Lab Framework

Text: CORD
Unit number and title: 9: Using Proportions and Ratios
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Lab Title
Pitch, the ratio of Rise to Run

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  Students will observe the effects of pitch on various objects and learn the importance of pitch in our everyday lives.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Use Mathematical operations with fractions to solve problems and write ratios.

- **Materials List**
  A variable pitch ramp 36 inches long and approximately 4" wide with rails.
  Ruler
  Wooden Block
  Marble
  Golf Ball
  Wiffle Ball
  Steel Block
  Brick (if available)

- **State Standards addressed**
  Math: **Math: A1.1A:** Select and justify functions and equations to model and solve problems.
  EALR'S:
  6.3.A: Identify and write ratios as comparisons of part-to-part and part-to-whole relationships.

  6.3.D: Sole single- and multi-step word problems involving ratios, rates, and percents, and verify solutions.

- **SCAN Skills/Workplace Skills**
  Writing: Records information completely and accurately.
  Includes supporting documentation and attends to level of detail, checks, edits, and revises for correct information.
  Mathematics: Uses quantitative data to construct explanations for real world situations.
  Expresses mathematical ideas and concepts orally and in writing.

Listening: Receives, attends to, interprets, and responds to verbal messages and other cues such as body language in ways that are appropriate to the purpose.

Reasoning: Discovers a rule or principle underlying the relationship between two or more objects.

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**
  Groups of 3-5.
  Time: Approximately b45 minutes for lab, 10 minutes for summary.

- **Teacher Assessment of student learning** (scoring guide, rubric)
  Students will turn in a summary of their findings.

- **Summary of learning** (to be finished after student completes lab)
  -discuss real world application of learning from lab
  -opportunity for students to share/present learning

- **Optional activities**
  With a stopwatch, measure in inches per second the speed of the objects at the various pitches. These figures can be converted to miles per hour.

- **Career Applications**
  Plumbing, roofing, architecture, highway construction, landscaping, home and commercial building.

LAB TITLE: Pitch, the ratio of Rise to Run
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  Pitch, the ratio of *Rise to Run,* of an inclined plane, has critical effects on objects and their relationship with gravity.

- **Grouping instructions and roles**
  Break into groups of 3 –5. One person will control the pitch of the ramp.
  One person will collect the data.
  Others help where needed.

- **Procedures** – steps to follow/instructions
  Each group will select one each of the supply list.
  With the ramp lying flat on the floor, place one object at one end of the ramp.
  Slowly raise the ramp 6". Do this with each object.
  Continue this exercise raising the ramp an additional 6" each time until all the objects leave the ramp on its own.
  Document at what height each object moves. This height is the *Run.*
  The *Pitch* of the ramp is the rise/run.
  Summarize your findings.

- **Outcome instructions**
  The objects will fall at different heights due to their shape and friction. Round objects will roll off with the first procedure because rolling consists if very little friction. Heavier, flat surfaced objects afford a lot of friction, so require more pitch to overcome the friction.

- **Assessment instructions** (peer-teacher)
  Assess the student summaries for completeness and accuracy.

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)