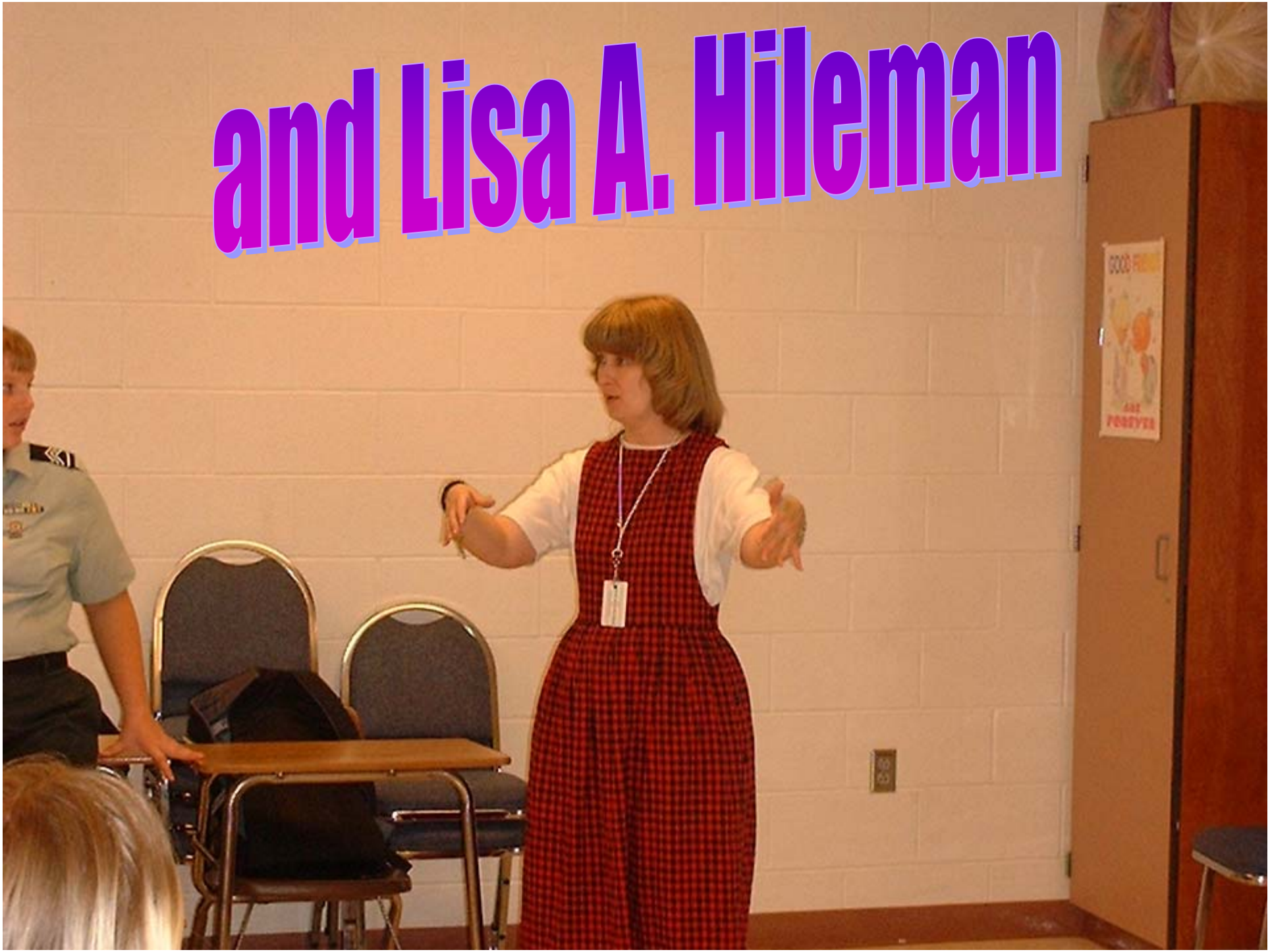
(x,y) Marks the Spot


By: Lisa Z. Poland
FRIENDSHIP


and Lisa A. Hileman

West Virginia Content Standards and Objectives:

Standard 2: Algebra (MA.S.2)

Students will:

* demonstrate understanding of patterns, relations, and functions;
* represent and analyze mathematical situations and structures using algebraic symbols;
* use mathematical models to represent and understand quantitative relationships; and
* analyze change in various contexts through communication, representation, reasoning and proof, problem solving, and making connections within and beyond the field of mathematics.

