Algebra Lab Activity Hour ____ Name _____
(algtoyactivity)

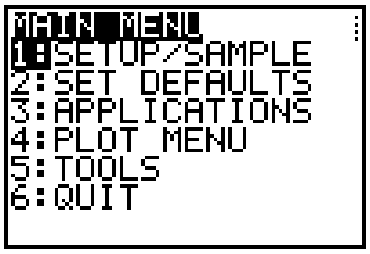
Toy Cars and Linear Equations

Using the CBRs, you are to run the **RANGER** program to gather the data for the motion of a toy car. You will be working in groups of three to collect your data. Be very careful with the equipment and handle the cars, calculators, and CBRs gently. **This lab is worth 30 pts and is due for the next class period.**

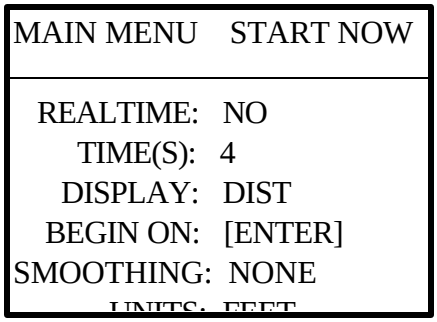
Equipment:
Graphing calculator, CBR, link cord, toy car, and a book to rest the CBR on

Part A: Set up and data collection
1) Hook the CBR to the graphing calculator making sure to press the link cord ends in firmly.

2) You have to run a program to get the data. Press **PRGM** and highlight the program **RANGER.** Press **ENTER** twice. You should get a screen like the one below.

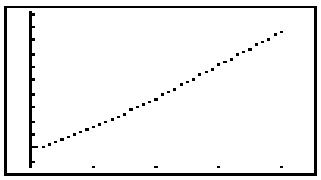


3) Press **#1** to **SETUP**. Setup the CBR as follows by using your arrow keys to move down the menu and pressing **ENTER** to change **REALTIME** to **NO.** Type in 4 at the **TIME** and press **ENTER** to change the units to **FEET**. When you have finished the set up, move the cursor back up to **START NOW** and press **ENTER**.



4) Place the CBR on the floor with it sitting on a book with the motion detector part turned up aimed at the car. Turn the toy car on and set it at least 1.5 ft away from the CBR. Release the car and press **ENTER** to start the CBR. You should hear a clicking sound and see a flashing green light.

5) After it records the data, a distance/time graph should appear on your calculator similar to the one below:



If your do not have a good graph, press **ENTER** and #5 **REPEAT SAMPLE.** Keep running the experiment until you have a good graph. Show your final graph to me.

7) Once you have a good graph, press **ENTER** and go down to **QUIT.** Press **GRAPH** to see your graph again.

<u>Part B:</u> To find an equation of the graph

1) Press the **TRACE** button and record the values for two points of the data. One point should be near the beginning of the data and the other near the end. Record them below:

_____ _____

2) Using the two points, find the slope of the line. Record your value here: _____

3) Pick one of the two points and write it here: _____ Record your value for slope here: _____

Using the equation y = mx + b, put your value for slope in for the "m" and place the x value of your point in for "x", and put your y value in for "y" in the equation. Using your algebra skills, find the value of "b".

4) Write your equation in y = mx + b form here: _____

Now, using the graphing calculator, follow the steps outlined below to find the calculator's equation:

- Press **STAT**, arrow to the right once, and press the number by **LinReg** and **ENTER**

- Record the rule in the space provided substituting in the numbers for the values for "a" and "b" in the equation y = ax + b:
  y= _____
- Press **Y =** , enter in the equation above into the space next to Y_1=, and press **GRAPH**. You should see a line go through your data.

Part C Questions: Answer each question with complete sentences and show all calculations and circle your answer.

1) What is the slope of your line? How did you determine the value?

2) What is the rate of speed of your car? What units are you using?

3) How are the slope of the line and the rate of the speed of the car related?

4) Where does your line cross the y axis? What does this value mean?

5) How would you change the experiment so that you would have a negative slope for your graph of the motion of the car?

6) Compare your equation to the calculator's equation. Tell me how they were similar and/or different.

7) Find which group had the fastest car.