



### Problem 1 – Defining and Plotting Absolute Value

Explore the number line on page 1.3. Grab the point on the bottom of the arrow and drag it around to make observations.

1. What happens to the absolute value when the point on the number line is on the left?
2. a.  $|10.5| =$  \_\_\_\_\_  
b.  $|-12| =$  \_\_\_\_\_

Page 1.6 allows you to plot the points and see the graph. In Column A, enter numbers between  $-4$  and  $4$ , including negative and positive integers and non-integers.

3. What trend do you notice about the  $y$ -values as you enter negative values into the table? Describe the shape of the graph to the left of  $x = 0$ ?

On the graph, click on one of the points you have plotted. Drag this point to the right and left.

4. What happens to the point?
5. Describe the shape of the graph of  $y = |x|$ .

### Problem 2 – Exploring Functions with Absolute Value

Now you will explore how changing parts of an absolute value function affects the graph.

On page 2.2, use the slider to change the values of  $a$ . Add a table of values by pressing  $\text{ctrl} + \text{T}$ .

6. What happens to the graph when  $a$  is negative? When  $a$  is positive?
7. In general, what effect does  $a$  have on the graph?



On page 2.4, use the sliders to change the values of  $c$  and  $d$ . First, leave  $c = 0$  and change  $d$ . Then have  $d = 0$  and change  $c$ . Finally, observe what happens when both are changed.

8. a. What happens to the graph when  $d$  is positive? When  $d$  is negative?
  
  
  
  
  
  
  
  
  
  
- b. What happens to the graph when  $c$  is positive? When  $c$  is negative?
  
  
  
  
  
  
  
  
  
  
- c. For this general function  $y = |x + d| + c$ , what are the coordinates of the vertex?

### Problem 3 – Matching Equations to Graphs

For pages 3.2 to 3.5, match the equation to the graph shown. Check your answer and if you do not get the correct answer the first time, try again.

9. Page 3.2: What is the vertex? \_\_\_\_\_ Equation? \_\_\_\_\_
  
  
  
  
  
  
  
  
  
  
10. Page 3.3: What is the vertex? \_\_\_\_\_ Equation? \_\_\_\_\_
  
  
  
  
  
  
  
  
  
  
11. Page 3.4: What is the vertex? \_\_\_\_\_ Equation? \_\_\_\_\_
  
  
  
  
  
  
  
  
  
  
12. Page 3.5: What is the vertex? \_\_\_\_\_ Equation? \_\_\_\_\_

### Extension – General Absolute Value Function

13. Explore page 4.2. What does the graph look like when  $a$  is zero? What about when  $b$  is zero? Explain why.
  
  
  
  
  
  
  
  
  
  
14. List any other observations. For example, how is the slope related to  $a$  and  $b$ ? Is the vertex always  $(-d, c)$ ?