Objectives:

Students will:

AM2.2.2	determine the slope of a line given an equation of a line, the graph of a line, and two points to be identified.
AM2.2.4	write an equation of a line given the graph of a line, two points on the line, the slope and a point, and the slope and y-intercept.
AM2.2.5	solve systems of linear equations numerically and graphically, by the elimination method, and by the substitution method.
TEC.9-12.1.2	demonstrate knowledge and appropriate use of hardware components, software programs, and their connections.
TEC.9-12.3.2	select and use appropriate technology tools to efficiently collect, analyze, and display data that is relevant to class assignments.

MATERIALS NEEDED

MORE MATERIALS

TIME REQUIRED

This activity could be completed in one ninety minute block period.

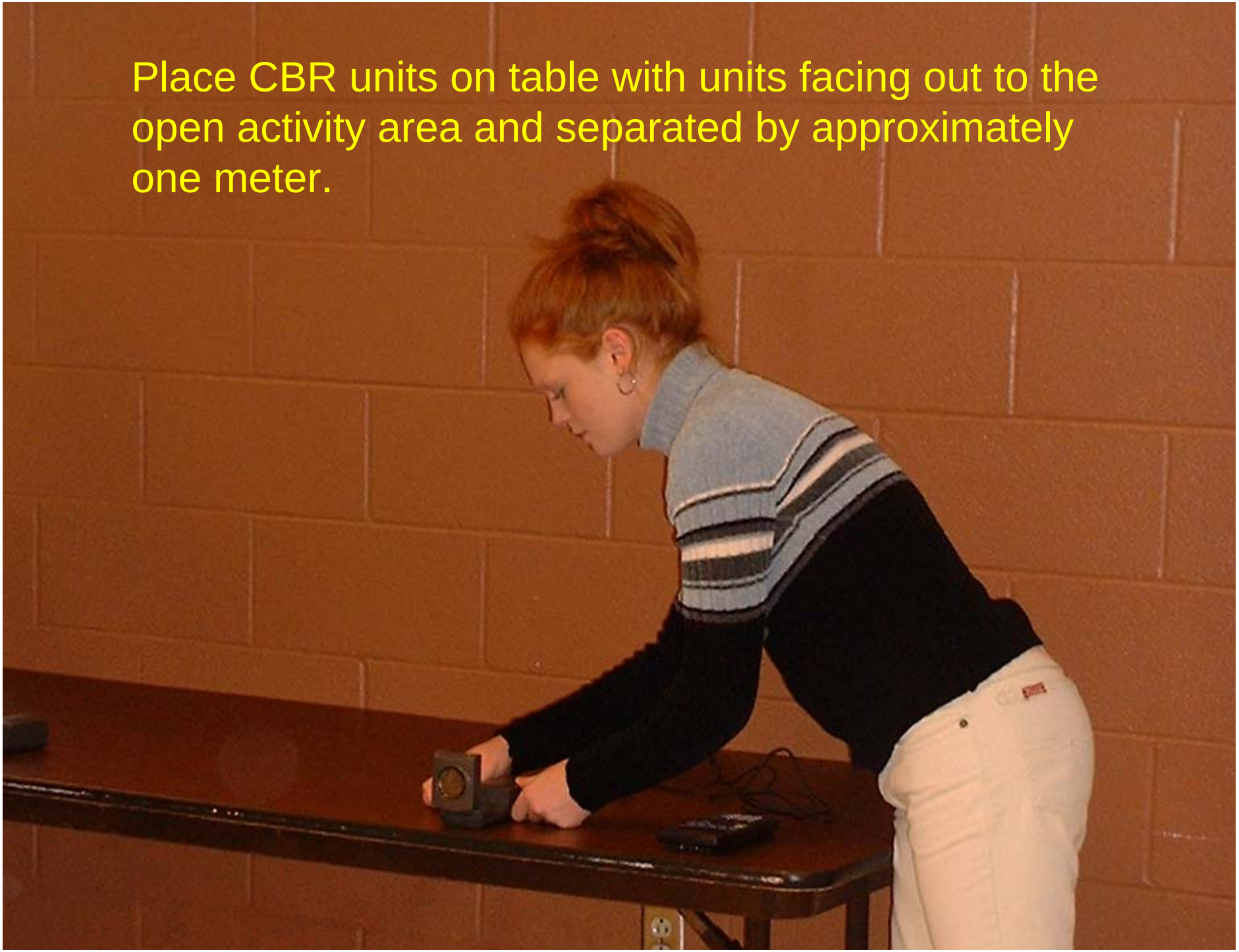
Prior Knowledge

Students should understand the principles of slope and y-intercept and be able to use them to write the equation for a line in slope-intercept form.

