Lab Framework

Text: CORD Applied Math

Unit number and title: Unit 11 Signed Numbers and Vectors

Short Description: Calculating the effects of two forces on a crate

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Lab Title
Unit 11 Crate Pull Lab

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
  1) Students will use understanding of vector forces to predict effects of pulls on a crate.
  2) Students will verify their predictions by calculating effects on crate by drawing scale drawings.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  Draw a line of specified length, draw a line at a specified angle, measure an angle.

- **Vocabulary**
  Head, tail, resultant of vector

- **Materials List**
  Graph paper, ruler, protractors for every student

- **State Standards addressed**
  Math: G.2.C Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
  G.7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

- **Leadership Skills**
  Working with and communicating effectively with a partner, presentation to group at end of Lab

- **SCAN Skills/Workplace Skills**

Writing

A. Communicates thoughts, ideas, information, and messages in writing
D. Uses language, style, organization, and format appropriate to the subject matter, purpose, and audience.

Mathematics

B. Uses quantitative data to construct logical explanations for real world situations
C. Expresses mathematical ideas and concepts orally and in writing
D. And understands the role of occurrence and prediction of events.

Speaking
A. Organizes ideas and communicates oral messages appropriate to listeners and situations

- **Set-up information**
  Remind students of the problem worked yesterday in class, Crate Pull. Project a student example from yesterday's work.

  Original situation: Force 1 is 50lbs pulling left. Force 2 is 30lbs pulling 45 degrees up from left.

- **Lab organization**

  Now, change the Crate Pull situation! Have students pair up.

  5 min - Help students make their graphic organizer. Hotdog-style Foldable with 5 tabs.

  Project these 5 modifications of the original problem in front of the class.

  1. Both forces are 30lbs. Force 1 pulls left. Force 2 pulls 45 degrees up from left.
  2. Force 1 is 50lbs and Force 2 is 30lbs. Force 1 pulls to the left, Force 2 is pulling to the right.
  3. Force 1 is 30lbs pulling left. Force 2 is 50lbs pulling right.
  4. Both forces are 30lbs. Force 1 pulls left. Force 2 pulls up.
  5. Both forces are 50lbs. Force 1 pulls left. Force 2 pulls 45 degrees up from left.

  10 min - Discussing with partner:
  On the front of each tab, students draw a picture of each situation. Label the drawing.
  On the inside cover of each tab, students predict the effects of the forces.

  25 min- Calculations with partner:
  Underneath each tab, students do the calculations for each situation. Redraw the situation and draw in the resultant and calculate the resultant.

  5 min – Reflect with partner:
  Go back to the inside cover of each tab, reflect on your prediction.

- **Teacher Assessment of student learning** (scoring guide, rubric)
  Collect graphic organizers and check student work.

- **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

Each pair presents one of their situations to the class – what was your original prediction, what actually happened, how close was your prediction?

- **Optional activities**
  Post each of the situations around the room with the answers so students can check their work.

- **Career Applications**
  Scale drawings, constructions and related calculations are done by engineers, architects, draftspersons.

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)

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)