Solutions

Algebra II Journal

Module 1: Linear, Quadratic and Exponential Regression

Which Model Makes Sense?

The journal belongs to:

Module 1: Which Model Makes Sense?

Algebra II Journal: Reflection 1

Respond to the following questions and submit your reflection to your teacher before continuing with the lesson.

What are the key features of each function type? What are some situations that are typically modeled by each function family?

Answer:

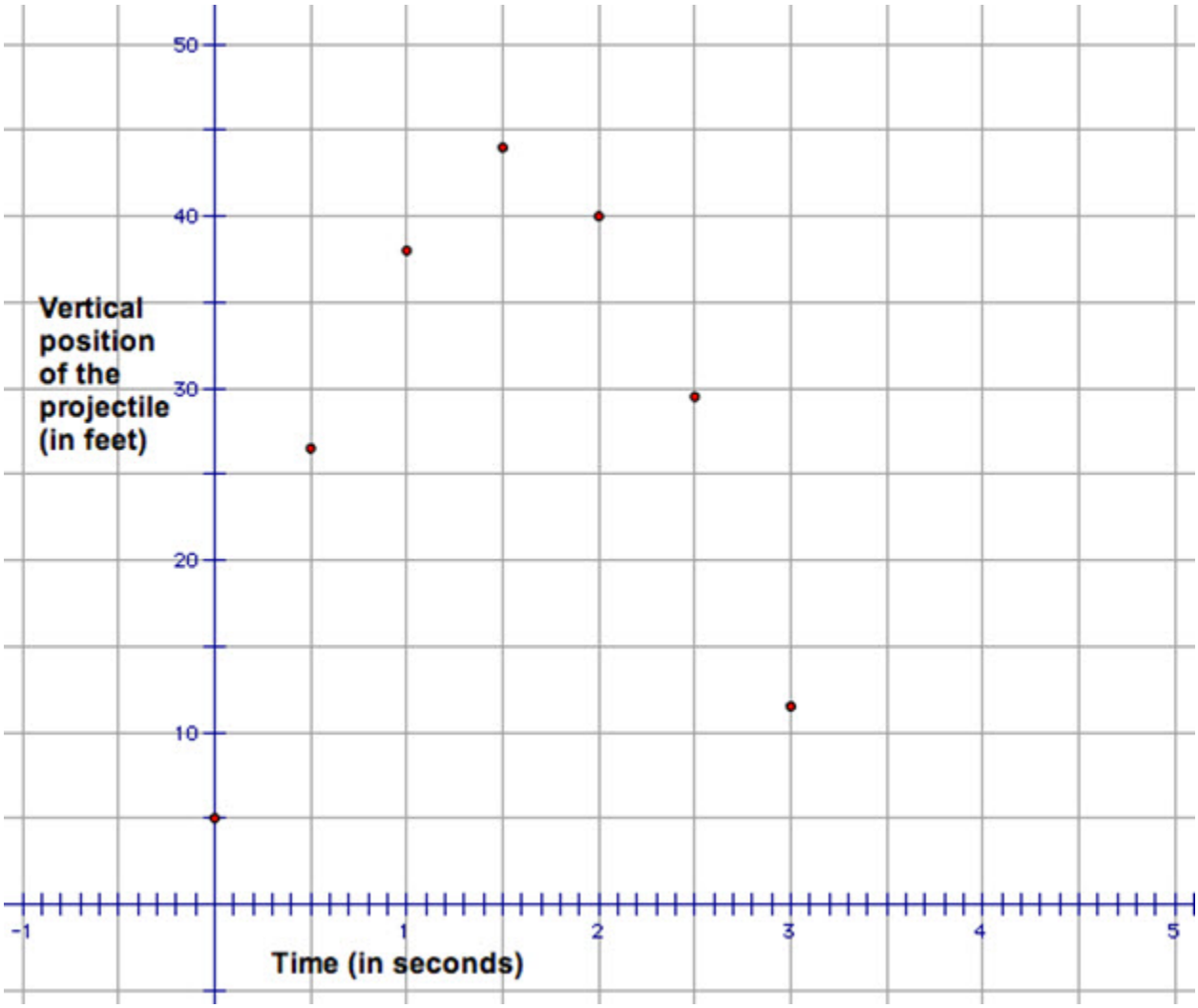
Check for students' understanding of each of the function families before proceeding with this lesson. Students should be able to distinguish between graphical behavior of each function family, rates of change, and situations for each family. Linear situations would include anything that would be increasing or decreasing at a constant rate. Quadratic situations may include area scenarios or vertical position of projectiles in motion. Exponential situations may include population data or cooling curves.