Students should be able to follow a set of instructions involving the use of a graphing calculator.

Students should have some understanding of linear systems and the different forms that their solutions can take.

Clear an area in the room to allow a working space of approximately two meters wide by six meters long.


Place CBR units on table with units facing out to the open activity area and separated by approximately one meter.


Discuss
FRIENDSHIP

with students

the basic function of the CBR unit,

the purpose for linking to the TI-83 Plus Silver Edition Calculator,

and the activity to be completed.

Students will divide into groups of six.

There will be


Two walkers,


two Ranger operators,


and two recorders-time and distance.

The Activity Begins !

Set up the Ranger program.

Turn on the TI-83 Plus SE Calculator.

Press Program (PRGM) and select RANGER by pressing enter.

Press enter twice. Select 1 (SETUP/ SAMPLE) by pressing enter again.

Press enter to select no for REALTIME.

Use down arrow to get to TIME. Type in 5 and press enter.

Check UNITS to make sure both of you will be measuring in meters.

Use up arrow to get to START NOW. Press enter to select.

CBR unit is now ready. Press enter when data collection is to begin.

Assume your positions!

Walker one should stand directly in front of CBR unit one with the unit positioned behind him/her.

Walker two should stand approximately six meters in front of CBR unit two and face the unit.

Ranger operators should be beside their respective CBR units.

The time recorder and measurement recorder should position themselves to the sides of the activity area.

Let’s collect data!

One Ranger operator will say, ”ONE, TWO, THREE, GO!!!” and press enter on the calculator.

The second Ranger operator will press enter on his/her calculator.

At the same instant, the time recorder begins the stopwatch and the walkers begin walking straight ahead.

Begin walking!


When they meet,
stop the time and
mark the spot, but
continue walking!

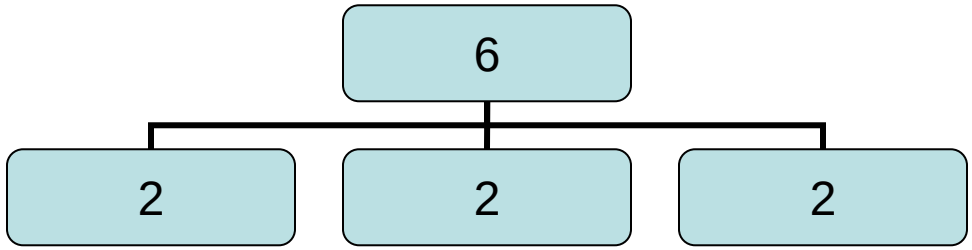
Group members should now look at the data displayed on the screen.

If a straight line appears, the pairs should rotate roles and collect data for the next set of walkers.

