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Linear Relationships using many tools

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Linear Relationships

CMST Institute 2006

Group M
Rationale:

This project is a unit plan that uses technology to teach lessons on Linear Relationships. It incorporates modeling software, graphing calculators, a power point activity and web-based tools to help strengthen students’ skills and understanding. Linear Relationships are also covered in science classes when graphing is studied.
Essential Questions:

- What is a linear relationship?
- How can you tell if a function is linear?
- How do you graph a line from an equation or table of values?
- How can you determine the slope and y-intercept of a line?
- How does slope affect the graph of a line?
- How does y-intercept affect the graph of a line?
New York State Standards:

*Students will apply coordinate geometry to analyze problem solving situations.*

- 8.G.13 Determine the slope of a line from a graph and explain the meaning of slope as a constant rate of change
- 8.G.14 Determine the y-intercept of a line from a graph and be able to explain the y-intercept
- 8.G.15 Graph a line using a table of values
- 8.G.16 Determine the equation of a line given the slope and the y-intercept
- 8.G.17 Graph a line from an equation in slope-intercept form \((y = mx + b)\)
Materials Needed:

- Computer Lab
- Class set of TI – 84 graphing calculators
- Worksheets provided with unit
- Computer with LCD projector
- Stella software and Geometer’s Sketchpad software
Lesson Using a Stella Model

- Students use the model to understand the linear relationships involved in the cost of driving to California.
- They can use the sliders to change specific variables that are related to the cost of driving.
- Students study the different graphs that they make to see linear relationships.
Trip to the West Coast

Distance to California

Gallons of Gas

mpg

Price of Gas

Run

Reset

Chart for cost of trip versus time.

Table for trip details.
GSP lesson

- Students follow a procedure to create their own model and draw their own conclusions.
- Students animate a line to visualize the affects that occur when you change the slope and y-intercept of a linear equation.
The equation of the line is given by:

\[ y(x) = mx + b \]

with the slope \( m = 0.46 \) and \( b = 7.00 \).
Jeopardy Game

- Students use the interactive game to reinforce skills and vocabulary.
- Students can test their knowledge against the knowledge of their classmates.
- Shows students which areas they may need extra practice in.
What’s that table?

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Slope or y-intercept

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Reading graphs

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I’m a genius

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There are some Project Interactivate programs that are great for linear equations. Data Flyer and Function Flyer are both excellent to engage students while strengthening their skills at the same time. These programs are meant to be used after a student has a basic understanding of linear equations to help the student practice and build their skills.
TI Lessons

- Using a class set of TI-84 graphing calculators, students will be able to apply what they have learned from the other lessons.
- Two lessons have been created using the TI technology and the concepts of linear relationships.
- These lessons would be an ideal assessment to the unit and allow the students to work independently with the technology.
Group M members:

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