Hot drinks such as coffee, tea, and hot chocolate seem to cool slowly when we have to wait to drink them and then cool rapidly once they reach the temperature at which we would like to drink them.

Is this the way it really works, or are we experiencing a lack of patience?

In this activity, you will drop 6 ice cubes into a cup of room-temperature water. With a temperature probe you will stir the water and ice. From the time of the drop, the probe will record the temperature every second for 2 minutes.

Problem 1 – Cool Down

Follow the instructions in the TI-Nspire document. After gathering the data and generating a scatter plot, answer the following questions.

1. What type of equation best models this data?

2. What was the regression equation initially obtained for the data?

3. Does this regression equation provide a good fit? Explain your reasoning.

4. How might an equation be obtained to better fit the data?

5. The graph of the equation $f(x) = 2 \cdot (0.5)^x$ appears to have a horizontal asymptote. Observe the data you generated. Does it appear to have a horizontal asymptote? If so, where is it located?

6. After adjusting the data as instructed in the .tns file to account for the apparent horizontal asymptote, what regression equation was obtained?

7. How do the correlation coefficients (*r*) compare for the initial regression and the regression performed after modifying the data? Which correlation coefficient indicates the best fit for the data?

8. Compare the graph of the "adjusted" regression equation to the initial equation graph. Which equation visually appears to fit the data best?

9. How might a better fitting equation be obtained?

10. After manipulating the values of *a*, *b*, and *c*, what equation did you find to best fit the data? How does it compare to the regression equations found earlier?

11. Is it true that very hot drinks cool very slowly at first, then cool rapidly once at a more reasonable temperature? Explain your answer through use of your data, graph, and/or equations generated from the cooling data generated.

Problem 2 – Exploring Another Triangle

12. What was the regression equation initially obtained for the data?

13. Does this regression equation provide a good fit for the data? Explain your reasoning.

14. Does the graph appear to have a horizontal asymptote? If so, where?

15. Adjust the data for an apparent horizontal asymptote as instructed in the .tns file for Problem 1. What regression equation was obtained?

16. How do the correlation coefficients (*r*) compare for the initial regression and the regression performed after modifying the data? Which correlation coefficient indicates the best fit for the data?

17. Compare the graph of the "adjusted" regression equation to the initial equation graph. Which equation visually appears to fit the data best?

18. After manipulating the values of *a*, *b*, and *c* on the graph page with sliders in Problem 2, what equation did you find to best fit the data? How does it compare to the regression equations found earlier?