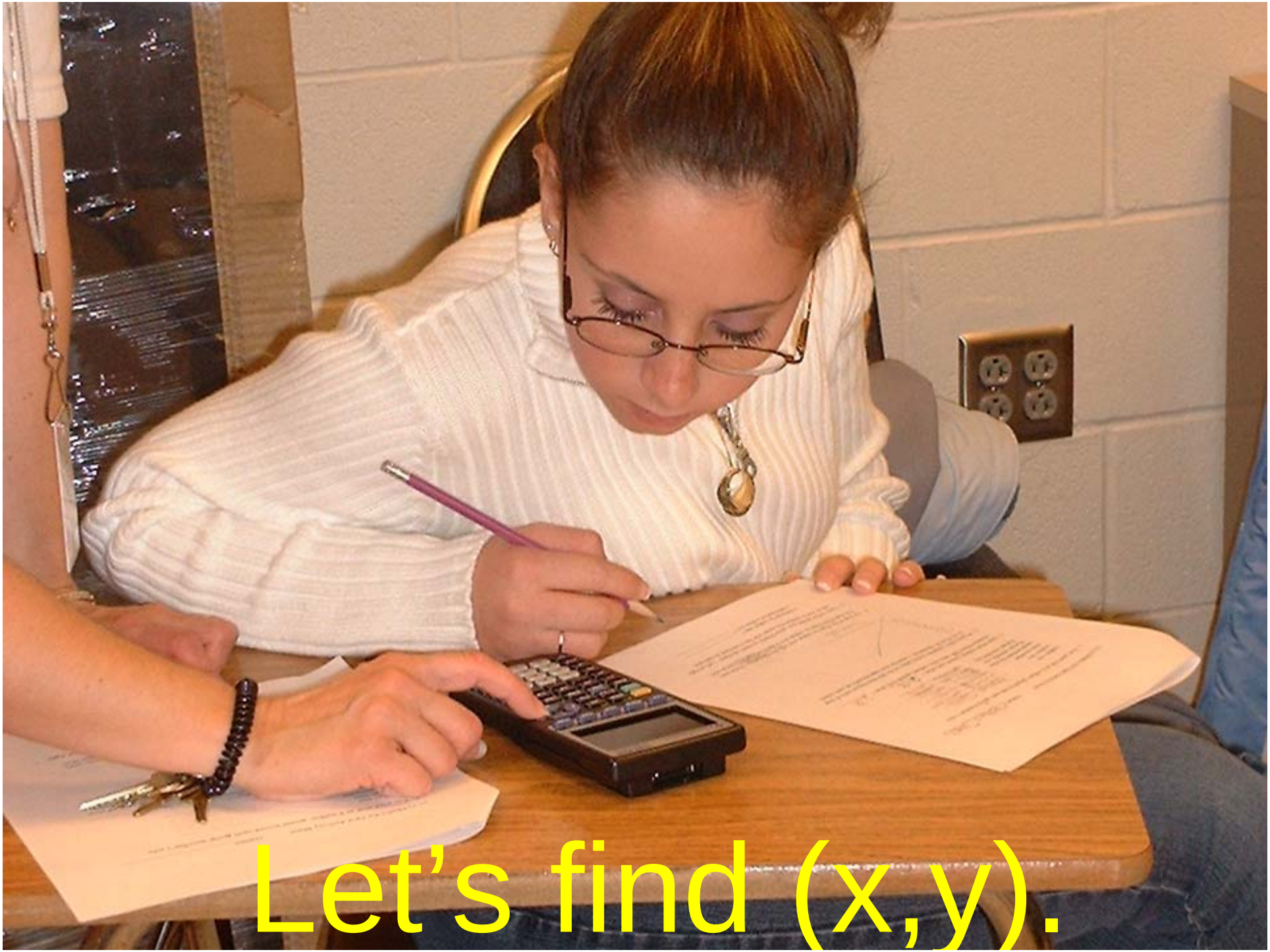
If a straight line does not appear, then the group will repeat the activity to obtain a straight line.

