
Cool It!

Background

Algebra is simply a way to describe the physical world. Anything that happens in the physical world can be expressed mathematically, usually by an equation. Cooling a hot liquid is a physical change. How can we express the cooling process mathematically?

Problem Statement

What type of mathematical equation can be used to express the physical process of a liquid cooling to ambient air temperature?

Hypothesis

Student statement of expectations.

Equipment

Casio EA-100 Data Analyzer
Casio CFX-9850 Color Graphing Calculator
1 temperature probe
1 cup of hot water

Procedure

1. Turn on EA-100
2. Press SHIFT key and then MODE key.
3. Select sample at 1 minute intervals by pressing DATALOG key until 60.00 appears.
4. Press TRIGGER
5. Select 20 samples by pressing DATALOG key until 20 appears.
6. Press TRIGGER
7. Select option for taking samples by pressing DATALOG key until 1 appears
8. Press TRIGGER to display READY
9. Place temperature probe in ambient air to get ambient air temperature and press TRIGGER to start collecting data.

10. After 2 minutes, place the probe into the hot water and leave it for 18 more samples.

TRANSFERRING DATA TO CALCULATOR:

1. Connect your EA-100 to your Casio 9850 using your data link cable
2. Turn calculator on and select PRGM from the menu and press EXE
3. Set EA-100 to communications mode by pressing MODE key to take it out of multimeter mode
4. Select LIST from the program list and press EXE. The calculator will display DONE when the data has been transferred
5. Press the MENU key and return to the MAIN MENU. Press the STAT key. You should have data in three lists. Determine which list is time and which is data.
6. Press F1 for graph on the soft menu; press F6 for set on the soft menu. You will now see the stats for graph 1. The Xlist should be list 1 and the Ylist should be list 2.
7. Press F4 for SEL on the soft menu. Highlight and turn on Statgraph 1.
8. Press F6 for DRAW
9. Print your graph using the computer and attach..

Data

Construct your data table here.

Results

State your interpretation of the data.

Conclusion

Relate your interpretation of the data.

Optional

Relate to science by doing the process twice more using different containers and discuss the similarities and differences.