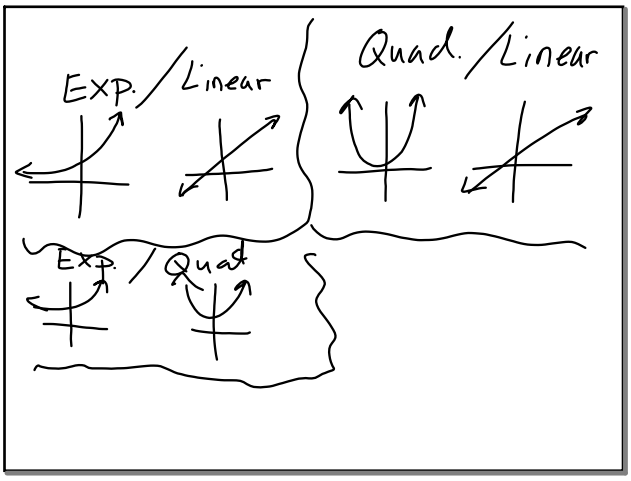
Table of Contents

Objectives

Compare linear, quadratic, and exponential models.

Given a set of data, decide which type of function models the data and write an equation to describe the function.

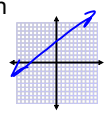
Mar 14-11:19 AM



Feb 28-9:33 AM

Can you draw a picture of a(n)...

Linear Function

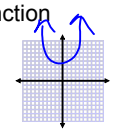


Linear Equation Example:

$y = mx + b$

$y = \frac{1}{2}x + 5$

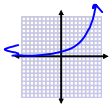
Quadratic Function



Quadratic Equation Example:

$y = x^2 + 4$

Exponential Function



Exponential Equation Example:

$y = 1(2)^x$

$y = a(b)^x$

Feb 21-8:22 AM

Look at the tables and graphs below. The data show three ways you have learned that variable quantities can be related. The relationships shown are linear, quadratic, and exponential.

Linear

Training Heart Rate	
Age (yr)	Beats/min
20	170
30	161.5
40	153
50	144.5

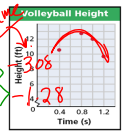
$161.5 - 170$

-8.5, -8.5, -8.5

Quadratic

Volleyball Height	
Time (s)	Height (ft)
0.4	10.44
0.8	12.76
1	12
1.2	9.96

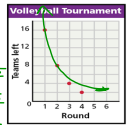
2.32, 0.76, -2.04



Exponential

Volleyball Tournament	
Round	Teams Left
1	16
2	8
3	4
4	2

$\frac{8}{16} = \frac{1}{2}$, $\frac{4}{8} = \frac{1}{2}$, $\frac{2}{4} = \frac{1}{2}$



Mar 14-11:22 AM

Write this in your notes!

Remember!

When the independent variable changes by a constant amount,

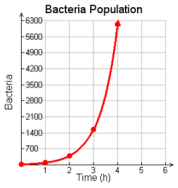
- linear functions have constant first differences.
- quadratic functions have constant second differences.
- exponential functions have a constant ratio.

Mar 14-12:13 PM

Graph each data set. Which kind of model best describes the data?

Time(h)	Bacteria
0	24
1	96
2	384
3	1536
4	6144

Plot the data points and connect them.



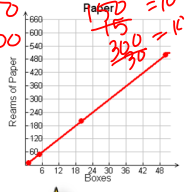
The data appear to be exponential.

Mar 14-11:27 AM

Graph each data set. Which kind of model best describes the data?

Boxes	Reams of paper
1	10
5	50
20	200
50	500

Plot the data points and connect them.



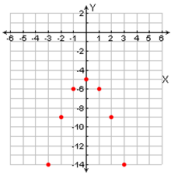
The data appears to be

Mar 14-11:27 AM

Graph each set of data. Which kind of model best describes the data?

x	y
–3	–14
–2	–9
–1	–6
0	–5
1	–6
2	–9
3	–14

Plot the data points.



The data appears to be quadratic.

Mar 14-11:54 AM

Look for a pattern in each data set to determine which kind of model best describes the data.

Money in CD	
Time (yr)	Amount ($)
0	1000.00
1	1169.86
2	1368.67
3	1601.04

For every constant change in time of + 1 year there is an approximate constant ratio of 1.17.

The data appears to be exponential.

Mar 14-12:04 PM

Look for a pattern in the data set {(–2, 10), (–1, 1), (0, –2), (1, 1), (2, 10)} to determine which kind of model best describes the data.

Write the information in a table...

Data (1)	Data (2)
–2	10
–1	1
0	–2
1	1
2	10

The data appear to be quadratic.

Mar 14-12:08 PM

After deciding which model best fits the data, you can write a function. Recall the general forms of linear, quadratic, and exponential functions.

General Forms of Functions

LINEAR	QUADRATIC	EXPONENTIAL
$y = mx + b$	$y = ax^2 + bx + c$	$y = ab^x$

Write a function to model each set of data.

1)

Number of Computers				
Year	'00	'01	'02	'03
Computers	14	28	56	112

$y = 14(2)^x$

$y = 14(2)^x$

2)

Cost of Peaches				
Pounds	1	2	3	4
Cost ($)	1.29	2.58	3.87	5.16

$y = 1.29x + 0$

$y = 1.29x$

3)

Miles driven	5	6	7	8	9	10	11
Gallons of gas left in the tank	12	11.9	11.8	11.7	11.6	11.5	11.4

Mar 14-12:12 PM

Assignment: p.793(1-7, 14, 16-22, 27-29)

Mar 8-8:36 AM