WALKING THE LINE

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Common Goals for Liberal Arts Courses

- Improve computational ability to improve thought processes and organizational skills.

- Illustrate that mathematics is more than balancing a checkbook

- Convey the usefulness & beauty of mathematics

Liberal Arts mathematics courses:

time versus last chances

CBU's Liberal Arts courses introduce the basic linear, quadratic, & exponential models

Do students see these as techniques to be memorized to complete a graduation requirement?

Activity is a welcome break from lecture and engages students.

Discoveries with student generated data

Students form groups of 3 or 4

- Calculator

- Motion detector

- Data collection device
  - We use CBL's (calculator-based laboratories)

Walking Lines with the CBL

- Experiment with the equipment to see what data they are recording.

- Walk to get graphs of increasing, decreasing, horizontal lines; vary the steepness

- How do distance, time, speed relate to data?

- Trace data to compute average speed, equations of the lines

Walking a Parabola

- After realizing that constant speed yields a line, students are asked to walk a parabola.

- ROUGH approximations are acceptable

- Guided questions lead to varying average speeds on this graph

Dropping a "Ball"

- Several tries to get something that looks "right"
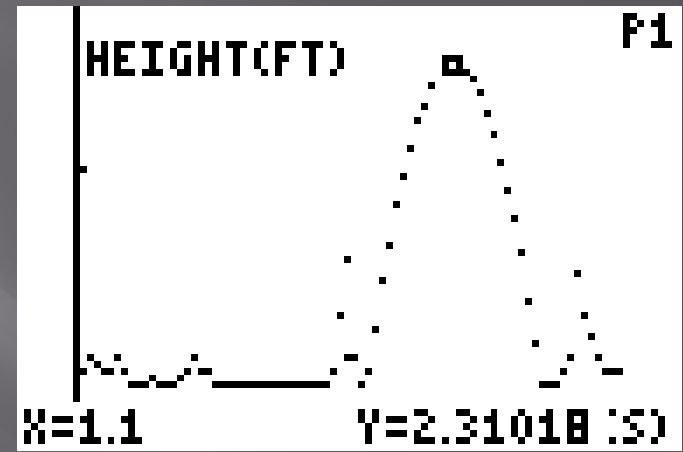

- Why might one get horizontal line segments?

- What type function might model the data?

- Find a regression model with calculator

Tossing an Object

- Try to get that perfect parabola

- Why is it a parabola?

- Much better than trying to "walk a parabola"

Cooling Curves
a different day

Exponential curves using temperature sensors
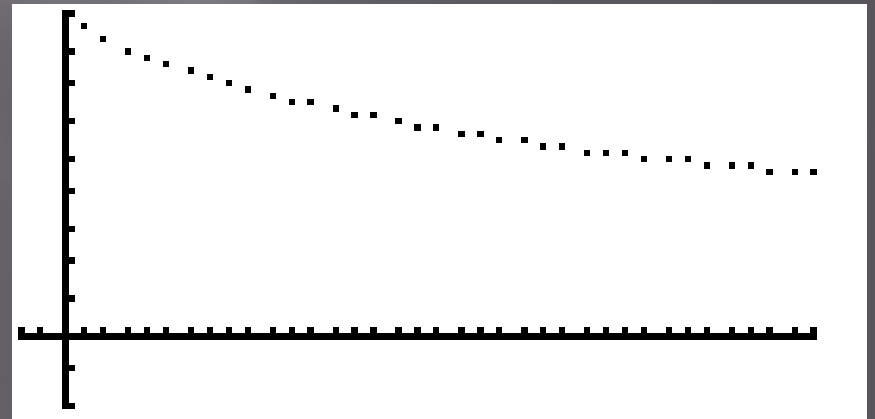
- Boiling water
- Ice water
- Aluminum foil

- Students are usually amazed at the accuracy of the of the exponential functions.

