

Lab Framework

Text: Applied Mathematics

Unit number and title: 20 Statistics

Short Description: Demonstrate how the odds of independent events do not change.

Developed by: Doug Fassler

Contact Information: Prosser High School

Date:

Lab Title

Marble Grab

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

The objective of the lesson is to allow students to discover for themselves that the outcome of a previous event does not affect the probability of the next event if the events are independent events

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

- **Vocabulary**

- **Materials List**

Three marbles of different color. Red, green and blue will be used as an example.

A bag or sock in which to conceal the marbles and draw them from.

- **GLEs (State Standards) addressed**

Math: (Math)

1.1.9 Use of estimation to check for reasonableness.

1.4.1 understanding the properties of dependent and independent events

1.4.4 Use of statistics to support point of view.

Reading: (Reading)

Writing: (Writing)

Students who guess correctly to the above situation “win”. Those that did not must do 10 push-ups. This allows students a chance to make a decision based on their own information with a cost associated with being wrong

- **SCAN Skills/Workplace Skills**

- **Set-up information**

Have a student place the three marbles in a sock. The teacher will then pull out the same color of marble five times in a row (looking) to set up the illusion that it is somehow less likely that the student could pull out the same color when they try. Have the student guess what the odds are that he will pull out that same color marble. When the student gives his answer, ask the

rest of the class to split up into two sides of the room. One side is “betting” he will pull out the same color, the other side is betting against it. After the class has split up, as some of them WHY they made the choice they did. Look for teachable moments here.

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required**)
One hour
- **Teacher Assessment of student learning** (scoring guide, rubric)
The teacher will ask all students to write down the reasons for their decision. A grading rubric will be used as follows:
 - 5 points for explaining the principal of Independent Events.
 - 3 points for an alternative explanation
 - 1 point for a short or illogical explanation
 - 0 points for non-participation
- **Summary of learning** (to be finished after student completes lab)
Students will be able to discover on their own the concept of independent events by witnessing these types of events in person. Their gut feelings will tell them to vote against the same event happening for an 11th time in a row. Using this logic, many will be wrong (33% of the time). It will be an opportunity to begin the discussion of independent vs. dependent events.
- **Optional activities**
Teacher can do the same experiment with two marbles of each color but this time; remove the marble from the population after it is pulled. After each event have the students “bet” on the upcoming color again. This starts the discussion of dependent events due to the fact that the act of removing a marble has an effect on the outcome of the next draw.
- **Career Applications**
Students will develop skills in risk analysis, predicting outcomes based on statistical data and odds.

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LAB TITLE: _____

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

- **Grouping instructions and roles**

- **Procedures** – steps to follow/instructions

- **Outcome instructions**

- **Assessment instructions** (peer-teacher)

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Lab Data Collection

Student: _____ Date: _____

Unit: _____

Lab Title:

Criteria: Write the problem/objective in statement form

Data Collection: Record the collected/given data

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

Summary Statement:

Other Assessment(s)

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