DATA & MATH ARE EVERYWHERE

Interpreting Equations and Making Predictions

By Jalyn Puckett

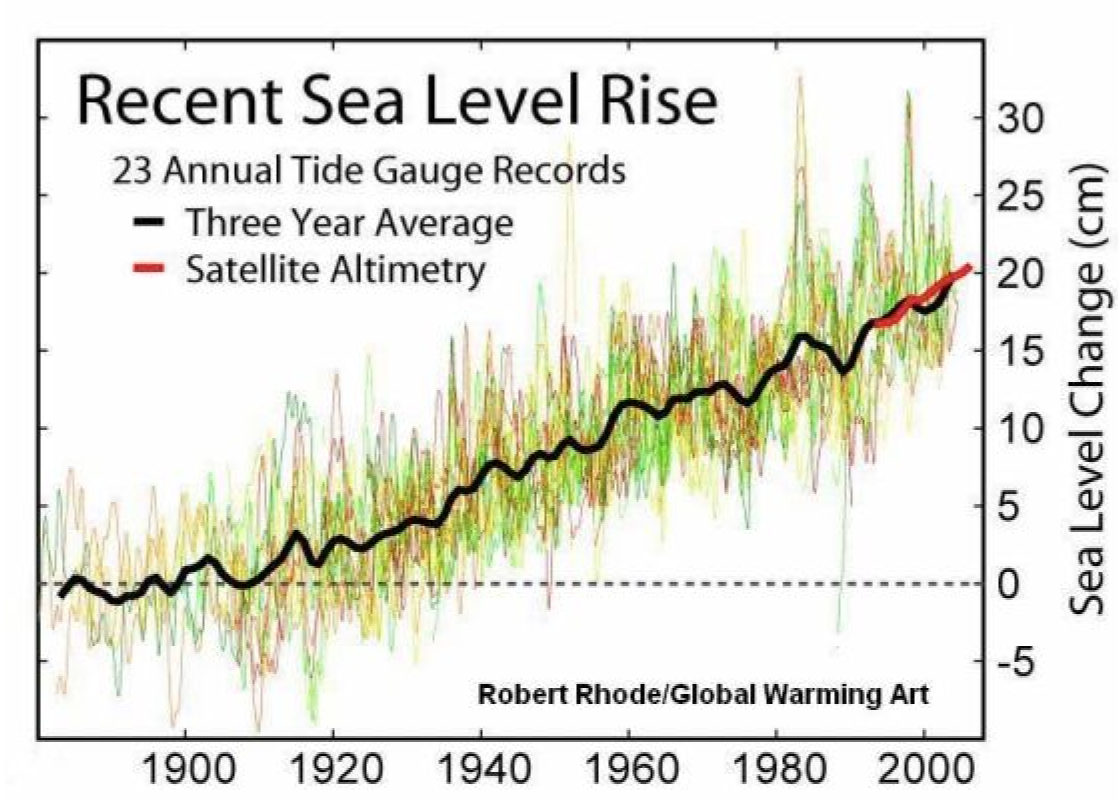
Information on my Data Set

Data Source:

Scroll down to page 15 from the following NASA source:

https://spacemath.gsfc.nasa.gov/algebra2/CH2v3.pdf

Data Image:



STANDARDS

KY State Math Standard:

KY.HS.SP.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Standards for Mathematical Practice:

MP.4 Model with mathematics

MP.7 Look for and make use of structure

MP.8 Look for and express regularity in repeated reasoning

KY Science Standards:

Disciplinary Core Ideas:

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.

Science and Engineering Practices:
Developing and Using Models
Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s). - Use a model to provide mechanistic accounts of phenomena. (HSESS2-4)

Cross-Cutting Concepts:
Stability and Change
Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3-5)

If I were to give a student two points on a line and ask them to write an equation, most likely they could do it with very few errors. However, they would struggle if they were asked, “What does the slope tell us about the relationship between one variable and the other?” This has been something I have noticed in my students from Algebra one all the way to AP Statistics. Therefore I wanted to find a more effective instructional strategy for helping them to interpret their equations. With this mini lesson and the data within, students will have a real life data set to work with rather than just a few random plots on a graph that don’t represent anything. Therefore it serves as the engaging context because it will have meaning and give students the opportunity to wonder and generate discussion. What I love about this particular NASA Sea Level RISE data set is that, unlike most problems I have given my students in the past, this data is not perfectly linear. This activity has students use the idea of linear regression to graph a line that best fits the data, and then write the equation. But I want to use this data and discuss even further how to predict things and interpret the important parts of their equation. Therefore, below are my two learning objectives for this lesson.