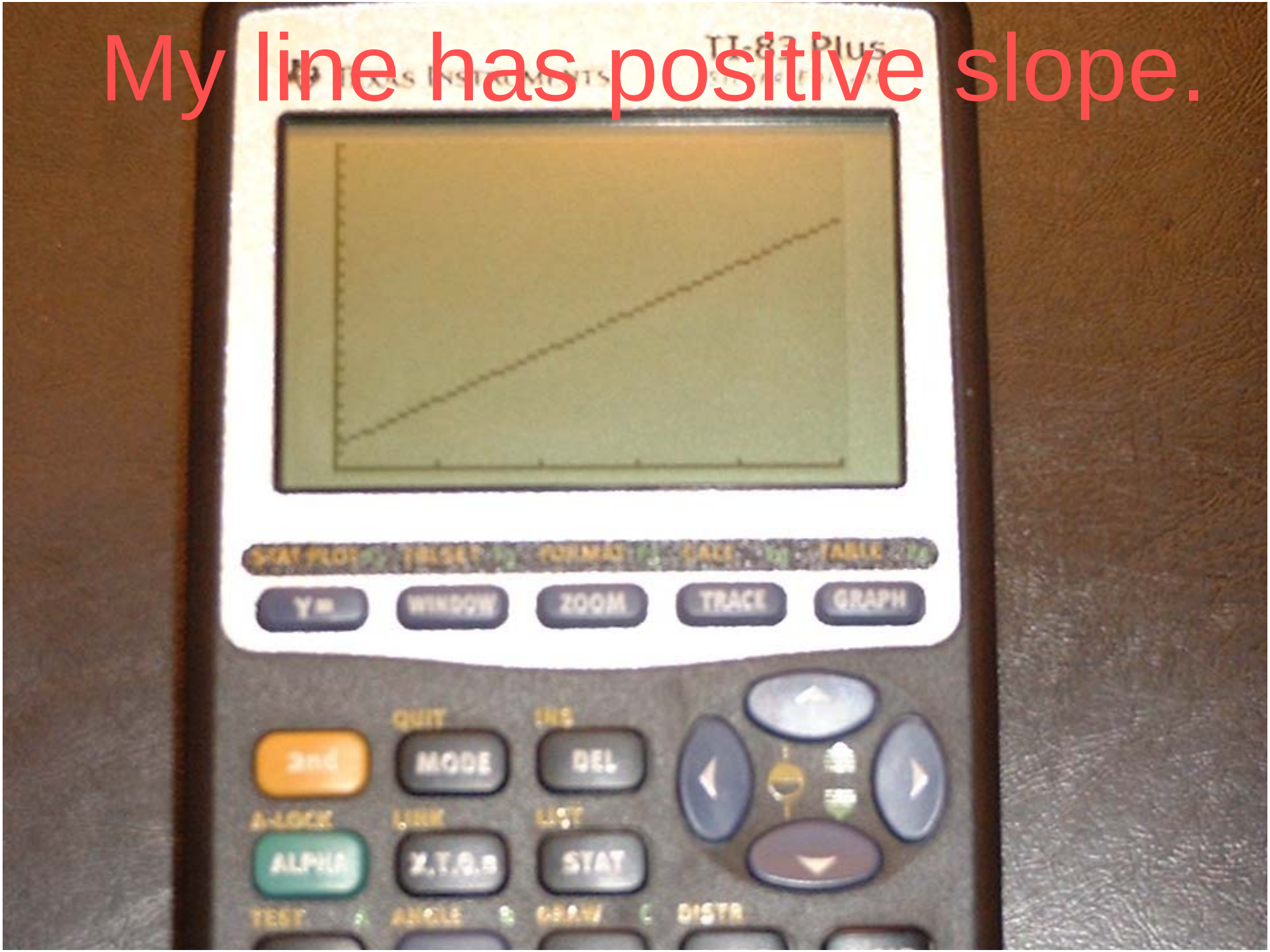
Group members should rotate roles until all walkers have collected their data.