Algebra II Journal: Reflection 2

Respond to the following questions and submit your reflection to your teacher before continuing with the lesson.

Create a scatter plot for the vertical position data and determine which function type (linear, exponential or quadratic) may be the best fit for the data set.

Answer:



Calculate and review the residual plot to determine if the model is the best fit. If you selected a linear model, analyze the correlation coefficient. Justify why the model you selected is the best fit for the Vertical Position data.

Answer:

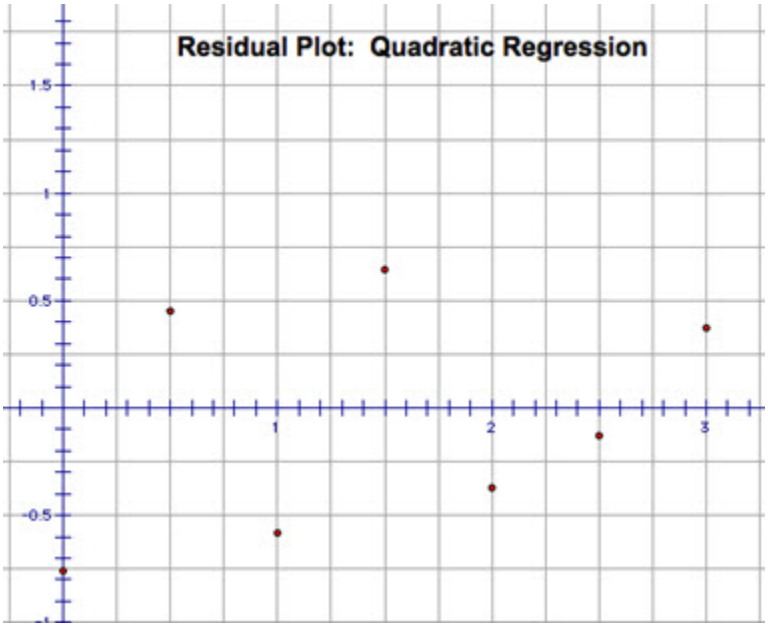
A quadratic model is the best fit because a projectile motion graph of vertical position is parabolic.

Immediately upon examination of the scatter plot, a parabolic curve appears. If you try to find a linear model, the correlation coefficient is extremely low and there is a clear pattern in the residual plot.

When you calculate a quadratic regression, you get the equation

$y = -15.517x^2 + 48.340x + 5.759$

The residual plot is also random.



Thus, the quadratic model is the best fit.

Algebra II Journal: Reflection 3

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

Examine the following data set:

Andrew's parents want to buy him a car for his birthday. They have been investigating the Blue Book values of cars to determine which car will have the best resale value in 10 years. They have gathered the following information on one car:

Car Resale Value (2007 Model)

Year	2007	2008	2009	2010	2011	2012
Resale Value (in dollars)	14,500	12,600	11,000	9,400	8,350	7,200

Analyze the data set and determine the model of best fit. If you selected a linear model, be sure to also analyze the correlation coefficient. Justify why the model you selected is the best fit.

Answer:

Car Resale Value (2007 Model)

Year	2007	2008	2009	2010	2011	2012
Resale Value (in dollars)	14,500	12,600	11,000	9,400	8,350	7,200

Note: The equation generated is based on the independent variable being years since 2007:

Car Resale Value (2007 Model)

Years since 2007	0	1	2	3	4	5
Resale Value (in dollars)	14,500	12,600	11,000	9,400	8,350	7,200

The model of best fit would be exponential. A linear function has a pattern in the residual plot.

Once you have a model of best fit, use the model to estimate the resale value of the car in 2018.

Answer:

Equation of best fit: $y=14491.90(0.869)^x$.

In year 11 (2018), the resale value should be worth about $3,109.81.