Cooling Water Lab - Chapter 4

In this lab, you will relate the temperature of some heated water to the amount of time that the water has been cool. Use the same data in the following table. Complete the third column, given that room temperature is approximately 21.7°C:

Time (minutes)	Water Temperature (°C)	Difference between Water Temperature and Room Temperature (°C)
0	83.49	
5	71.22	
10	63.09	
15	57.23	
20	52.65	
25	48.83	
30	45.63	

Analyzing the Data

1. For each water temperature reading, compute the difference between the water temperature and the room temperature. Enter these differences in the third column of the table.

2. Let $D = f(t)$ be the difference between the water and room temperature (in degrees Celsius) at t minutes after the water is allowed to cool. Create a scattergram by hand comparing D with t for the cooling water data.

3. Use a graphing calculator to draw a scattergram of the data. Will a linear or exponential function better model the data? Explain.

4. Find an equation of f.

5. Use a graphing calculator to draw a graph of your model and the scattergram in the same viewing window. Also, graph the model and scattergram by hand. How well does f model the data?

6. If your model is linear, what is the meaning of the slope? If your model is exponential, what is the meaning of the base?

7. Use your model to estimate the water temperature at 22 minutes.

8. Use your model to estimate the water temperature at 1 hour.

9. What will be the temperature of the water when it stops cooling? Does f predict when this temperature will be reached? According to f, how much time will it take for this to happen? Is this a reasonable prediction? Explain.