

## *All Washed Up* Investigating *Real Numbers* with the *fx-9750G PLUS* An Algebra Activity

Pose the following questions to your class:

- Have your parents ever complained about the length of time you stay in the shower?  
(Some will answer “yes” – ask them why they think that might be)
- How much does a shower cost?
- What about a bath?
- Which costs more?

Let’s look at some real data to begin to answer some of these questions.

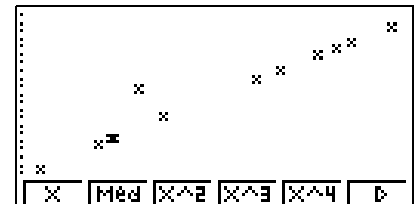
In List 1, have students enter the following amounts of water usage for one family from August, 2003 through July, 2004 in an upstate South Carolina town: 4800, 4400, 2600, 4700, 6300, 13100, 10900, 9800, 11900, 11400, 9000, 5600.

In List 2, have them enter the corresponding water bill charges in dollars: 30.83, 29.45, 23.22, 30.48, 36.02, 59.31, 51.85, 48.13, 55.23, 53.55, 45.36, 43.25.

Ask students whether they see any patterns in the data. To graph the data, select F1 (GRPH), F6 (SET), select Scatter, List 1, List 2, etc. then F1, (GPH1). Ask students to describe the graph and have them explain why it is linear in shape.

List 1	List 2	List 3	List 4
1 4800	30.83		
2 4400	29.45		
3 2600	23.22		
4 4700	30.48		
5 6300	36.02		

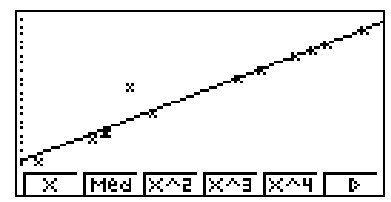
StatGraph1	
Graph Type	:Scatter
XList	:List1
YList	:List2
Frequency	:1
Mark Type	:*



Have them press F1 (X) to see the regression equation. Ask them to explain the meaning of a and b in the context of our problem. Tell them to press F5, EXE to copy the equation into the y = screen and then F6 to draw the line.

LinearReg	
a	=3.2809E-03
b	=16.3857191
r	=0.9733178
r <sup>2</sup>	=0.94734755
y=ax+b	

Graph Func	
Y1=	
Y2:	
Y3:	
Y4:	
Y5:	
Y6:	
To Store : [EXE]	



How much did a gallon of water cost this family each month during the year in question?

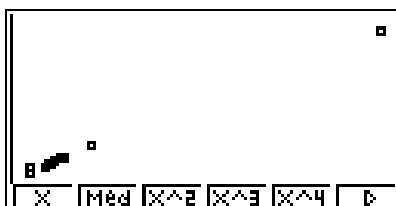
In List 3, have students enter the following amounts of water usage for the same family from August, 2004 through July, 2005: 10600, 11400, 8300, 9700, 10300, 14200, 9700, 41500, 10400, 11500, 10100, 8500.

In List 4, have them enter the corresponding water bill charges in dollars: 61.50, 64.42, 53.11, 58.22, 60.41, 74.64, 58.22, 174.29, 60.77, 64.79, 59.68, 57.42.

Ask students if they see any patterns. Are these data consistent with the year before? Have them brainstorm explanations for March, 2005. (Actually, there was a water line break near the house that went unnoticed for several days.)

Have them set up the graph in Graph 2 and store the regression equation in Y2.

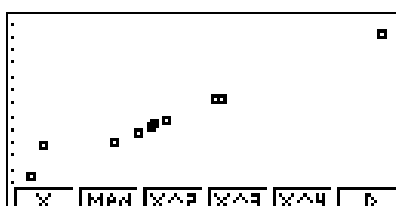
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StatGraph2
Graph Type : Scatter
XList      : List3
YList      : List4
Frequency  : 1
Mark Type  : □
GP1 GP2 GP3
```



```
LinearReg
a = 3.6322E-03
b = 23.3423549
r = 0.99952292
r² = 0.99904607
y = ax + b
COPY DRAW
```

Discuss the meaning of a and b in the context of the new situation with the students. Suggest that they delete the data points (press F6, F3 (DEL) for March 2005) and repeat the exercise.

	List 1	List 2	List 3	List 4
4	4700	30.48	9700	58.22
5	6300	36.02	10300	60.41
6	13100	59.31	14200	74.64
7	10900	51.85	9700	58.22
8	9800	48.13	10400	174.29



```
LinearReg
a = 3.3814E-03
b = 25.9390356
r = 0.98377365
r² = 0.9678106
y = ax + b
COPY DRAW
```

Ask students to discuss why the values of a and b are slightly different.

Have them compare the first and second years' results.

Considering our original questions, ask them how they might use what they have found out about the cost of a gallon of water to determine how much a shower or bath would cost? Have them research the question of how much water a shower or bath takes.