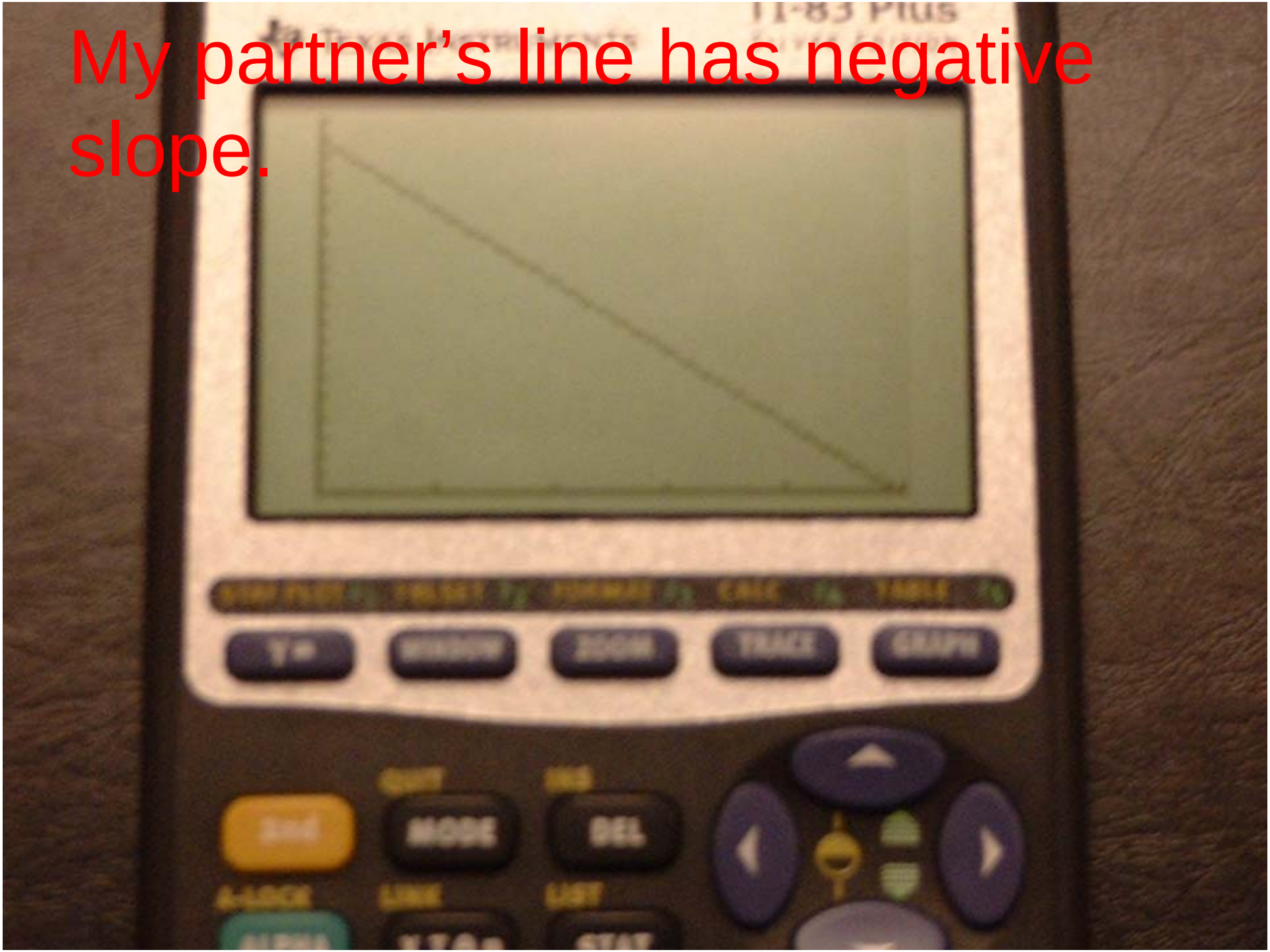
After all data is collected, the group divides



