Lab Framework

Text: Cord

Unit number and title: Unit 17, Graphing Data

Short Description: To introduce unit 17 in a fun way and to get the kids out of class, we will start the unit with a lab to collect data necessary to build a graph, and also show slope, and an equation of the line.

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Lab Title

Unit 17 Basketball Bounce

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

  Students will work in small groups and learn how to gather the data needed to plot a graph. Students will then take the data they have gathered to come back into the classroom and plot the graph, and also determine the slope of the graph. Finally using, the information about slope, students will then have a discussion around the ability to predict future drops from various heights without physically having to make the drops themselves.

- **Statement of pre-requisite skills needed**

  We will build off previous units such as Unit 4 (Using graphs, charts, and tables) and also Unit 15 (Using formulas to solve problems)

- **Vocabulary**

X-Y Intercepts	Coordinate System	Slope
Quadrant	Range	

- **Materials List**

  Measuring Tape(s)
  Yard sticks
  Basketballs, or some other type of larger sports balls
  Bleachers (Or other structure that has increasing height which students can safely move about to gather data

- **State Standards addressed**

  Math: A1.1.A Select and justify functions and equations to model and solve problems. A1.1.B Solve problems that can be represented by linear functions, equations, and inequalities. A1..3.B Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.
  Reading: 1.2 Use vocabulary (word meaning) strategies to comprehend text. 2.1 Demonstrate evidence of reading comprehension.
  Writing: 2.2 Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures.

- **Leadership Skills**

  Students will work in small groups and take turns doing each activity in the lab. Students will need to work together to come to a consensus of the

measurements taken, which will take team work and talking to one another. Each group will be presenting its findings to the entire class. Each team will verify accuracy of all data collected.

- **SCAN Skills/Workplace Skills**

  Sociability Demonstrates understanding, friendliness, adaptability, empathy, and politeness in a new and on-going group settings

  Responsibility Works hard to become excellent at doing tasks by setting high standards, paying attention to details, working well, and displaying a high level of concentration, even when assigned an unpleasant task.

  Reasoning Applies rules and principles to a new situation, or determines which conclusions are correct when given a set of facts and a set of conclusions

  Mathematics Uses quantitative data to construct logical explanations for real world situations

- **Set-up information**

  Depending on class size, divide students into groups of about 4. Each group will need a measuring tape, a basketball, and 2 yard sticks. Students then will move to the gym and using the bleachers as their drop points, will begin to drop their basketballs from a pre-determined height (i.e. start at 1, 2 , or 3 ft) Students will make two drops from each height and will use the average of those two drops as their data point. Students are measuring the height of the basketball after it hits the floor and bounces back up to see how high the rebound height.

- **Lab organization**

  Students should be grouped in groups of four or more. The measurement portion of this lab should take one class period. The graphing and presentations could take one or two more periods depending on class size and understanding.

- **Teacher Assessment of student learning**

  Students will be graded in two separate but equal ways. First each student will be graded by their participation in the group work and presentation. (50%) Second, students will be graded on the accuracy of their completed graph, labeled correctly, and slope determined. (50%)

- **Summary of learning**

  Students learn that they are able to accurately predict the bounce height once only a few drops have been made. Students will also learn that they can present data that was gathered and deliver it successfully to an audience.

- **Optional activities**

  Students could take the measurements of the 2^{nd} bounce and subsequent bounces to see if there is a specific percentage drop in height after each subsequent bounce.

- **Career Applications**

  Students will be able to successfully work in a group to accomplish a common goal. Students will also learn that with a few data points, a person could be able to predict or estimate the outcome of a given task.
  i.e. how many units will be sold the rest of the month, after only a week of data, or how much inventory to be ordered based on previous information.

  Occupations: Managers, Inventory specialists, small business owners, etc.

LAB TITLE: Graphing the bouncing ball!
STUDENT INSTRUCTIONS:

- **Is there a correlation we can make**
  Using the data we collect and the slope and equation of the line we create, can we predict what the outcome would be of future ball drops from increasing heights, without making the drops?

- **Grouping instructions and roles**
  (1) Ball dropper
  (1) Measurer of height of drop
  (2) Yard stick holders o measure the height of the rebound

- **Procedures** – steps to follow/instructions
  In groups of four, one student will drop the ball from a determined height measured by another student. The other two students will use their yard sticks to measure the height that the rebound travels to and document this information on your data tables. Students will make the same drop two times from each height and take the average of the two heights. Students will rotate each job so that everyone drops the ball, and everyone is measuring and recording.

- **Outcome instructions**
  Groups will make between 5-10 drops at various heights and record the data on their data collection sheets. Afterwards groups will come back to class and successfully draw a graph of the data obtained and find the slope of the equation. Students will then present their date to the class.

- **Assessment instructions**
  You will be graded on your participation with the collection of data. There will be NO WATCHING THE REST OF YOUR GROUP GATHER DATA, while you play on your cell phone or twiddle your thumbs.

Lab Data Collection

Student: _____ **Date:** _____

Unit: 17, Graphing Data

Lab Title: Graphing the bouncing ball

Criteria: Write the problem/objective in statement form

Is there a linear equation that we can draw from the height a basketball reaches on the rebound from a pre-determined drop height?

Data Collection: Record the collected/given data

DROP HEIGHT	REBOUND HEIGHT

Calculations: Complete the given calculations to solve for an answer(s)

Summary Statement:

Other Assessment(s)