Algebra 1B Live Lesson

U4L7: Linear, Quadratic and Exponential Models
(Chapter 9-7 in textbook)

Agenda

1. Review selected problems and topics from U4L7– Linear, Quadratic and Exponential Models.

2. Use the 2-column note system to take better notes in math class. Bring your math notebook and pen or pencil to each math LiveLesson class.

2-Column Notes Template

1. Announcements/To Do's	1. Write down important details.
2. School-Wide Learner Outcomes	2. What are you going to work on this week?
3. LL Objectives	
4. Vocabulary words	4. Definitions (fill in as we go)
5. Problems	5. Steps to solving problems
6. Summary (End of class)	6. 1 or 2 sentences about the LL class.

Reminders and To – Do's

Information	What to do
1. Complete 1 math lesson per day.	1. Go to your Planner in Connexus to find the math lesson for the day
2. Check your WebMail every day	2. Go to Connexus to find WebMail
3. Be prepared to spend 4 - 6 hours per day on schoolwork.	3. Complete lessons for the day from your Planner. Do not get behind on lessons.
4. Remind your Learning Coach to take daily attendance	4. Have your Learning Coach log into Connexus daily.

Reminders and To – Do's

Information	What to do
5. Go to the Message Board first for information about our math class.	
6. Contact Mr. Elizondo for math questions. Remember: You need at least 2 phone calls with Mr. Elizondo per semester.	6. Call (559) 549 - 3244 and leave a voicemail if call is not answered. Make an appointment at: https://elizondo.youcanbook.me Send a WebMail

U4L7 – California Common Core State Standards

- HSF-LE.A.1: Distinguish between situations that can be modeled with linear functions and with exponential functions

U4L7 - Objectives

- Choose a linear, quadratic, or exponential model for data

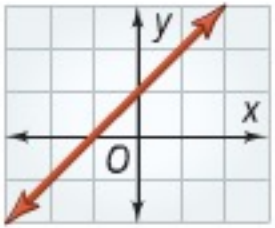
U4L7 - Introduction

- You can use the linear, quadratic, or exponential functions you have studied to model some sets of data.

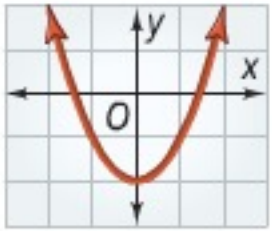
take note

Concept Summary Linear, Quadratic, and Exponential Functions

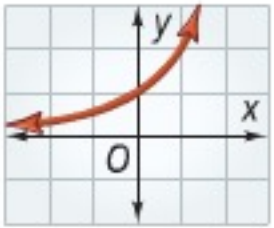
Linear: $y = mx + b$



Quadratic: $y = ax^2 + bx + c$



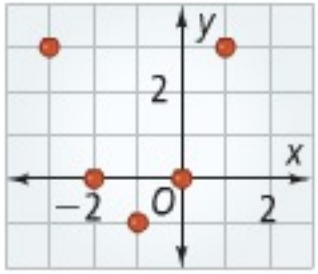
Exponential: $y = a \cdot b^x$



U4L7 - Choose a Model by Graphing

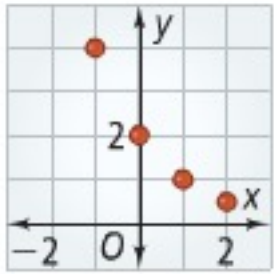
Graph each set of points. Which model is most appropriate for each set?

A $(1, 3), (0, 0), (-3, 3), (-1, -1), (-2, 0)$



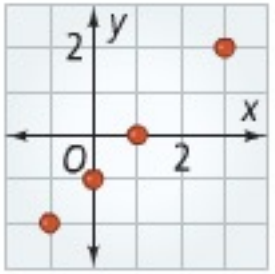
Quadratic

B $(0, 2), (-1, 4), (1, 1), (2, 0.5)$



Exponential

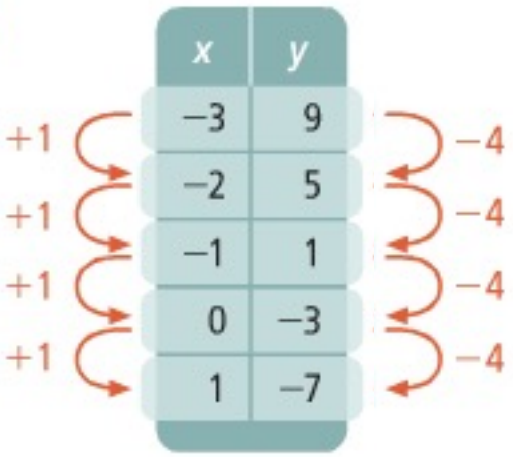
C $(-1, -2), (0, -1), (1, 0), (3, 2)$



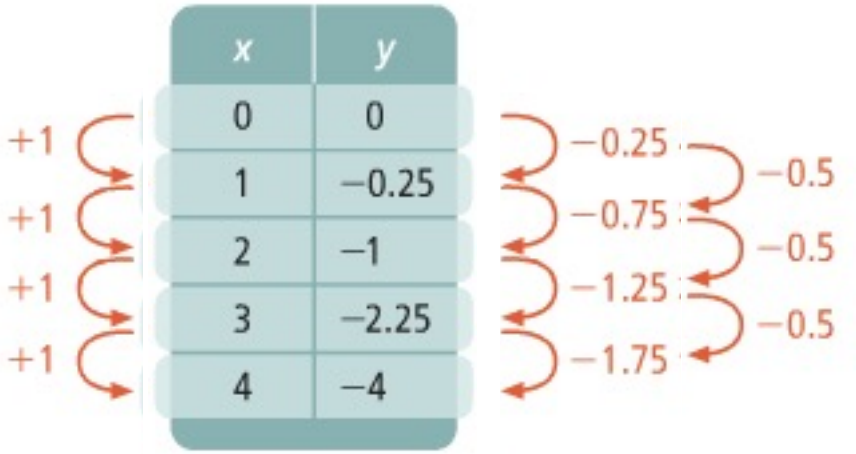
Linear

U4L7 - Choosing a model using Differences or Ratios

Which type of function best models the data? Use differences or ratios.



