Instructions for Ball Bounce Experiment (a distance-time graph)

1. Plug CBR2 into TI-84
2. APPS key ➔ Select EASY DATA (this may happen automatically)
3. You will hear the CBR2 clicking at this point
4. Go to SETUP menu key ➔ select Ball Bounce
5. Select the START menu key:
    (i) Read the Instructions on this screen
    (ii) Select the NEXT key
    (iii) Read these instructions as well
6. You are now ready to begin. Hold the CBR2 about 0.5 m above the ball and hit the TRIGGER button on the CBR2 (you will now hear lots of "clicking")
7. Drop the ball and let it bounce several times.
8. Hit the TRIGGER key again to stop the CBR2 (although it will stop automatically after 5 seconds)
9. Hit the NEXT key on the TI-84 ➔ you will get the message ➔TRANSFERRING DATA
10. You should now see a graph appear on the TI-84
11. Select the MAIN menu, which will return you to the Ball Bounce screen where you can decide to (i) repeat the experiment if the data/graph aren't to your liking (select SETUP) or (ii) stop by selecting QUIT

12. To record the data for the "first complete bounce", select QUIT ➔ you will notice that your data is being transferred to L1, L6, L7, L8 ➔ Select OK
13. Now, from your home screen, select GRAPH and then TRACE and you can read the data points as you TRACE along the curve. RECORD THE DATA ONTO YOUR OBSERVATIONS SHEET. (You may also go into WINDOW (adjust the window for xmin and xmax in keeping with the "first complete bounce"; then STATPLOT and change from "connect" to "scatterplot" and trace along the scatterplot)

Instructions for Pillow Toss Experiment (a distance-time graph)

1. Plug CBR 2 into TI-84
2. APPS key ➔ Select EASY DATA (this may happen automatically)
3. You will hear the CBR2 clicking at this point
4. Go to SETUP menu key ➔ select TIME GRAPH
5. We will EDIT the settings ➔ time between samples will be changed to 0.025 seconds and the number of samples collected will change to 200 ➔ select OK
6. Select the START menu key ➔ Read the DATA DELETION instruction on this screen
7. Get your pillow ready to toss upward
8. Select the OK key ➔ you will now hear lots of "clicking" as the CBR2 is now beginning the data collection ➔ toss the pillow upward so that it rises and then falls ONTOP OF THE CBR2 ranger.
9. When the CBR2 stops collecting data, it will TRANSFER DATA and present the graph
10. Select the MAIN menu, which will return you to the TIME GRAPH screen where you can decide to (i) repeat the experiment if the data/graph aren't to your liking (select START and be ready to go again) or (ii) stop by selecting QUIT ➔ you will notice that your data is being transferred to L1, L6, L7, L8 ➔ Select OK
11. Now, from your home screen, select GRAPH and then TRACE and you can read the data points as you TRACE along the curve. RECORD THE DATA ONTO YOUR OBSERVATIONS SHEET .(You may also go into WINDOW (adjust the window for xmin and xmax in keeping with the "pillow toss"; then STATPLOT and change from "connect" to "scatterplot" and trace along the scatterplot)

Optimizing Revenue/Income

A hockey arena seats 1600 people. The cost of a ticket is $10. At this price, every ticket is sold. To increase revenue, the arena management plans to increase ticket prices. They conduct a survey and determine that for 50 cent increase in price, 50 less people will attend.

(a) What is the initial cost of a ticket?
(b) What is the initial number of people attending the game?
(c) What revenue/income does the hockey arena make?

(d) One price increment of $0.50 is made. What is the new ticket price?
(e) How many people attend the game now?
(f) What revenue/income does the hockey arena make?

(g) Two price increments of $0.50 is made. What is the new ticket price?
(h) How many people attend the game now?
(i) What revenue/income does the hockey arena make?

(j) Three price increments of $0.50 is made. What is the new ticket price?
(k) How many people attend the game now?
(l) What revenue/income does the hockey arena make?

