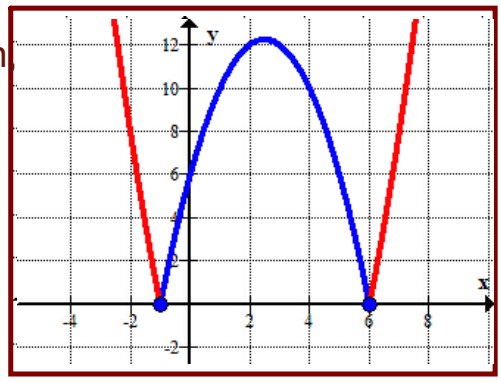
Sketch the graph of $y = |-x^2 + 5x + 6|$

The graph of $y = |-x^2 + 5x + 6|$ may be sketched using the graph of $y = -x^2 + 5x + 6$.

Use the pen tool to sketch the graph of the function $y = -x^2 + 5x + 6$ on the accompanying grid.




To graph the absolute value function, use the pen tool to reflect in the $x$-axis the sections of the graph that are below the $x$-axis.



Chapter 7

# Graphs of Absolute Value Functions

Drag each of the following absolute value functions to the matching graph. Pull the tabs to reveal the answers.

A $y = \left|-2x^2 - 3x + 2\right|$

B $y = \left|2(x-3)^2 - 4\right|$ (3, -4)

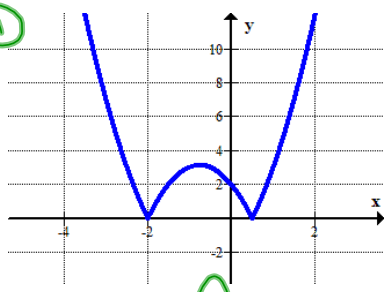
C $y = \left|-x - 2\right|$

D $y = \left|x^2 - 9\right|$

E $y = \left|2x - 5\right|$

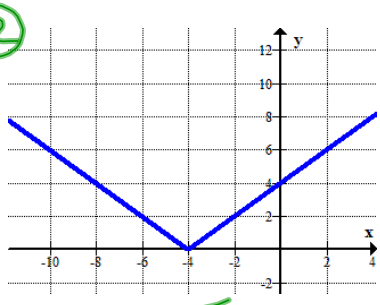
F $y = \left|-x - 4\right|$

1



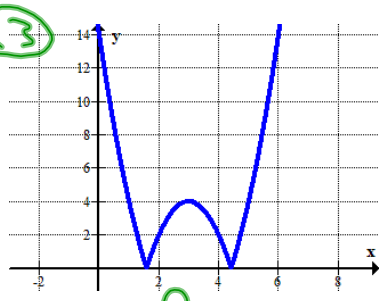
A

2



F

3

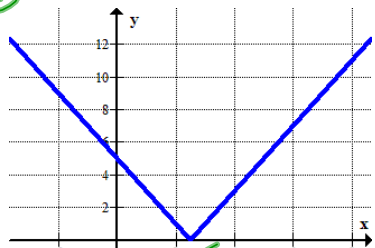


B

Pull

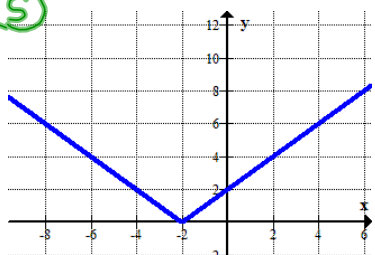
Pull to here

4



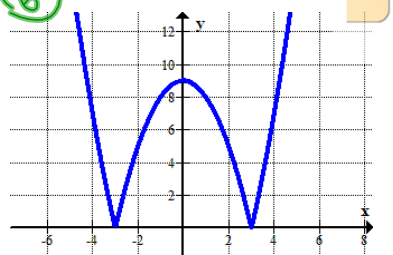
E

5



C

6



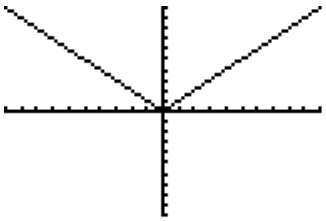
D

Pull

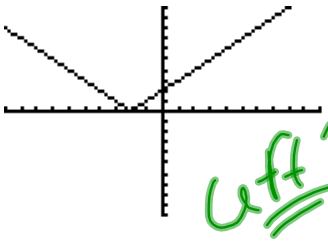
Pull to here

# Let's examine linear absolute value functions:

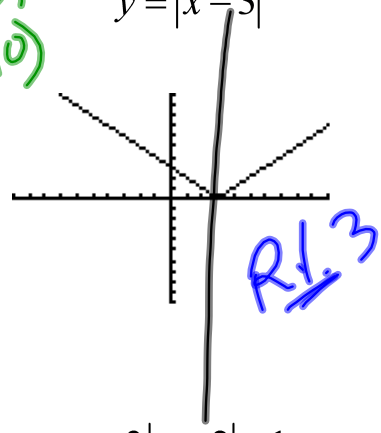
$y = |x|$



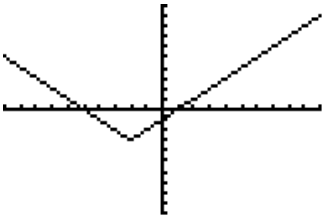
$y = |x+2|$



$y = |x-3|$

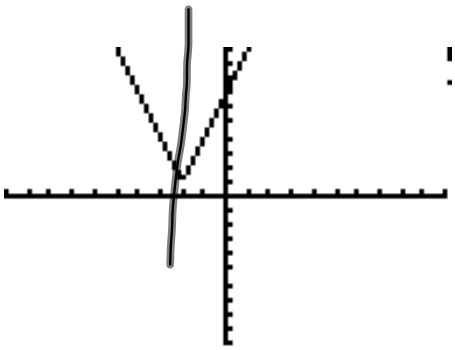


$y = |x+2| - 3$

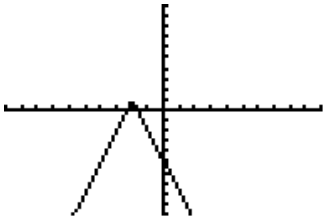


$y = |x+2| + 1$

$y = 3|x+2| + 1$



$y = -3|x+2| + 1$



Let's summarize our findings:

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

(LINEAR)

Shape? Vertex? Direction opens?

V-shape (h, k)

$a > 0 \rightarrow$ up

$a < 0 \rightarrow$ down

Width of opening

$|a| > 1 \Rightarrow$ Narrower

$0 < |a| < 1 \Rightarrow$ wider

Axis of Symmetry? Domain? Range?

$x = h$

$x \in R$

$y \geq k$ (opens up)

$y \leq k$ (opens down)