

**CBR LAB**  
**Unit 24**

**Lab Framework**

**Text: Unit 24**

**Unit number and title:**

**Short Description:** This lab is a popular investigation for teachers who have access to a TI/CBR. The lab from TI is called WALK THE LINE. I'm calling this SET THE LINE. Students set up samples for other students to match.

**Developed by: Larry Gursky**

**Date: 6/24/08**

**Lab Title**  
**SET THE LINE**

**LAB PLAN**

**TEACHER:** Teacher Prep/ Lesson Plan

- **Lab Objective**

Students will be able to interpret the relationship between rate of speed and distance covered on a graph of motion data.

Students will be able to communicate mathematically about changes in a pattern and the change needed to be able to communicate the change mathematically

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

Students should be able to relate the effect of an independent variable on the dependant variable. Students should be able to identify x and y axis and the relationship to the data contained on an (XY) coordinate graph.

Slope intercept form. ( $y=mx+b$ )

Development and interpretation of graphs related to linear equations.

- **Vocabulary**

Independent variable

Dependant variable

Velocity

Rate

- **Materials List**

CBR UNIT

TI 73/83 calculator with the HIKER program

- **GLEs (State Standards) addressed**

Math: 1.5.1 Apply knowledge of patterns or sequences to represent linear functions (W) and/or exponential functions.

Reading: None

Writing: **3.1.1 Analyzes ideas, selects a manageable topic, and elaborates using specific, relevant details and/or examples.**

- **Leadership Skills**  
Student will provide each other with direction and assistance during the performance of this LAB activity
- **SCAN Skills/Workplace Skills**
  1. Teamwork and cooperation
  2. Solve the problem of interpreting change in the slope of a line and it's relationship to independent and dependant variables on a graph
- **Set-up information**
  1. Attach CBR to calculator
    - Press 2<sup>nd</sup> link enter
    - Press transfer button on CBR
  2. Activate RANGER program on calculator
    - Press ranger
    - Choose RANGER
    - Press enter
  3. From main menu select 2: set defaults.
  4. With selector arrow move it to “start now” press enter.

#### COLLECTING DATA

1. To start place the CBR on a table and demonstrate how the WALK THE LINE PROGRAM works.
  2. Have a student stand about 0.5 meters in front of the RANGER
  3. Have the student walk in a straight line in front of the CBR. When ready press enter and tell the student to begin to walk. (data will be collected for about 15 seconds)
  4. When the students are familiar with how the walking affects the line plotted have a student set up a line that another student will attempt to duplicate.
  5. Have students estimate a rate of travel (ie. Meters or feet of change per second)
  6. Have another student try to duplicate the line without being able to observe the display.
  7. Have the students describe the accuracy or the second line and have them defend their response using mathematical reasoning.
    - a.  $Y=mx+b$  Movement was a 2 meters per second but the line shows a rate of 3 meter per second so the line was  $Y=3x+.5$  while the walker moved at about  $y=2x+.5$ .
- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required**)

This is a 1 50 minute period activity but may be easily expanded to be used either more than 1 time or over a period of 2 or more days.

The students work in teams to compete with opposing teams to create graphs that can be matched but contain 1 but no more than 1 change in slope during the 15 second set-up of data.

- **Teacher Assessment of student learning** (scoring guide, rubric)
  1. Students can use y intercept form to estimate slope of one or more parts of a graph of linear motion
  2. Students can relate motion to time in calculating slope and define such motion as rate of change in  $y=mx+b$  form
- **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**

Have kids write functions and try to match them with motion in the HIKER PROGRAM
- **Career Applications**

(LAW ENFORCEMENT) Functions are a description of a pattern. Speed and distance is used when a highway patrolman attempts to figure out the speed of vehicles involved in an accident. Skid marks are a function of speed So length of a baking skid is = to  $Y= m(Sp)$  where M is skid and S is speed.

<https://wa-appliedmath.org/>

