

WAMC Lab – Algebra 1 – Statistics Unit

Math Concept(s): Describe trends and variability of data with two quantitative variables.

Arguments for correlation versus causation

Source / Text: N/A

Developed by: Kathryn Batts

E-Mail: kabatts@seattleschools.org

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Attach the following documents:

Lab Instructions

Students will work in pairs to measure and record data. All data will be organized in a class excel sheet. Once the various measurements are recorded as a class, students will choose two variables to compare in a scatter plot. Students will copy the data into a table (making sure to have different variable pairings within each group different relationships can be compared.

Students will graph the data then describe any relationship between the variables. Students will compare their results with others in their group and describe which relationships have stronger relationships. IF there is a correlation, is it positive or negative? (If students have graphing calculators, students can find the line of best fit using Linear Regression, otherwise they can approximate a line of fit to help with analysis).

Student Handout(s)

Attached worksheet

Rubric and/or Assessment Tool

Check list:

Students have completed measurements

Table recorded compares two variables

Scatter plot and line of fit

Answered questions

Indicate “SPECIFIC” relationship to Science, Technology, or Engineering

Science – attend to precision with measurements

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

Lab Plan

Lab Title: How are we related?

Prerequisite skills: Graphing, drawing a line of fit, familiar with correlation vocabulary

Lab objective: Compare quantitative data in two variables and describe relationships. Also to compare different types of relationships.

Standards:

Mathematics K–12 Learning Standards:

- S-ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- S-ID.C.9 Distinguish between correlation and causation.

Standards for Mathematical Practice:

- MP1 – Make sense of problems and persevere in solving them.
- MP3 – Construct viable arguments and critique the reasoning of others.
- MP5 – Use appropriate tools strategically
- MP6 – Attend to precision

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- L.11-12.3 Knowledge of Language

Leadership/21st Century Skills:

<p><u>21st Century Interdisciplinary themes</u> (Check those that apply to the above activity.)</p> <input type="checkbox"/> Global Awareness <input type="checkbox"/> Financial/Economic/Business/Entrepreneurial Literacy <input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health/Safety Literacy <input type="checkbox"/> Environmental Literacy			
<p><u>21st Century Skills</u> (Check those that students will demonstrate in the above activity.)</p>			
<p>LEARNING AND INNOVATION</p> <p><u>Creativity and Innovation</u></p> <input checked="" type="checkbox"/> Think Creatively <input checked="" type="checkbox"/> Work Creatively with Others <input type="checkbox"/> Implement Innovations <p><u>Critical Thinking and Problem Solving</u></p> <input checked="" type="checkbox"/> Reason Effectively <input type="checkbox"/> Use Systems Thinking <input checked="" type="checkbox"/> Make Judgments and Decisions <input type="checkbox"/> Solve Problems <p><u>Communication and Collaboration</u></p> <input checked="" type="checkbox"/> Communicate Clearly <input checked="" type="checkbox"/> Collaborate with Others	<p>INFORMATION, MEDIA & TECHNOLOGY SKILLS</p> <p><u>Information Literacy</u></p> <input type="checkbox"/> Access and Evaluate Information <input type="checkbox"/> Use and manage Information <p><u>Media Literacy</u></p> <input type="checkbox"/> Analyze Media <input type="checkbox"/> Create Media Products <p><u>Information, Communications and Technology (ICT Literacy)</u></p> <input type="checkbox"/> Apply Technology Effectively	<p>LIFE & CAREER SKILLS</p> <p><u>Flexibility and Adaptability</u></p> <input type="checkbox"/> Adapt to Change <input checked="" type="checkbox"/> Be Flexible <p><u>Initiative and Self-Direction</u></p> <input checked="" type="checkbox"/> Manage Goals and Time <input type="checkbox"/> Work Independently <input checked="" type="checkbox"/> Be Self-Directed Learners <p><u>Social and Cross-Cultural</u></p> <input type="checkbox"/> Interact Effectively with Others <input checked="" type="checkbox"/> Work Effectively in Diverse Teams	<p>Productivity and Accountability</p> <input type="checkbox"/> Manage Projects <input checked="" type="checkbox"/> Produce Results <p>Leadership and Responsibility</p> <input type="checkbox"/> Guide and Lead Others <input checked="" type="checkbox"/> Be Responsible to Others

Council

<https://wa-appliedmath.org/>

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

Materials

- Excel Sheet to record data
- Student Worksheet
- Pencils
- Measuring Tape (Meter sticks optional)
- Graph paper (optional)
- Post-It notes or Tape to mark jump height

Set-Up Required:

- Either tape meter sticks to the wall, for measuring vertical jump, or use measuring tape after post-it note/tape is in place.
- Print worksheets
- Have measuring tapes readily available
- Project Excel Sheet where students will enter data

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will collaborate with others and communicate clearly while gathering data. They will need to be flexible when recording data for the class and if the method of measuring is not effective, they may need to try other strategies. Students will decide which variables to compare and will need to judge which variable combinations have stronger or weaker correlations compared to others.

Cooperative Learning:

- Group students with varying abilities together
- Groups of students will work together to collect data, individually to graph and analyze their scatter plot, and then together again to compare the trends of different graphs.

Expectations:

- Respectfully collaborate in groups
- Collect all measurements in a timely manner
- Record data in class set
- Complete table, graph and follow up questions

Timeline:

- ~5-minute introduction
- 10 minutes Data gathering and recording
- 20 minutes Plotting data
- 10 minutes Answer Questions
- 10 minutes Compare between group members and write a statement or two about the relative correlations. Outside variables that could be effecting the data?

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- How might this data be helpful to someone developing a product?
- What variables did you compare and was it useful to compare these measurements?

Career Applications

- Census Bureau
- Statistician
- Engineering
- Chemists / Scientist

Optional or Extension Activities

- Analyze advertisements that make scatter plots or misleading data
- Critique public opinion articles, court cases, or data that claim causation instead of correlation

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