Mary Wilkerson
CBL Write-up

SOLs Covered:
AII.8 The student will recognize multiple representations of functions (linear, quadratic, absolute value, step, and exponential functions) and convert between a graph, a table, and symbolic form. A transformational approach to graphing will be employed through the use of graphing calculators.
AII.15 The student will recognize the general shape of polynomial, exponential, and logarithmic functions. The graphing calculator will be used as a tool to investigate the shape and behavior of these functions.
AII.19 The student will collect and analyze data to make predictions and solve practical problems. Graphing calculators will be used to investigate scatter-plots and to determine the equation for a curve of best fit. Models will include linear, quadratic, exponential, and logarithmic functions.

1. Work through the first 3 instructional activities. In pairs, write up a solution using your data from one. Include a snapshot of the calculator screen with your data graphed as a part of your solution.

1. The data points will never reach zero. It does not make sense for a heated object in a room to drop below room temperature. Thus, the lowest temperature the foil will reach should be room temperature.

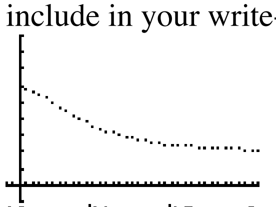
2. See screenshots.

3. a) In terms of the mathematical model, the aluminum foil will never reach room temperature. There is no value to plug into t such that 44.996e^-.0057073t + 24 will equal 24, so it never reaches 24.
However, the model predicts that 1 degree will be reached at approximately 11 minutes.

b) The foil was 40 degrees at approximately 3 minutes.

c) It loses .5691% of its heat each second.

2. Include a snapshot (using TI Connect X) of the graph from the activities you do not include in your write-up.

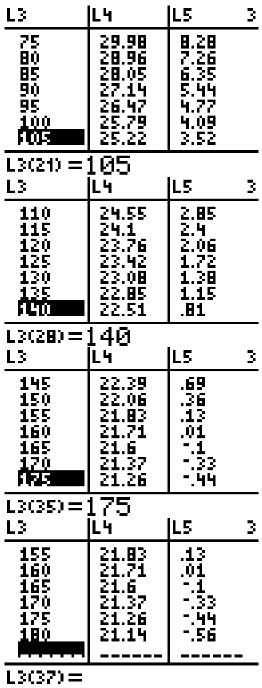


L3	L4	L5 3
5	57.08	35.38
10	56.53	34.83
15	54.57	32.87
20	52.16	30.46
25	49.5	27.8
30	46.76	25.06
35	44.26	22.56

L3(1)=5

L3	L4	L5 3
40	41.97	20.27
45	39.67	17.97
50	37.62	15.92
55	35.84	14.14
60	34.09	12.39
65	32.7	11
70	31.33	9.63

L3(14) =70



L3	L4	L5 3
75	29.98	8.28
80	28.96	7.26
85	28.05	6.35
90	27.14	5.44
95	26.47	4.77
100	25.79	4.09
105	25.22	3.52

L3(21) =105

L3	L4	L5 3
110	24.55	2.85
115	24.1	2.4
120	23.76	2.06
125	23.42	1.72
130	23.08	1.38
135	22.85	1.15
140	22.51	.81

L3(28) =140

L3	L4	L5 3
145	22.39	.69
150	22.06	.36
155	21.83	.13
160	21.71	.01
165	21.6	⁻.1
170	21.37	⁻.33
175	21.26	⁻.44

L3(35) =175

L3	L4	L5 3
155	21.83	.13
160	21.71	.01
165	21.6	⁻.1
170	21.37	⁻.33
175	21.26	⁻.44
180	21.14	⁻.56
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L3(37) =

3. Suggest (and create) an improvement. Discuss briefly why or how the improvement helps.

I think that this activity may have worked better if it had been done as a class. In attempting it with my partner, *several* things went wrong. We were not able to obtain the correct initial temperature, we had problems having our lists work properly before graphing, we had difficulty obtaining a screen capture, and problems getting a decent exponential fit, etc. When as many problems pop up as my partner and I had to contend with, students will focus more on their frustration with the activity, and less on the math involved. Since activities like this are usually meant to serve as explorations or review, this is clearly not the goal! Many students start out frustrated with math before entering the classroom, and lessons should not exacerbate the situation.

If the teacher were to perform this activity on a calculator that was hooked up to a projector (especially after having tested the equipment and practiced doing it several times before), I think it would run a lot more smoothly. Volunteers could be obtained from the class for different parts of the activity so that it could still be hands on and no one would be left out. Portions of the activity could even be repeated for sake of everyone getting a chance to participate. Repeating parts could even serve to help solidify the idea that Newton's cooling curve always comes out similarly. In this situation, although the activity is now a lot more controlled, students are more likely to feel accomplished in carrying steps out successfully. Starting with this sort of group participation also provides a foundation for an atmosphere conducive to group discussion of the mathematical topics involved. Once students are actively participating in the activity, it is not a far jump to ask them about what step they are carrying out, what this step is accomplishing, and what the implications are for this step. Thus, modifying the activity to include the whole class could serve to motivate students to become more positively involved.

4. Critique the activity. Discuss how well you feel the technology is used. For example, what does the calculator/CBL add or allow? Is it possible to do the activity without a calculator/CBL? Do you feel the skills and concepts emphasized are important? Why or why not? Give specific examples.

Besides technical difficulties, I felt that this actually was a pretty good activity. This learning engagement—or at least portions of it—can be used for any of a handful of concepts within the classroom. Dependent upon what a teacher was planning on stressing in the lesson the focus could be plotting points and graphing, trendlines, interpolation and extrapolation, mathematical models, and/or exponential functions.

The CBL and TI-83 used in this lesson (if they work smoothly enough, and there is not much to troubleshoot) are a fairly effective means of showing students how data collection works real-time. Although it would have been easier to pull the data from this activity out of a book or off of a worksheet, I feel that seeing the data being collected on the calculator has a lot more impact on students than just finding a graph in a book.

Participating in the activity and actively collecting data in class helps students connect more with the mathematical concepts behind the activity. Seeing a time versus temperature graph may not mean much to a student initially, but they are more likely to understand it on a deeper level when they can tie it to an event that they can actually observe happening.