Got Linear Equations?

Now Let's See What They Mean

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Analyzing a Scatter Plot – The Wave

How did you organize the experiment?

What happened when you had to "redo" a time with the same number of people?

Did all the points fall directly on a line? Why or why not?

Did you always have everyone in the same order? Would it have mattered if you changed the order?

What effect could one person have on the time?

What could change from one session to the next?

Sometimes I heard the groups saying, "Aw, that's not right. It's messed up." How did you know?

What was the independent variable? The dependent variable?

Create a scatterplot of the data you collected with the graphing calculator.

Does it show a positive, negative, or no correlation?

- What did you see in the table to show you that?

- What did you see in the graph?

Use the calculator to find the line of best fit. Write it here: _____

What is the y-intercept according to the equation? What does that mean for our experiment?

What is the slope? What does that mean for our experiment?

Does every point on the line of best fit make sense? Why or why not?

Our entire class has _____ students. Use your equation to determine how long it would take to have the entire class do the wave. Should you round the answer? Why or why not?If you did, why did you round up or why did you round down?

How many students would we need to have in order to have a wave that lasted 15 seconds? (Use the equation.) Should you round the answer? Why or why not?If you did, why did you round up or why did you round down?

Write down the equations from the other 2 groups.

Did all of the groups get the same numbers? Why?

Compare your slopes. What does that mean happened in the experiments?

Bouncing Around

Pair up (if in an odd number then do a group of 3)

One person will be the timer so they should hold the stopwatch

The second person will bounce the tennis ball.

The bouncer should count how many times they bounced the ball (how many times it hit the floor) given a certain amount of time

The timer will tell the bouncer when to start and when to stop.

Create a table like the following in your notebook and fill it in as you work through the experiment.

Time (seconds)	# of bounces
5	
10	
15	
20	
25	
30	

Need for Speed

The cardboard will be used as a ramp for the trains.

Use the ruler to measure how high one side of the cardboard will be.

One person will hold the cardboard and release the train.

The second person will tell the "release" person to start and stop and will time how long it takes the train to hit the floor.

Create a table like the following in your notebook and fill it in as you work through the experiment.

Height of ramp (in)	Time (s)
1	
1.5	
2	
2.5	
3	

Leaky Faucet

Each person will do this individually.

Lay out a paper towel.

Start in one area of the towel and make one drop. Measure the diameter of the circle created.

Repeat using the number of drops indicated.

Create a table like the following in your notebook and fill it in as you work through the experiment.

# of drops	Diameter (cm)
1	
2	
3	
4	
5	

I Once Caught a Fish This Big…

As a group, measure each person's height in inches.

Next measure each person's wing span. This means measure the distance from middle finger tip to middle finger tip when he/she holds her arms out as wide as possible. Make this measurement by going across the back.

Create a table like the following in your notebook and fill it in as you work through the experiment.

Height (in)	Wing span (in)

Drop it like it's hot

One person will stand holding the tennis ball at the top of the meter stick.

The second person will kneel down to be eye level with the middle of the meter stick.

The first person will drop the ball (do not throw, just release it) from a certain height and the second person will attempt to determine how high the ball bounced on its first bounce.

Create a table like the following in your notebook and fill it in as you work through the experiment.

Release height (cm)	Bounce height (cm)
100	
90	
80	
70	
60	

Linear Modeling Project

For this project, you will use data collected in one of the experiments we did in class.

Requirements:

- This project must be TYPED.
- You must have your name on the project.

For the experiment you choose, you will:

- Write a brief description of the experiment
    - Within your description, describe any factors that may have effected the data.
- Include a typed version of the data table (label each column)
- Create a graph of the data using technology (I suggest Excel)
    - On the graph, you will have the data points, label the axes, and have the line of best fit with the equation of that line on the graph
- Discuss why all the points did not fall exactly on the line.
- Identify the independent and dependent variables. How did you determine which was which?
- Identify the type of correlation (positive/negative and weak/strong/perfect) and describe how this was determined
- Interpret the y-intercept (and determine if it makes sense in this problem) and slope based on the equation of the line of best fit
- Answer: Does every point on the line of best fit make sense? Why or why not?
- Write 2 future prediction questions.
    - One question should provide the independent variable and ask for the dependent and the second should provide the dependent variable and ask for the independent.

  Find the answers to your equations by using the given regression (line of best fit) equation. SHOW WORK!!!!!

