Pesticide Resistance (Date) __ pts

Essential Question: How can we relate mathematics to pesticide application?

Objectives:

1. Construct an explanation based on evidence that the process of evolution primarily results from four factors:
    a. the potential for a species to increase in number,
    b. the heritable genetic variation of individuals in a species due to mutation and sexual reproduction,
    c. competition for limited resources, and
    d. the proliferation of those organisms that are better able to survive and reproduce in the environment.
2. Students will discuss graphs that depict the rate of resistance for bugs to determine how the data might best be mathematically modeled.



Engage (+1)	Response
Watch this short introductory video of an Army Entomologist team. Write down questions or short notes you might have as you watch the video. Record those answers by following the link available in the left column. When do you think the highest mortality rate occurs when pesticides are applied to an area? You do not need to know the actual answer, but provide an answer with a good reason.	Write your questions and notes at this link here. Revisit the link here, and write your responses to these two questions. **Be sure your first and last name are on each note you created to receive credit.**



Explore (+1)	Response
Read the article (pdf), and then follow the directions from the linked slideshow.	Snap a picture of your filled out table, and post the picture in this column.



Explain (+6)	Response
Look at the following slideshows of different Rate of	1. What general trends do you notice about each

	Resistance graphs. These graphs depict the mortality rate of insects over time given different pesticides or different doses of pesticides.	graph on each slide? 2. What do you notice about each line representing different bug sprays on each slide? a. Slide 2 b. Slide 3 c. Slide 4 3. Which spray works the fastest? 4. Which spray kills the most bugs? 5. Which spray is the most effective and why? 6. Which spray is the least effective and why? 7. When do you think the highest mortality rate occurs when pesticides are applied to a given area and why?

	Elaborate (+10)	Link
	Watch these videos about linear and exponential functions Video 1. Video 2. Video 3. Pay close attention to the general appearance of each type of graph. Complete the Desmos activity 1 and Desmos activity 2. Be sure to answer each question posed to you in the Desmos Activity (part of your grade). Pay close attention to how the data is related to the outcome/appearance of the graph. In a separate document: 1. Identify which model (linear or exponential) might better fit the rate of resistance graphs? 2. Explain why you have selected the mathematical function in great detail. MAKE SURE YOU SHARE YOUR GOOGLE DOC FILE WITH ME!! *to hyperlink, right click and highlight the word Hyperlink. Click on Link and paste the link to your worksheet. **to save as PDF, go to File → Download → PDF. It saves to your computer. Upload to your google drive. Right click "share". **Alternative: Print → Change printer to "Save as PDF".	This activity automatically updates your work as you progress. When you are done, it automatically is submitted. Hyperlink your completed Google Doc.

	Evaluate and Reflect (+2)	Response
	Complete the Desmos activity online. Be	This activity automatically updates your work as you

	sure to follow the directions at each step. In a separate document answer the questions posed to you in the right hand column. MAKE SURE YOU SHARE YOUR GOOGLE DOC FILE WITH ME!! *to hyperlink, right click and highlight the word Hyperlink. Click on Link and paste the link to your worksheet. **to save as PDF, go to File → Download → PDF. It saves to your computer. Upload to your google drive. Right click "share". **Alternative: Print → Change printer to "Save as PDF"	progress. When you are done, it automatically submits itself. Hyperlink your completed Google Doc (with Screenshot of Final Desmos *regression*/mathematical model you chose as the best fit for your data). Be sure to answer the following questions in your Google Doc: 1.) Does your selected model support your model selection from the "Elaborate" part of this lesson plan? Why do you think your answer was right (OR) Why do you think your answer was wrong? 2.) What questions do you still have? Please include your questions in this document. 3.) A. If you chose a linear model, where else do you think linear models might be useful to mathematically express a different real-world situation? Please be detailed in your answer. B. If you chose a linear model, where else do you think linear models might be useful to mathematically express a different real-world situation? Please be detailed in your answer.