to complete the activity sheet.

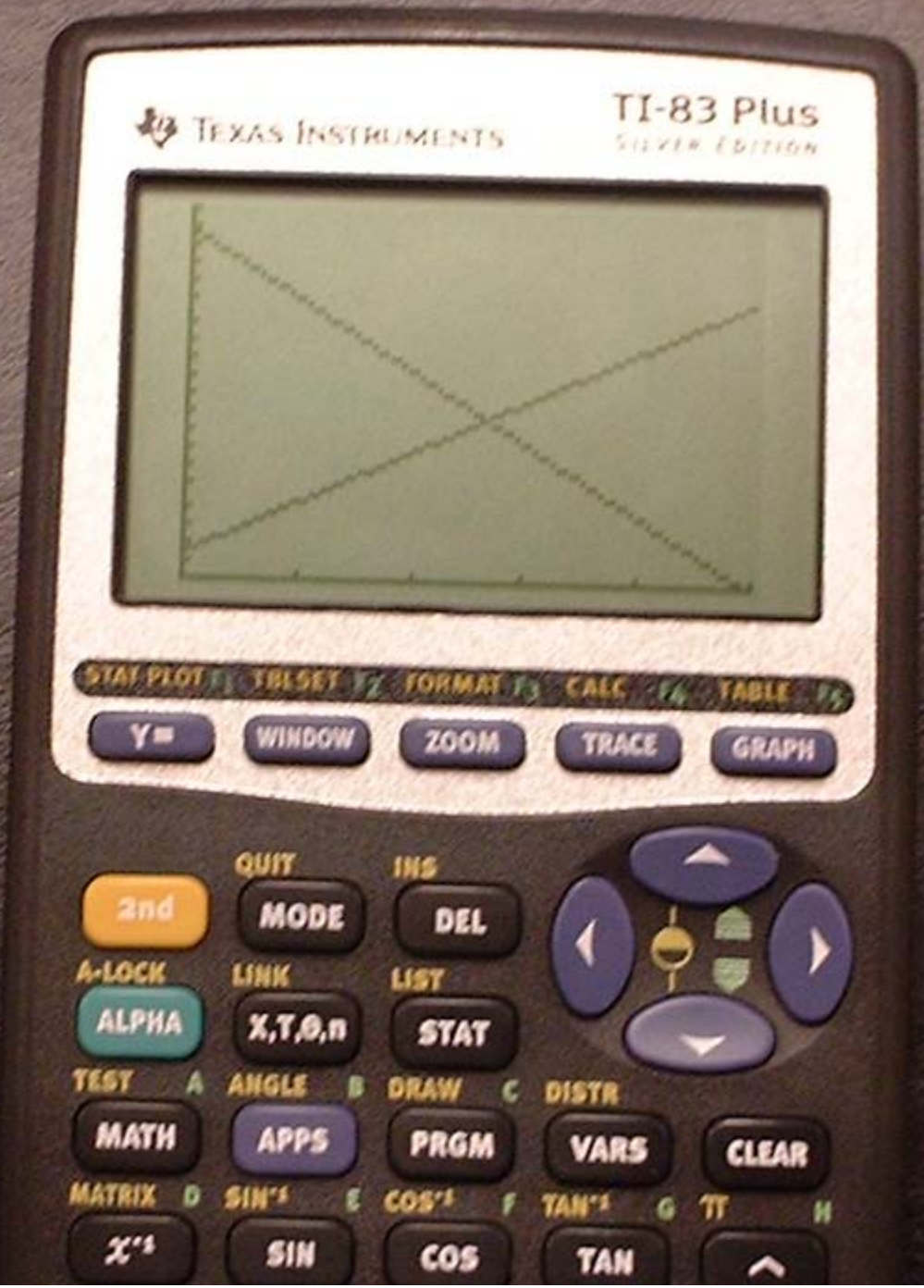

Let’s find (x,y).


My line has positive slope.
TI-83 Plus
Y=
WINDOW
ZOOM
TRACE
GRAPH
QUIT
INS
MODE
DEL
ALPHA
STAT
TEST
ANGLE
DRAW
DISTR


My partner's line has negative slope.

We meet!

(x,y)


TEXAS INSTRUMENTS
TI-83 Plus
SILVER EDITION
STAT PLOT F1 TBLSET F2 FORMAT F3 CALC F4 TABLE F5
Y=
WINDOW
ZOOM
TRACE
GRAPH
2nd
QUIT
MODE
INS
DEL
A-LOCK
ALPHA
LINK
X,T,Θ,n
LIST
STAT
TEST A
MATH
ANGLE B
APPS
DRAW C
PRGM
DISTR
VARS
CLEAR
MATRIX D
SIN⁻¹ E
COS⁻¹ F
TAN⁻¹ G
π H
SIN
COS
TAN

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EVALUATION

Walker pairs will receive a grade based on their completion of the activity sheet.

Performance Descriptors

Each question on the activity sheet was categorized according to the levels of Bloom's Taxonomy. These levels make up the basis of our performance descriptors.

Distinguished

The student demonstrates exceptional and exemplary performance with distinctive and sophisticated synthesis and evaluation of knowledge and skills that exceeds the standard in algebra. This will be evidenced by answering all questions on the activity sheet completely and correctly.

Above Mastery

The student demonstrates competent and proficient performance and shows a thorough and effective application and analysis of knowledge and skills that exceeds the standard in algebra. This will be evidenced by answering all questions on the activity sheet completely and correctly with the exception of numbers twelve and fourteen. Answers to twelve and fourteen must reflect some understanding, but the explanation may be incomplete.

Mastery

The student demonstrates fundamental course or grade level knowledge and skills by showing consistent and accurate performance that meets the standard in algebra. This will be evidenced by correct answers for all of the eleven knowledge and comprehension questions on the activity sheet.

Partial Mastery

The student demonstrates basic but inconsistent performance of fundamental knowledge and skills characterized by errors and/or omissions in algebra. This will be evidenced by correct answers for eight of the eleven knowledge and comprehension questions on the activity sheet.

Novice

The student demonstrates substantial need for the development of fundamental knowledge and skills, characterized by fragmented and incomplete performance in algebra. This will be evidenced by correct answers for less than eight of the eleven knowledge and comprehension questions on the activity sheet.

Extensions

Students could attempt to model a system of linear equations that do not intersect.

Students could attempt to model a system of linear equations that turns out to be one line.

Students could perform a linear regression with the TI-83 Plus SE using the data they collect as walkers and compare the regression equation obtained with the equation they formulated on the activity sheet.

Adaptations

1. six people to a group
2. oral and written instructions
3. key words in bold print
4. individual accommodations

Resources used

Real World Math with the CBL System (1994, Texas Instrument)

Getting Started with CBR (1997, Texas Instrument)

Websites

http://www.curriculum.org/occ/profiles/

http://goals2000mathematics.truman.edu/modexam.html

http://www.visi.com/~dethier/activities.htm