The first differences are constant, so a **linear** function models the data.



The second differences are constant, so a **quadratic** function models the data.

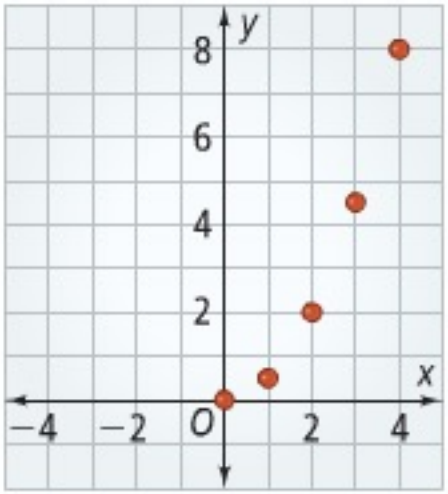
U4L7 - Modeling data

Which type of function best models the data in the table. Write an equation to model the data.

x	y
0	0
1	0.5
2	2
3	4.5
4	8

Step 1

Graph the data.



Step 2

The data appear to be quadratic. Test for a common second difference.

x	y		
0	0	+1	+0.5
1	0.5	+1	+1.5
2	2	+1	+2.5
3	4.5	+1	+3.5
4	8		

+1 +1 +1

There is a common second difference, 1.

U4L7 - Modeling data

Which type of function best models the data in the table. Write an equation to model the data.

x	y
0	0
1	0.5
2	2
3	4.5
4	8

Step 3

The graph appears to be a parabola with vertex at $(0, 0)$, so use $y = ax^2$.

$y = ax^2$

$2 = a(2)^2$ Use a point other than (0, 0) to find a.

$2 = 4a$ Simplify.

$0.5 = a$ Divide each side by 4.

$y = 0.5x^2$ Write a quadratic function.

Step 4

Test two points in the data set other than $(2, 2)$ and $(0, 0)$.

Test (3, 4.5):

$y = 0.5x^2$

$y = 0.5(3)^2$

$y = 4.5$ ✔

Test (4, 8):

$y = 0.5x^2$

$y = 0.5(4)^2$

$y = 8$ ✔

The points $(3, 4.5)$ and $(4, 8)$ both satisfy $y = 0.5x^2$. The equation $y = 0.5x^2$ models the data.

U4L7 - Modeling Real-World Data

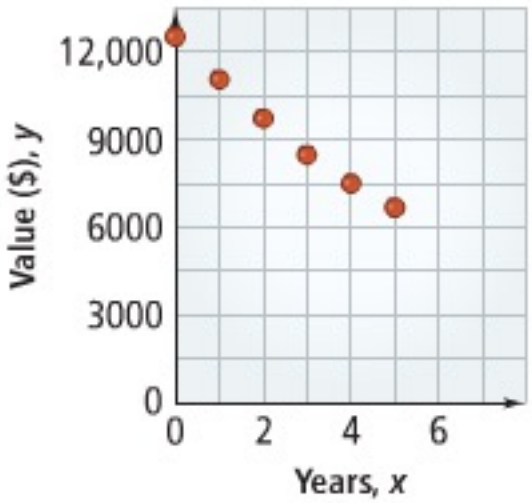
The data in the table give the value of a used car over time. Which type of function best models the data. Write an equation to model the data.

Value of Used Car

Years	Value ($)
0	12,575
1	11,065
2	9750
3	8520
4	7540
5	6710

Step 1

Graph the data.



The graph curves and does not look quadratic. It may be exponential.

Step 2

Test for a common ratio.

Years	Value ($)		
0	12,575	+1	$\frac{11,065}{12,575} \approx 0.88$
1	11,065	+1	$\frac{9750}{11,065} \approx 0.88$
2	9750	+1	$\frac{8520}{9750} \approx 0.87$
3	8520	+1	$\frac{7540}{8520} \approx 0.88$
4	7540	+1	$\frac{6710}{7540} \approx 0.89$
5	6710		

The value of the car is roughly 0.88 times its value the previous year.

U4L7 - Modeling Real-World Data

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Value of Used Car

Years	Value ($)
0	12,575
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Step 3

Write an exponential model.

Relate $y = a \cdot b^x$

Define Let a = the initial value, 12,575.
Let b = the decay factor, 0.88.

Write $y = 12{,}575 \cdot 0.88^x$

Step 4

Test two points other than (0, 12,575).

Test (2, 9750): $y = 12{,}575 \cdot 0.88^2$, $y \approx 9738$

Test (4, 7540): $y = 12{,}575 \cdot 0.88^4$, $y \approx 7541$

The point (2, 9738) is close to the data point (2, 9750). The point (4, 7541) is close to the data point (4, 7540). The equation $y = 12{,}575 \cdot 0.88^x$ models the data.

Questions?

- Check the Message Board first
- Send a WebMail
- You can also make an appointment at https://elizondo.youcanbook.me
- You can also call me at (559) 549-3244. If I'm not available to answer your call, please leave a voicemail with your full name and phone number.