

WAMC Lab Template

Math Concept(s): Finding the line of best fit using technology

Source / Text: Cord Algebra 1 after the completion of Chapter 7 Section 3 (also refer to Holt Algebra I Linear Regression Lesson)

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E-Mail: Date: Summer In-service 2013

Attach the following documents:

Lab Instructions: See attached.

Student Handout(s): See attached.

Rubric and/or Assessment Tool: Formative assessment is observation students while completing lab and listening to their discussions. Summative assessment is attached.

Short Description (Be sure to include where in your instruction this lab takes place):

Lab Plan

Lab Title: That's the Way the Ball Bounces

Prerequisite skills: Find the slope and y-intercept from a set of data points and an approximate line of best fit.

Lab objective: Using data collected in experimental form, find the best fitting line that describes the rebound bounce of the ball.

Standards:

CCSS-M:

- F-IF A 1, 2
- F-IF B 4, 5, 6

Standards for Mathematical Practice:

- 1, 4, 5, 6

State Standards addressed (2008 Washington State Mathematics Standards):

- A1.6.D

Reading:

- N/A

Writing:

- N/A

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Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

- Global Awareness Financial/Economic/Business/Entrepreneurial Literacy Civic Literacy
 Health/Safety Literacy Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation

- Think Creatively
X Work Creatively with Others
 Implement Innovations

Critical Thinking and Problem Solving

- X Reason Effectively
 Use Systems Thinking
 Make Judgments and Decisions
X Solve Problems

Communication and Collaboration

- X Communicate Clearly
X Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy

- Access and Evaluate Information
X Use and manage Information

Media Literacy

- Analyze Media
 Create Media Products

Information, Communications and Technology (ICT Literacy)

- X Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability

- X Adapt to Change
X Be Flexible

Initiative and Self-Direction

- Manage Goals and Time
 Work Independently

Social and Cross-Cultural

- X Interact Effectively with Others
X Work Effectively in Diverse Teams

Productivity and

Accountability

- Manage Projects
X Produce Results

Leadership and

Responsibility

- X Guide and Lead Others
X Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Video clip of testing ball drop before game
- Variety of balls: basketballs, soccer balls, volleyballs, tennis balls, whiffle balls, nerf balls
- Measuring tape
- Graphing Calculators

Set-Up Required:

- Students will set up their stations to complete the lab. Make sure there is enough wall space for students to hold tapes and sufficient floor space for the balls to bounce.

Lab Organization Strategies:

Grouping/Leadership/Presentation Opportunities:

- Groups of 4 picked by the students.

Cooperative Learning:

- Roles: Dropper, Tape Holder, Rebound Reader and Data Recorder.

Expectations:

- Have students collect data, plot data, read data, and then calculate the line of best fit.

Timeline:

- 40 to 50 minutes

Post Lab Follow-Up/conclusions:

Discuss real world application of learning from lab

- A fun and interactive way of learning how to calculate the line of best fit to get students prepared for the EOC.

Career Applications

- Insurance actuaries or NBA ref.

Optional or Extension Activities

- Given the line of best fit from students' data, can students predict the rebound of the ball dropped from heights outside the data set like the Extreme Scream.
- At what inflation would the ball have to be at for the ball to rebound to 50% of its drop height?

Learning Target: Using data collected in experimental form, find the best fitting line that describes the rebound bounce of the ball.

Materials Needed:

- Group of four
- Two different balls
- A measuring tape
- Graphing Calculator

Using the following sets of data and a graphing calculator, find the best fitting line using the Stat and Linear Regression functions. Round the slope and y-intercept to the nearest ten-thousandth.

1.

X	50	75	80	100	150	175	210	250	260	320
Y	0.3	0.5	0.6	0.7	0.75	0.85	1.05	0.9	1.1	1.15

Line of Best Fit:

2.

X	4	7	8.5	10	11	14	15	16	18	19
Y	150	450	600	600	900	1100	1250	1400	1400	1650

Line of Best Fit:

When everyone agrees on the answers to all the above questions and can explain how to get them using a graphing calculator, have Mr. Horton check them.

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Now, get the materials needed to perform the experiment.

Experiment Procedures:

1. Drop the ball three times from each height in the table below.
2. Record the height of the rebound bounce after each drop.
3. Average the rebound bounces.
4. Calculate the line of best fit describing the rebound bounce of each ball using a graphing calculator.

Starting Height	Type of Ball:				Type of Ball:			
	Trial Number			Average	Trial Number			Average
	1	2	3	Bounce	1	2	3	Bounce
200 cm								
175 cm								
150 cm								
125 cm								
100 cm								
75 cm								
50 cm								
25 cm								

1. Create a graph on a coordinate system for each set of data with the axis properly labeled.
2. Sketch the approximate line of best fit for each set of data on its appropriate graph and calculate the equation using points from the line you drew.
3. Using the graphing calculator, find the line of best fit for each set of data and explain what the slope and y-intercept mean in this situation.
4. Using your line of best fit from each set of data, calculate what the rebound of each the ball would be if it were dropped from the top of the Extreme Scream (185 feet tall)?

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Assessment

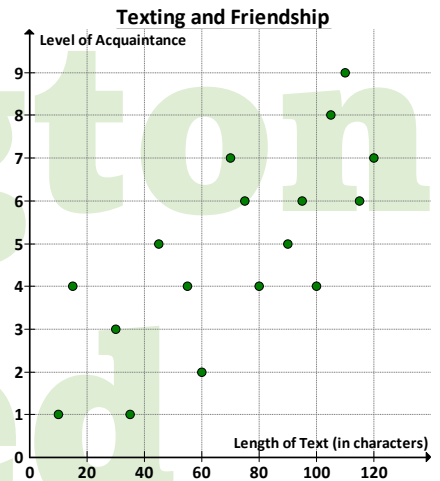
Show your understanding of lines of best fit by completing the following

1. Joe graphed the relationship between texting and friendship.

- Draw a line of best fit that models this data.
- Which equation represents a line that fits the data?

(Circle AND explain your choice.)

- $y = 0.12L + 0.5$
- $y = 0.25L + 0.5$
- $y = 0.06L + 0.5$
- $y = \frac{120}{8}L + 0.5$



Explanation:

2. The Super Cool Math Club owns their own donut shop and they are tracking their profits. The following table shows some data that they have collected.

# of donuts sold	15	17	30	38	45	55	59	70	78
Profits (\$)	1	3	12	19	24	31	34	43	49

- Using technology, what is the equation for the line of best fit?
- Using the line of best fit above, explain the meaning of the slope for the donut shop.

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- Using the line of best fit above, explain the meaning of the vertical intercept for the donut shop

- Using the line of best fit, predict the profit for the sale of 35 doughnuts. Explain your confidence in your prediction.

Washington

- Predict the profit for the sale of 120 doughnuts and explain your confidence in your prediction.

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