Continue this pattern to complete a data table

Number of price increments	Ticket price	Number of people attending	Revenue/income
0	$10	1600	
1			

We will ultimately graph “number of increments” vs “revenue”

Finally, what ticket price will maximize revenue?

BALL DROP Experiment

You will be requiring 4 stop watches (either use your phones/wrist watches). I have already measured out 0.50 m increments along the far wall. We will prepare a distance-time data set.

1. From a height of 50 cm, one person will drop a tennis ball and the other 3-4 people will all record the time taken for the ball to drop the 50 cm. Co-ordinate this as it takes some time to "get it right". Record ALL times from the 3-4 timers. Repeat again and record this times as well. Maybe repeat a third time. Finally AVERAGE ALL RECORDED TIMES and record this ONE AVERAGE time

2. Repeat for a height of 100 cm.
3. Repeat for a height of 150 cm.
4. Repeat for a height of 200 cm.
5. Repeat for a height of 250 cm.
6. Repeat for a height of 300 cm. (go outside and use the step ladder)
7. Repeat for a "stair drop" ➔ you will also have to measure the distance
8. Repeat for a "second stair drop" ➔you will also have to measure this distance

Height (m)									
Time (sec)									

GEOMETRY RELATIONSHIPS

1. On a sheet of graph paper, draw a square that measures 1 square by one square. Determine the perimeter of the square and its area. Record both these results on a data table.

2. On the sheet of graph paper, draw a square that measures 2 squares by 2 squares. Determine the perimeter of the square and its area. Record both these results on a data table.

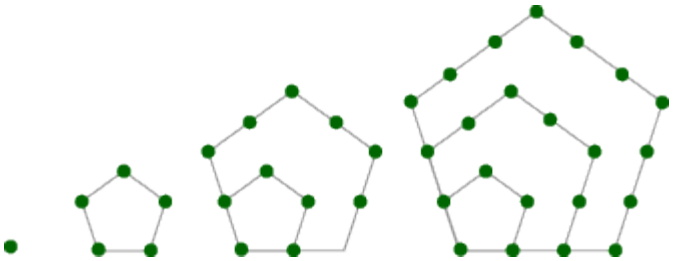
3. Draw a square that measures 3 squares by 3 squares. Determine the perimeter of the square and its area. Record both these results on a data table.

4. Draw a square that measures 4 squares by 4 squares. Determine the perimeter of the square and its area. Record both these results on a data table.

5. Continue the pattern and record results

Perimeter (cm)								
Area (cm^2)								

FIGURATE NUMBERS ➔ PENTAGONAL NUMBERS ➔ study the pattern below wherein I show you the first 4 pentagonal numbers and make predictions/drawings for the next several "pentagonal numbers"



Pattern number	1	2	3	4	5	6	7	8	9	10	11	12
Total # of dots	1	5	12									

Optimizing Area/Perimeter

Work on the Bulletin Board on the back wall. You will need a sheet of graph paper and 4 pins/thumb tacks for these activities

PART A

You need to "fence off" a field whose perimeter measures 90 units. You will use the 4 pins/thumb tacks to represent the "corner posts" of the field that you set up.

For example, one possibility is a field that has a width of 5 units and a length of 40 units.

1. So, on the grid paper, put in one "corner post" on one corner of the grid paper.

2. Place the second corner post 5 units "down" from your first corner post.

3. Place the third "corner post" 40 units "across" from your first corner post.

4. Intuition will dictate where the 4^{th} one goes!

5. So there you have modeled ONE possible arrangement ➔ a width of 5 units and a length of 40 units. Now determine the area of the field

6. You now have one data point to record ➔ the width vs the area of the field (5 units, 200 units^2)

Repeat for another possible width and length ➔ build the model, determine the various measurements and finally the data point

Repeat for another possible width and length ➔ build the model, determine the various measurements and finally the data point

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Repeat for another possible width and length ➔ build the model, determine the various measurements and finally the data point

Etc….

Width (units)									
Area (units^2)									

We will ultimately graph "width" vs "area"

Finally, what width will maximize area?