EA-100
DEMONSTRATION

"QUICK START"

CASIO DATA COLLECTOR-"Manual Set-up"

NO PROGRAMMING NECESSARY! NO CALCULATOR NECESSARY

PURPOSE: ***TO MEASURE THE CHANGE IN TEMPERATURE OVER A SPECIFIED TIME (Using your hand)***

STEPS FOR "MANUAL-MODE" (No program)

Make sure temperature probe is connected to EA-100. Do not connect to calculator.
You will program it by choosing 3 built in options:

	OPTION RANGE/CHOICES
1) **Sample Time**	**10 milliseconds to 60 seconds**
2) **Number of samples to be collected**	**10 to 200**
3) **Time consideration…**	**(0) none, (1) absolute, or (2) relative**

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KEYSTROKE	EXPLANATION
1) **Press [SHIFT] [MODE]**	**"Set-up"**
2) **Press [DataLOG] until "1.00sec" appears see the**	**"Next" Press [DataLOG] several times until you sample time you want to use on your screen. In this case 1.00sec.**
3) **Press [TRIGGER]**	**Chooses 1.00sec as sample time.**
4) **Press [DataLOG] until "10" appears**	**Press [DataLOG] several times until you see the number of samples you want to use on your screen. In this case 10.**
5) **Press [TRIGGER]**	**Chooses 10 as number of samples to collect.**
6) Press [DataLOG] until "1" appears	**"Next" Press [DataLOG] until you see the time consideration you want to use on your screen. In this case 1. 1 means time is collected as data and in this case time is stored as,: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.**
7) Press [TRIGGER]	**Chooses 1 as time consideration (absolute time).**

ARE YOU READY?????? Put the temperature probe in your hand.

8) **Press [TRIGGER]**	**Starts data collection.**

WAIT UNTIL SCREEN SAYS "DONE"!

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***Now view your data by pressing [DataLOG] key over and over again.**
***To redo or repeat the last experiment….press [SHIFT] [RESTART].**
***To transfer the data from the EA-100 to calculator…Use this program (or type this in the RUN icon)…**
Receive(List1) [EXE] Receive (List 2) [EXE]
Data will show up in list 1 and list 2 in statistics icon.
***You may use any other probe with this manual set-up, not just the light probe.**

PATH OF A BALL

MATERIALS:

1) EA-100
2) MOTION DETECTOR
3) GRAPHING CALCULATOR WITH SONIC PROGRAM
4) 1 LARGE "BOUNCY" BALL

PROCEDURE:

Measure the track of a ball dropped, based on it's distance from the floor

1) Connect the motion detector to SONIC CH.
2) Connect the data collector to the CFX calculator. Make sure it's plugged all the way in.
3) Turn the data collector on and execute the program "Sonic" on the CFX.
4) Secure the motion detector above where the ball will be dropped and get the ball ready to drop under the detector.
5) Push "trigger" on the data collector at the same time as dropping the ball to start the experiment.
6) Measurement will be finished when "done" is displayed on the data collector.
7) Push "EXE" on the CFX to graph the results.

NOTES:

-Alter the sample interval if you like…

Enter the program icon on the CFX-9850 and highlight the "sonic" program.
[F2] to edit program.
GO to 6th line and alter it as you wish following the example below.

Example {3, .02, 150, 1}
{3 means motion detector, .02 is time interval, 150 is number of data points to collect, 1 is absolute time}

QUESTIONS:

1) Predict the graph
2) Copy the graph to a piece of paper. Are there any points that don't seem to belong? Circle them.
3) What are some reasons for these points?
4) How do these points effect the data?
5) Describe the path of the ball.
6) Is it the same at the beginning and at the end of the data collected?
7) What would the graph have looked like if the ball you dropped was bigger?
8) What would the graph have looked like if the ball you dropped bounced better?
9) How was the actual graph different from the one you predicted? Why was it different?

WHICH LIGHT SHOULD YOU BUY?

MATERIALS:

1) EA-100
2) LIGHT PROBE
3) 2 different brand flashlights or light bulbs
4) measurement stick
5) masking tape

PROCEDURE:

Measure the light given off by each flash light at distances of every 6 inches.

1) Connect the light probe to CH 1.
2) Turn the data collector on.
3) Use [shift] [setup] to choose 5 second intervals, and 10 data points, and 1 for time.
4) Place 1 flash light on a table and use the masking tape to make a mark every 3 inches for 2 1/4 feet.
5) Turn the flash light on and put the light detector at the 0" mark. (Is it in the center of the light beam?)
6) Push "trigger" on the data to start the experiment.
   MOVE the light probe to the next mark after each data point is collected. You have a 5 second interval to move to the next mark before the next point will be collected.
   You should finish on the 2' 3" mark when EA-100 reads "done".