Rubric:
Description of experiment: 5
Data table: 2
Graph: 7
Correct use of unit vocabulary: 2
Proper use of periods and capitals: 2
Identification of independent and dependent variables: 4
Identification of correlation: 5
Interpretation of slope and y-intercept: 10
Answering the question of each line making sense: 3
Future prediction questions (5 points each): 10

Total: 50

Name:	
Description of experiment:	/2
Data table:	/2
Graph:	/10
Identification of independent and dependent variables:	/4
Identification of correlation:	/5
Interpretation of slope and y-intercept:	/10
Does every point on the line make sense?	/3
Future prediction question 1:	/7
Future prediction question 2:	/7
Total:	/50

Name:	
Description of experiment:	/2
Data table:	/2
Graph:	/10
Identification of independent and dependent variables:	/4
Identification of correlation:	/5
Interpretation of slope and y-intercept:	/10
Does every point on the line make sense?	/3
Future prediction question 1:	/7
Future prediction question 2:	/7
Total:	/50

Bouncing Around (Linear Modeling Project)

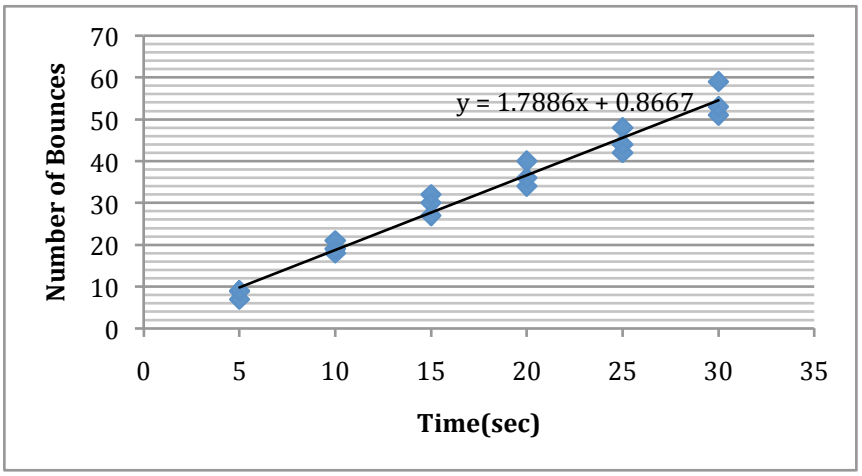
By Ryan

Period 3

In this experiment, you bounce a ball for a certain time and record how many bounces you got in that time. Some things that could affect the experiment is if the person doesn't count right, the timer doesn't tell the person bouncing when to stop at the right time, and if the ball rolls around and you have to get it. This last one happened to me and Kyle a lot.

Time in seconds	Number of Bounces
5	9
5	7
5	9
10	21
10	19
10	18
15	32
15	30
15	27
20	40
20	36
20	34
25	44
25	48
25	42
30	59
30	51
30	53

All the points didn't fall on the line for a couple of reasons. One reason not all points are on the line is that I used three different sets of data that were all different. Another reason is that humans are not a machine, so the ball does not bounce 1.7886 times per second. That would be impossible.



The independent variable in this experiment is the time you had to bounce the ball, and the dependent variable was the number of times you bounced the ball in that period of time. I knew this because the independent variable is the variable that affects the dependent variable. The time you had to bounce the ball affected how many bounces you can do in a certain period of time.

The correlation I saw in this problem was a medium strong, positive correlation. I figure this out with two things. The table showed that it is a positive correlation because as the *x*s go up, the *y*s also go up. The graph showed me again that it was a positive correlation because it has a positive slope. It also showed me that most of the points are on or near the line, but some are about 5 bounces away. That would make it not strong, but also not weak. I would describe it as a medium strong, positive correlation.

The equation for this experiment is y=1.79x+0.87. The y-intercept is 0.87. This means that after 0 seconds, you should have bounced the ball 0.87 times. This doesn't make sense because after 0 seconds, you should have been not able to bounce the ball at all. The slope of this equation is 1.79. This means that every second you bounce the ball you should get 1.79 more bounces than one second less.

Not every point on the line makes sense. There are a couple of examples.

1. The y-intercept (as described above)
2. There can't be any points in quadrants 2-4 because you can't have negative time or a negative amount of bounces
3. You can't have a fraction of a bounce

For an example of how I used the equations, I tried to figure out how many bounces you can do in a minute. I plugged in 60(sec) for x so my equation was y=1.79(60) + 0.87. I solved the equation and got y=108.27. This means that you will probably bounce the ball 108 times in a minute. I rounded because there can't be a fraction of a bounce. I rounded down because the ball didn't bounce a complete 109 times.

