

Introducing the Absolute Value Function

ID: 8196

 Time required
 30 minutes

Activity Overview

Students will examine data by comparing individual data points to the mean by finding the difference (positive or negative) and the distance from the mean, plot the distances versus the differences to examine the shape of the plot, investigate the absolute value function in the Y= register to model the relationship between the distances and the differences, and extend the investigation of absolute value equations by examining tables and graphs.

Topic: Linear Equations

- *Solve a linear equation involving absolute value.*

Teacher Preparation and Notes

- *This activity is designed to be used in an Algebra 1 classroom.*
- *Prior to beginning this activity, students should have experience graphing linear functions and analyzing simple graphs and function tables.*
- *Information for an optional extension is provided at the end of this activity on the student worksheet. Should you not wish students to complete the extension, you may have students disregard that portion of the student worksheet.*
- *Prior to beginning the activity, students should clear out any functions from the Y= screen and any data from the Lists.*
- ***To download the student worksheet, go to education.ti.com/exchange and enter "8196" in the keyword search box.***

Associated Materials

- *AbsoluteValueFunction_Student.doc*

In this activity, students will examine data by comparing individual data points to the mean by finding the difference (positive or negative) and the distance from the mean, plot the distances versus the differences to examine the shape of the plot, investigate the absolute value function in the Y= register to model the relationship between the distances and the differences, and extend the investigation of absolute value equations by examining tables and graphs.

Students are given temperatures for the first 12 days of February:

43, 49, 47, 42, 54, 55, 58, 58, 61, 62, 49, 46.

They will enter the data in L1.

```

3000 CALC TESTS
1:Edit...
2:SortA(
3:SortD(
4:ClrList
5:SetUpEditor
    
```

L1	L2	L3	1
58			
58			
61			
62			
49			
46			
L1(13) =			

Students will calculate the mean of the data using the **mean** command from the List Math menu. They will use L2 to calculate the difference between the data values and the mean. Students should make observations about the results in L2.

L1	L2	L3	2
43	-----	-----	
49			
47			
42			
54			
55			
58			
L2 = L1 - 52			

In L3, students will enter the distance of each value in L1 from the mean into L3. They should notice that the entries in L3 are the 'positive versions' of the entries in L2.

L1	L2	L3	3
58	6	6	
58	6	6	
61	9	9	
62	10	10	
49	-3	3	
46	-6	6	
-----	-----	-----	
L3(13) =			

Next, students will create a scatter plot comparing the distances to the differences (L3 to L2) using the settings to the right.

```

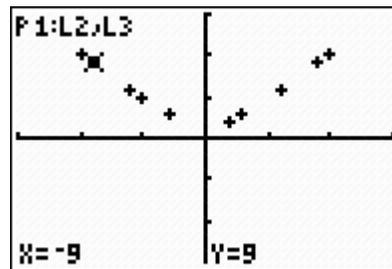
5:STAT PLOTS
1:Plot1...Off
  [ ] L1 L2
2:Plot2...Off
  [ ] L1 L2
3:Plot3...Off
  [ ] L1 L2
4:PlotsOff
    
```

Students should use the window settings to the right to view the scatter plot.

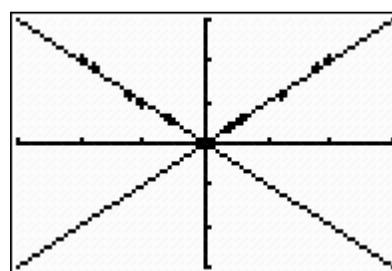
```

WINDOW
Xmin=-15
Xmax=15
Xscl=5
Ymin=-15
Ymax=15
Yscl=5
Xres=1
    
```

Students will observe that x is negative whenever the temperature was lower than the mean and that y will not be negative because distances are positive.



Next, they will graph $y = x$ and $y = -x$ to find the relationship between the graphs of the equations and the scatter plot. They also make observations using the table.



Students then graph $y = \text{abs}(x)$ and compare the absolute value function to $y = x$ and $y = -x$.

```

MODE Plot2 Plot3
Y1=X
Y2=-X
Y3=abs(X)
Y4=
Y5=
Y6=
Y7=
    
```

Extension

As an extension, students will explore transformations of the absolute value function.

