Solutions

Algebra II Journal

Module 2: Regression

Exploring Other Function Models

This journal belongs to:

Module 2: Exploring Other Function Models

Algebra II Journal: Reflection 1

Before exploring these function families, let's review what we know about linear, quadratic and exponential models. Complete the graphic organizer below and submit it to your teacher.

Answer:

Responses will vary. It is important to check students' prior understanding of linear, exponential and quadratic functions before proceeding with this module. Here are sample responses:

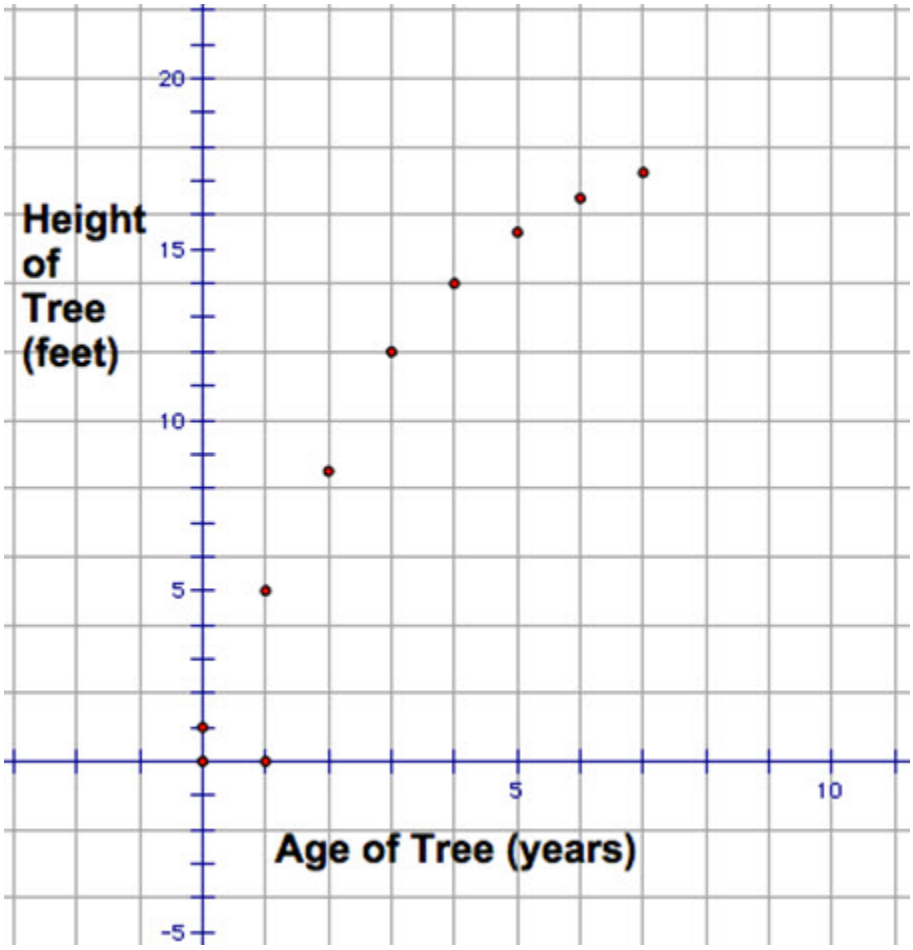
	Linear Functions	Exponential Functions	Quadratic Functions
Key Behaviors	• Graph is a line • Always increasing or always decreasing • No maximum or minimum • Constant rate of change/constant slope	• Graph is a curve • Always increasing or always decreasing • No maximum or minimum • Constant multiplier (growth factor) • Has a horizontal asymptote (if exponential decay, the function approaches this value)	• Graph is a parabola • Graph changes direction (increases then decreases or decreases then increases) • Has a maximum or minimum (where the graph changes direction) • Second differences are constant
When this function may be best model for a data set	• When the data is moving in one direction (always increasing or always decreasing) • When the data shows a relatively constant increase or decrease • Example: Distance-time graphs if speed is constant	• When the data is moving in one direction (always increasing or always decreasing) • When the data is not increasing/decreasing by a constant (linear association) • Examples: Cooling curves, population	• When the data could change direction • When the data is not increasing/decreasing by a constant (linear association) • Example: Area models

Algebra II Journal: Reflection 2

Respond to the following questions and submit your reflection to your teacher.

Create a scatter plot for the data.

Answer:



Examine the scatter plot. Which possible models should you consider for a regression equation for this data set?

Answer:

Each of the following functions should be selected:

- Linear
- Exponential
- Cubic
- Power
- Logarithmic

- Logistic

Each of these functions can show an increase in one direction. Some of these functions increase without bound and some functions will have a slower rate of change as the *x*-values increase. Based on the clustering of the data in later years, most likely a function that increases at a slower rate (such as the logarithmic function) may prove to be a best fit.

These other functions are less likely to be a best fit:

- **Quadratic:** For this function, typically there is a change of direction, unless the starting value represents the minimum or maximum value. If a quadratic model was appropriate for this data set, the clustering at the larger ages of trees would indicate that a maximum is near, but the height of pine trees should not decrease.
- **Quartic:** This function is not as likely to be a best fit for the same reasons as the quadratic function.
- **Trigonometric:** This function models **periodic** data. For this function to be appropriate, the heights of the trees would need to increase and decrease over time.

Algebra II Journal: Reflection 3

Respond to the following questions and submit your reflection to your teacher.

Select one of the new function families to research in more depth:

- Cubic Functions
- Quartic Functions
- Power Functions
- Logarithmic Functions
- Logistic Functions
- Trigonometric Functions

For the function family you selected, use your textbook and online searches to develop a deeper understanding of the function family. Summarize your findings and submit to your teacher. Make sure to address:

- What are the key features of this function family? (end behavior, number of possible maximum and minimum values, increasing/decreasing trends, etc.)
- Include sample graphs to represent the variety of functions within this function family.
- Include any possible contextual examples that could be modeled with this function type.

Answer:

Answers will vary based on the function family selected.