For another example I decided to find out how long it would take to bounce the ball 100 times. I plugged in 100 for y and solved for x. My equation, with y plugged in, was 100=1.79x+0.87. I subtracted 0.87 from each side so my equation was now 99.13=1.79x. I divided each side by 1.79, and got my final answer that x (how long it would take for someone to bounce a ball 100 times) = 55.38 sec.

Katelyn

11-3-2011

Period 3

Linear Modeling Project

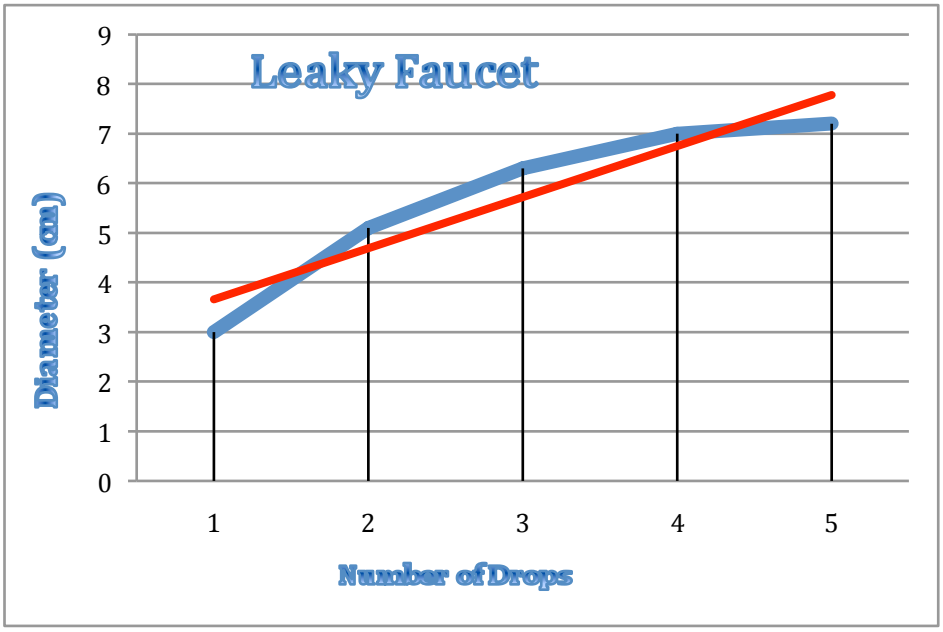
Type 3 Writing Prompt

To do the "Leaky Faucet" experiment, one had to drop one drop of water first on a piece of paper, then record the diameter of that spread, in centimeters. After that, one would put two repeated drops on the paper, record the diameter, and so on until one reaches 5 repeated drops. A factor that could affect the data is the fact that some spreads may interfere with other spreads, and one cannot keep track of which one is which. Also, one could have put a larger drop for one drop and a smaller one for another.

This is a typed version of the data table.

# of drops	Diameter (cm)
1	3
2	5.1
3	6.3
4	7
5	7.2

This is a graph of the data. (The line of best fit is in the red.)



All of the points did not fall exactly on the line because of all the factors that could affect the data. The factors are:

- Some spreads may interfere with the others
- One may put larger drops on one drop and a smaller one on the other.
- *TEACHER NOTE: Also looking for the students recognizing that there could not be a fraction of a drop.*

The number of drops is the independent variable and the diameter is the dependent variable. I determined which was which by thinking: "Does the number of drops depend on the diameter or does the diameter depend on the number of drops?" The answer to that question was that the diameter depends on the number of drops because one can change the number of drops, but not the diameter.

The type of correlation is positive and strong. It is positive because the line on the graph is going in the positive direction, and the line is strong because it is not a perfect, straight line, but it isn't a weak one either.

The y-intercept is (0,3). This means that if one puts 0 drops on the piece of paper, then it will be 3 cm in diameter. (This does not make sense.) The slope is 1, and that means that every time one puts one drop on the paper, the diameter of the spread will increase by about 1 cm.

Not every point on the line makes sense. The y-intercept doesn't make sense because the diameter of the drop can't be 3 cm if there is nothing on the paper. These are the two future prediction questions:

1. At 8 drops, what would the diameter of the spread be?

   y= x+3
   x= 8
   y= (8)+3
   y= 11
   The diameter of the spread would be about 11 cm.

2. If the diameter was 9 cm, then how many drops is that?

   y= x+3
   y= 9
   9= x+3
   9-3= x
   6= x
   One would have put on about 6 drops if the diameter was 9 cm.