

Exploring Absolute Value

Starter Questions:

Find the value of

$$|5|, |-5|, |-2 \cdot 3|, |-5 + 6|, |7 - 11|, |3| - |2| + 5|3|$$

Part I:

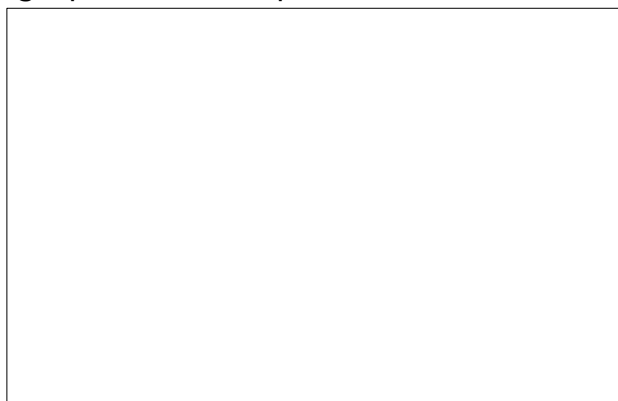
Press Y=. Enter the equation $y = |x|$ in your graphing calculator. ($|x|$ is absolute value and is found under the MATH key). So your equation should say $y1 = \text{abs}(x)$.

Press TBLSET and set TblMin = -3 and $\Delta t|b| = 1$

Create a table of value for this equation.

x	y1

Press ZOOM 4. Decimal and create a graph for this equation.



Trace along the graph. The bottom of the screen should show you some of the coordinates on the graph. Record at least 5 coordinates on the graph.

What do you notice about the y-coordinates in the table and the graph?

Change the graph of y1 to a heavy line. Re-graph the equation.

Enter a new equation in y2 that equals $y = x$.

Graph the two equations. When are the two equations the same?

Turn off y2. Enter a new equation in y3 that equals $y = -x$.

Graph the two equations. When are the two equations the same?

So $y = |x|$ is really made of up two parts. $y = |x|$ One part is $y = x$ and one part is $y = -x$. We can write this in a new way:

$$y = \begin{cases} x, & \text{when } x \text{ _____} \\ -x, & \text{when } x \text{ _____} \end{cases}$$

Part II:

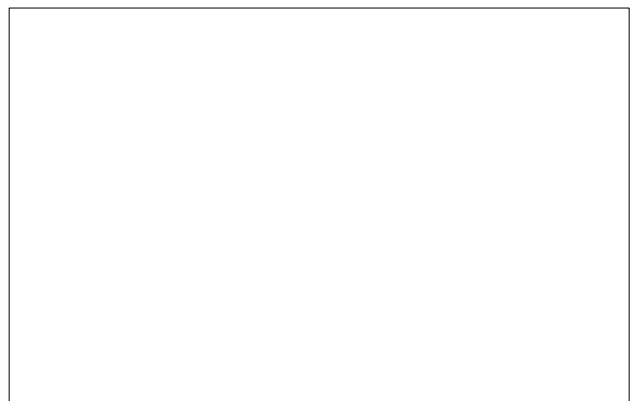
Press $Y=$. Enter the equation $y = |2x|$ in your graphing calculator. So your equation should say $y1=abs(2x)$.

Press $TBLSET$ and set $TblMin = -3$ and $\Delta tbl = 1$

Create a table of value for this equation.

x	y1

Press $ZOOM$ 4. Decimal and create a graph for this equation.



Trace along the graph. The bottom of the screen should show you some of the coordinates on the graph. Record at least 5 coordinates on the graph.

What do you notice about the y-coordinates in the table and the graph?

The graph is again made up of two parts. What graph do you think it is graphing when x is greater than zero?

Enter that equation in $y2$. Graph the two equations. Were you right?

Turn off $y2$. What graph do you think it is graphing when x is less than zero?
Enter that equation in $y3$. Graph the two equations. Were you right?

Graph the two equations. When are the two equations the same?

So $y = |2x|$ is really made of up two parts. One part is $y = \underline{\hspace{2cm}}$ and one part is $y = \underline{\hspace{2cm}}$. We can write this in a new way:

$$y = \begin{cases} \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \end{cases}$$

Part III:

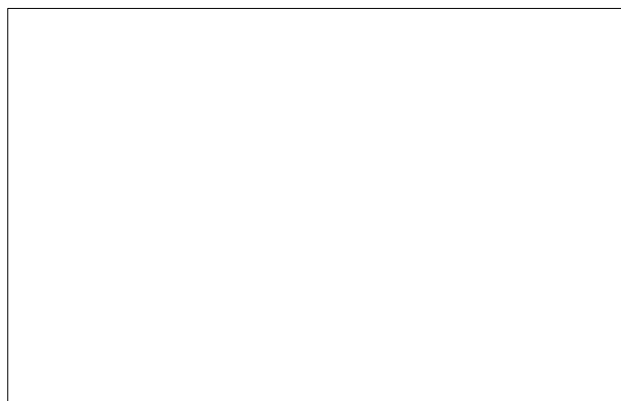
Press Y=. Enter the equation $y = |x+1|$ in your graphing calculator. So your equation should say $y1 = \text{abs}(x+1)$.

Press TBLSET and set TblMin = -3 and $\Delta tbl = 1$

Create a table of value for this equation.

x	y1

Press ZOOM 4. Decimal and create a graph for this equation.



Trace along the graph. The bottom of the screen should show you some of the coordinates on the graph. Record at least 5 coordinates on the graph.

What do you notice about the y-coordinates in the table and the graph?

The graph is again made up of two parts. What graph do you think it is graphing when x is greater than zero?

Enter that equation in y2. Graph the two equations. Were you right?

Turn off y2. What graph do you think it is graphing when x is less than zero? Enter that equation in y3. Graph the two equations. Were you right?

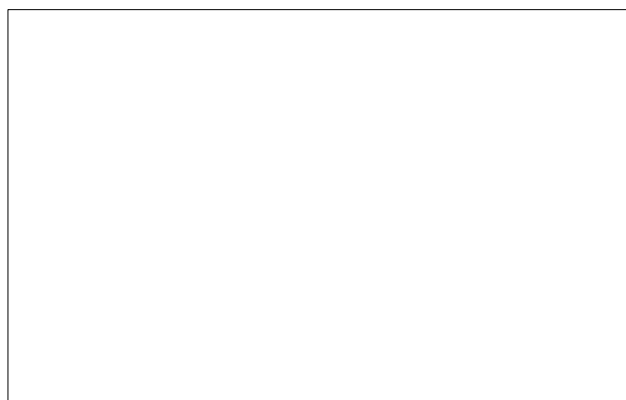
Graph the two equations. When are the two equations the same?

So $y = |x + 1|$ is really made of up two parts. One part is $y = \underline{\hspace{2cm}}$ and one part is $y = \underline{\hspace{2cm}}$. We can write this in a new way:

$$y = \begin{cases} \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \end{cases}$$

Part IV:

Can you predict what the graph of $y = |x - 1|$ will look like? First make a guess and then enter it in your calculator.



What is the new way to write this equation?

$$y = \begin{cases} \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}}, & \text{when } x \underline{\hspace{2cm}} \end{cases}$$