NOTES:

HI - means reading too high for probe to measure…out of range.
LO - means reading too low for probe to measure…out of range.
Secure light probe in a place where the "center" of the light beam is directly across from probe.

QUESTIONS:

1) Predict which light is better? Why?
2) Describe different ways that would make one light better than another.
3) Copy the data points to the table below.

REPEAT THE EXPERIMENT FOR FLASHLIGHT #2. Copy the data points to the table.

1) Both flash lights were sold for $5 at the local store. Which one is a better buy (gives off the most light)?
2) Describe why you made your decision.

	LIGHT # 1	LIGHT # 2
0"		
3"		
6"		
9"		
12"		
1'		
1' 3"		
1' 6"		
1' 9"		
2'		

HEATING AND LINE OF BEST FIT

MATERIALS:

1) EA-100
2) TEMP PROBE
3) YOUR HAND

PROCEDURE:

Measure the heating of a temperature probe in your hand, transfer data to the calculator, and find the line of best fit.

1) Connect the temperature probe to CH 1.
2) Turn the data collector on.
3) Use [shift] [setup] to choose 1 second intervals, and 10 data points, and 1 for time.
4) Push "trigger" on the data to start the experiment when you put the probe into your hand.
5) EA-100 will say "done" when complete.
6) Connect EA-100 to calculator and execute "RECEIVE1" program on the CFX-9850.
7) Make sure the cable is plugged all the way into both units. Press until you hear a click.
8) Go to the Stat Icon on the calculator and graph your results.
9) While viewing your graph choose a line of best fit.

QUESTIONS:

1) Predict the graph you will see.
2) Describe your graph.
3) Which of the lines of best fit (regressions) is best? (Try each of the F1-F5) that will appear on the bottom of your graph after you draw it. Hint: which one has the highest "r" value?
4) How was the actual graph different from the one you predicted? Why was it different?

REAL TIME…CAN YOU MATCH THESE CURVES?

MATERIALS:

1) EA-100
2) MOTION DETECTOR
3) GRAPHING CALCULATOR WITH "REALTIME" PROGRAM

PROCEDURE:

Measure the movement in front of the motion detector in real time. The data collector (EA-100) can measure the variation and graph the results as they are received on the CFX-9850.

1) Connect the motion detector to SONIC CH.
2) Connect the data collector to the CFX calculator. Make sure it's plugged all the way in. Push hard into both units.
3) Put the motion detector on a table in front of you and get ready to move in front of the motion detector.
4) Turn the data collector on and execute the program "REALTIME" on the CFX.
5) Measurement will be finished when "done" is displayed on the data collector.

NOTES:

Use your body to make curves.
You can press [EXE] to restart program, over and over again.

QUESTIONS:

1) Predict how you will draw each graph using your body and write it in the space below.
2) Draw the following graphs with your movement in front of the motion detector.
3) Describe the movement needed to draw each graph.
4) How did you make the actual graph? Was your actions different from the one you predicted? Why was it different?
5) How would you draw a vertical line.

Horizontal line	downward sloping line	upward sloping line

parabola opening up	parabola opening down	sin wave curve

COOLING OF A LIQUID

MATERIALS:

1) EA-100
2) TEMPERATURE PROBE
3) GRAPHING CALCULATOR WITH "TEMP" PROGRAM
4) Hot cup of coffee, water, or other liquid
5) ice cubes

PROCEDURE:

Measure the cooling of a cup of coffee when an ice cube is added.

1) Connect the temperature probe to CH 1.
2) Connect the data collector to the CFX calculator. Make sure it's plugged all the way in. Push hard into both units.
3) Turn the data collector on and execute the program "temp" on the CFX.
4) Put the temperature probe into the coffee and wait for the temperature to peak or level out.
5) Push "trigger" on the data to start the experiment and then, immediately add 1 ice cube.
6) Measurement will be finished when "done" is displayed on the data collector.
7) Push "EXE" on the CFX to graph the results.

NOTES:

If you don't see your data on your graph, make sure your "setup" has "AUTO" selected for "Stat Graph".

Do this by go into the STAT icon and press… [SHIFT], [MENU], [F1], [EXIT]

Now re-draw your stat graph 1 using [F1: GRPH 1].

QUESTIONS:

Copy the graph to a piece of paper.

1) Predict the graph you will see.
2) Describe your results.
3) Does the cooling occur at the same rate through out your experiment?
4) How was the actual graph different from the one you predicted? Why was it different?

REPEAT THE EXPERIMENT WITH A NEW CUP OF COFFEE
THIS TIME, IN STEP #5, ADD 4 ICE CUBES

1) How did your graph change?
2) Describe why the graph changed.
3) How would the graph change if the sample interval was changed to every 5 seconds, over 10 minutes?
4) How would the graph change if the sample interval was changed to every 5 milliseconds, over 2 seconds?