1. Students will interpret the slope and y intercept in context.
2. Students will make predictions using the data and linear model.

I feel like we need to show students that the whole point in finding slope or rate of change is to find a trend in data, make predictions, and identify relationships between variables. Therefore, in the discussion piece after answering the questions on the attached pdf about sea level, I will have students thinking about how slope involves the change in one quantitative variable with another quantitative variable. In order for me to collect evidence on student mastery, I will have the students make predictions and interpret the slope and y-intercept from a different dataset. In order to let the students have a say in what we collect data on, I will display several NASA data sources on the board and allow students to jot down the data sources they find most interesting. Then as a class we will narrow down to two different data sets. Students will look up the data set on their chromebook and complete the student handout I have made where they will plot the data and draw the regression line. Then they will be asked to write the linear equation for their regression line. Then in order to assess our learning objectives, students will be asked to interpret the slope and intercept from the equation they wrote, and create and answer a question about predicting either future or past events based on their linear model and something that they are truly interested in knowing. By doing this, students will still be required to make predictions and interpret their model in context, but they get a choice in what data set they are using, and they are getting to generate their own questions of interest.

The way that I will know students have a conceptual understanding of interpreting slope and y-intercept and their ability to make predictions is when I go over their student handout. I have the handout very step by step so that I can see what part of this concept students are getting stuck on. If they don't know how to graph data or a line of best fit, or calculate slope and y-intercept, that will show up in steps one and two. The measurable learning objectives were for students to interpret slope and y-intercept and make predictions from data. If students are having trouble with either of these things, it will show in steps three and four. I will also be able to see, if they wrote the equation wrong, but they interpret the incorrect values correctly, then they still technically mastered the learning objective. I just might need to review previous standards from middle school that the student might not have mastered. There will also be a final question to challenge students more that asks them to determine if the linear equation was the best option for representing this data set. This is what will really have students seeing that not every data set is perfectly linear, in fact some data sets would be better represented with a curve, or a constant linear, etc.

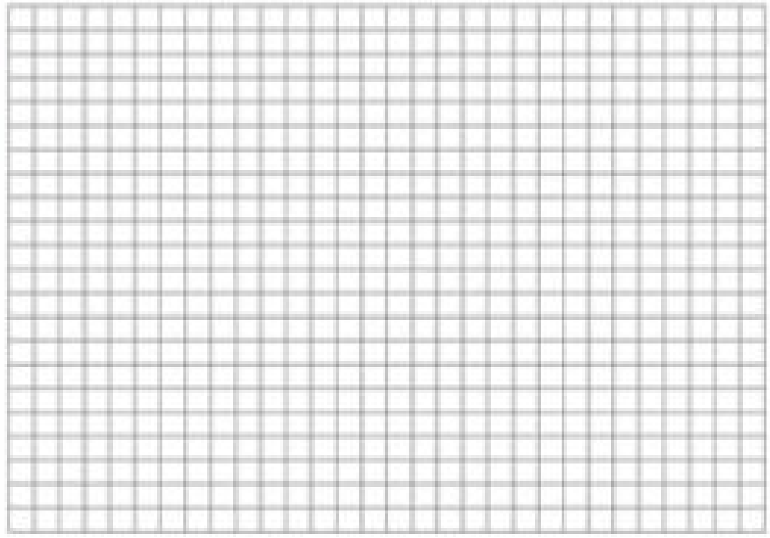
Since this data integration aspect of instruction is new to me I would love feedback from my students on how this lesson turned out for them. Since it is summer break, I don't have students currently. However, when I do this lesson I will randomly select six students from class, and I will ask them the following three questions: Did seeing the real world data help you learn our objectives for today? What do you think could have made this lesson better? What did you enjoy the most about this lesson? This would be a general evaluation for myself to gauge the effectiveness of the lesson from the students' point of view. The formative assessment that I will use to determine conceptual understanding among students is the student handout that they will be turning in. I have attached a screenshot of this on the next page. I believe that simply using appropriate data sets could enhance any concept in a positive way and I look forward to using this in my classroom soon.

Name: ______________________________

Tell me which data source you chose:

STEP 1:

Plot your data to the right. Label your x and y axis and give your data display a name. Then draw a line of best fit through the data.



STEP 2:
Write the equation of the line of best fit and identify the slope and y-intercept.

STEP 3:
Interpret in context the meaning of the slope and the y-intercept in your equation from above.

STEP 4:
We can use our equation as a model to predict future or past events. Look at your data and think about something that you might want to predict. Write out this question and then answer it using your linear model.

STEP 5:
Based on the original data and then looking at the line of best fit, do you think drawing a line was the best way of interpreting the data? If not, what do you think would have been better to use?