Lab Template

Text: CORD Hard Bound
Volume: 3ʳᵈ Edition   **Chapter: 7**
Unit number: 19   **Title of unit: Statistics**
Developed by *(Include contact information)***: Justin Timothy**
(timotjj@puyallup.k12.wa.us)
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Attach the Following Documents:
     1. Lab Instructions
     2. Student Handout(s)
     3. Rubric and/or Assessment Tool

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

> This lab is intended to be an introduction to scatter plots. The lab would take place after students have learned slope intercept form and how to plot coordinates and write equations of lines given two points. This lab will help students understand the practical application of scatter plots and challenge them to think of other real world applications. Students will be discovering the linear relationship between femur length and height. Students will be given the opportunity to work in small groups and as a class to collect data and make predications based of their data.

Scatter Plots and the Human Body

LAB PLAN

TEACHER: *(Teacher Prep/Lab Plan)*
     ⚒ **Lab Objective**
Students will be able to record data using measurement tools
Students will be able to organize and display data using a table
Students will be able to graph data from a table thus creating a scatter plot
Students will be able to draw a line of best fit, calculate an equation for their line of best fit and translate between the forms of linear equations (line and equation)

     ⚒ **Statement of prerequisite skills needed**
Graphing ordered pairs on a coordinate grid
Calculating slope using two points
Awareness and comprehension of slope-intercept form (y=mx+b)
Making tables
Using accurate scales and intervals

     ⚒ **Vocabulary**
line of best fit/trend line, positive correlation, negative correlation, strong correlation, weak correlation, scatter plot

- **State Standards addressed:**
  - **Math:**
  <mark>A1.6.A Use and evaluate the accuracy of summary statistics to describe and compare data sets.</mark>
  <mark>A1.6.B Make valid inferences and draw conclusions based on data.</mark>
  <mark>A1.6.E Describe the correlation of data in scatterplots in terms of strong or weak and positive or negative.</mark>
  - **Reading:**
  - **Writing:**
  - **Leadership:**
  Organize materials, demonstrate knowledge in helping a peer

- **Teacher Preparation:** *(What materials and set-up are required for this lesson?)*
  - Materials: Yard or meter sticks, graph paper, rulers
  - Set-Up Required: Desks rearranged to accommodate students moving around room and measuring their body lengths

- **Lab Organizational Strategies:**
  - Grouping/Leadership/Presentation Opportunities: Students will work in groups of two or three. Leadership points will be given to students who take on the group leader role and students that assist in materials management. Students will be given the opportunity to show their line of best fit and discuss the differences between each group's lines of best fit.
  - Cooperative Learning: Students are expected to work together to collect the necessary data for the class activity. Students will also have the opportunity to work together in writing equations and discussing how to draw trend lines.
  - Expectations: Students are expected to stay on task (group leader will be responsible for off task group members) Students are expected to complete their own table, graph, line of best fit and equation.
  - Time-line: 1 Day Lab
    - Intro: 5 min
    - Data collection: 10 min
    - Guided Practice: 20 min
    - Discussion: 10 min
    - Self Practice 10 min

- **Post Lab Follow-Up/Conclusions** *(to be covered after student completes lab)*
  - Discuss real world application of learning from lab:
  Doctors use growth charts (what percentile are the students in) BMI charts,
  Agriculture harvesting crops and making predictions for future harvests based on past harvests
  Scientists use scatter plots all the time. (measure seismic activity, fish populations, forestry statistics ect….)

  - Career Applications: Doctors, Scientists, Marketing, Sales, Economics, Food Industry
  - Optional or Extension Activities: Have student's research linear relationships that can be represented by scatter plots.

Lab Instructions

- Students will be paired in groups of 2 or 3.
- Students will be given instructions to measure each of their femur lengths and heights in inches.
- Students will record their data on a small piece of paper and then have one of their group members write in the data for each person on the board.
- On the white board students will write in their femur length and height in inches in the table provided.
- **Guided practice**
- As a class, with the teacher modeling each student will construct a table of values for the whole class data.
- Make a coordinate grid (Quadrant I) and define intervals, labels, titles, independent and dependent variables.
- Plot data from table on the graph
- Teacher will demonstrate a few points and then let students finish plotting the data
- After all students have plotted the data the class will discuss what a line of best fit is and what a scatter plot looks like, we will also talk about positive and negative correlations and strong and weak correlations. Vocab Time!
- After vocab, have students model lines of best fit on the camera with a ruler, then guide students through drawing their own line of best fit.
- With two points on the line of best fit, calculate the slope, then find the y-intercept and write an equation for the line in slope intercept form
- Have students discuss why some of their equations are different and talk about why this line of best fit and equation may or may not apply to all age groups
- **Self Practice**
- Allow students to have time to complete selected exercises from their text book

Student Handouts

Students will need regular graph paper to complete this assignment.

Assessment Tool

Teacher Name: **Mr. Timothy**

Student Name: _____

CATEGORY	4	3	2	1
Data Table	Data in the table is well organized, accurate, and easy to read.	Data in the table is organized, accurate, and easy to read.	Data in the table is accurate and easy to read.	Data in the table is not accurate and/or cannot be read.
Accuracy of Plot	All points are plotted correctly and are easy to see. A ruler is used to neatly connect the points or make the bars, if not using a computerized graphing program.	All points are plotted correctly and are easy to see.	All points are plotted correctly.	Points are not plotted correctly OR extra points were included.
Title	Title is creative and clearly relates to the problem being graphed (includes dependent and independent variable). It is printed at the top of the graph.	Title clearly relates to the problem being graphed (includes dependent and independent variable) and is printed at the top of the graph.	A title is present at the top of the graph.	A title is not present.
Labeling of X axis	The X axis has a clear, neat label that describes the units used for the independent variable (e.g, days, months, participants\' names).	The X axis has a clear label that describes the units used for the independent variable.	The X axis has a label.	The X axis is not labeled.
Labeling of Y axis	The Y axis has a clear, neat label that describes the units and the dependent variable (e.g, % of dogfood eaten; degree of satisfaction).	The Y axis has a clear label that describes the units and the dependent variable (e.g, % of dogfood eaten; degree of satisfaction).	The Y axis has a label.	The Y axis is not labeled.
Units	All units are described (in a key or with labels) and are appropriately sized for the data set.	Most units are described (in a key or with labels) and are appropriately sized for the data set.	All units are described (in a key or with labels) but are not appropriately sized for the data set.	Units are neither described NOR appropriately sized for the data set.

Line of Best Fit	Line of best fit accurately passes through the data	Line of best fit is drawn and goes through the data	Line of best fit does not fit the data but is drawn	No line of best fit
Slope Intercept equation	Accurately calculated slope with two points on the line of best fit and either calculated or estimated y-intercept. Both slope and y-intercept are accurate and students have checked their accuracy.	Student has written the equation accurately in slope intercept form.	Student has attempted equation and has shown work but the equation is not accurate.	Student did not attempt an equation.