- Trace to get two points & find equation of exponential function

Viewing Window
xMin = - 2   yMin = -20
xMax = 36   yMax = 90
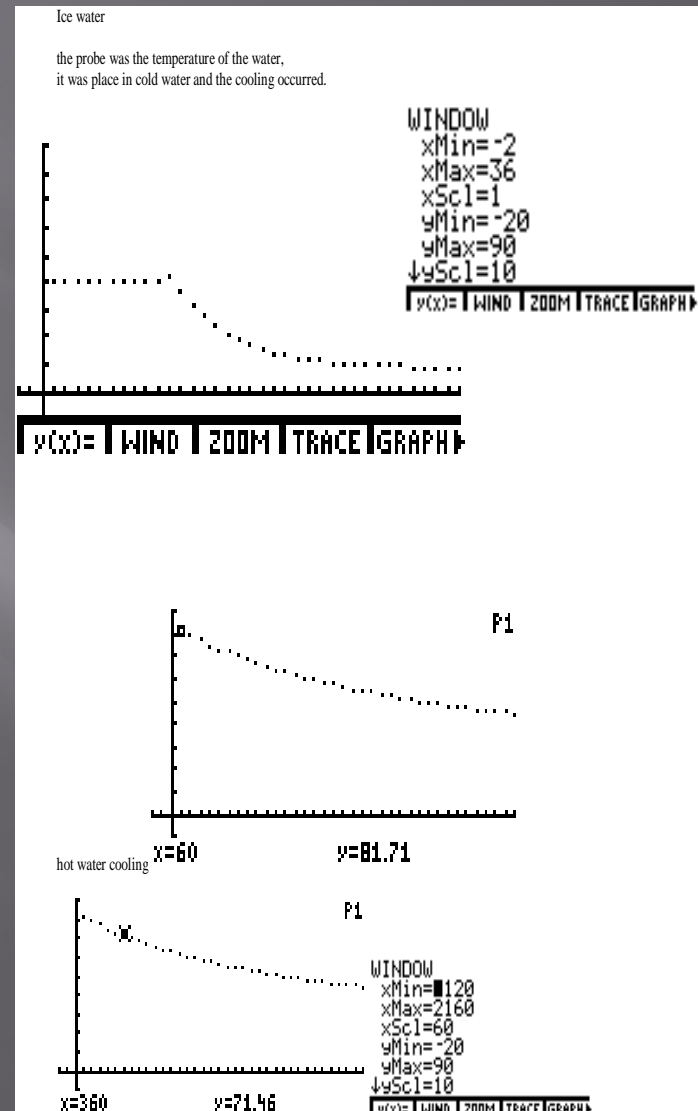xScl =   1   yScl   = 10

- Transfer graphs to a Word document to save, compare, share with class when some groups' models don't quite work in the time allowed.

Ice water

the probe was the temperature of the water,
it was place in cold water and the cooling occurred.

WINDOW
xMin=-2
xMax=36
xScl=1
yMin=-20
yMax=90
↓yScl=10

y(x)= | WIND | ZOOM | TRACE | GRAPH ▶

y(x)= | WIND | ZOOM | TRACE | GRAPH ▶

P1

x=60   y=81.71

hot water cooling

P1

WINDOW
xMin=■120
xMax=2160
xScl=60
yMin=-20
yMax=90
↓yScl=10

x=360   y=71.46

y(x)= | WIND | ZOOM | TRACE | GRAPH ▶

Final Exam Question:
What did you find most interesting or valuable about the course?

Some excerpts:

- It was cool that we were able to see exponential curves and both quadratic and linear models in things that we experience everyday.

- I also found the CBL experiment to be fun, yet I learned a lot at the same time.

- The most interesting thing about this course was the use of the CBL's. I liked using those and relating them to the real world.

Proud of their parabolas!

- I liked doing the CBL stuff and our party.

- The most interesting thing was the unique problems such as the ball drop with the motion detector. The most valuable part was that for once in a math class I didn't feel stupid.

Discoveries with the CBL and the Motion Detector

Thank you for your attention.

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