

# Lesson 6: Modeling a Context from Data

## Classwork

### Opening Exercise

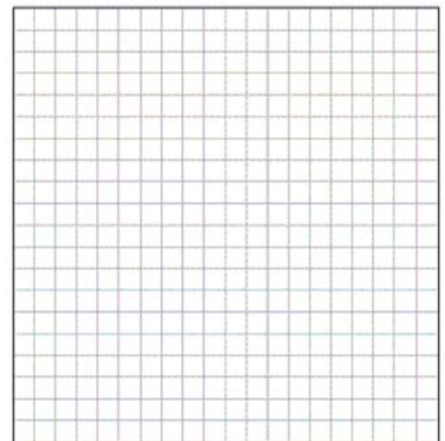
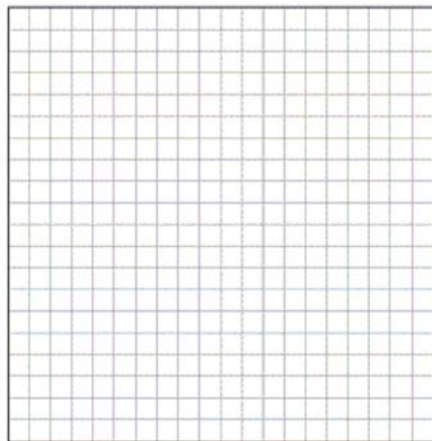
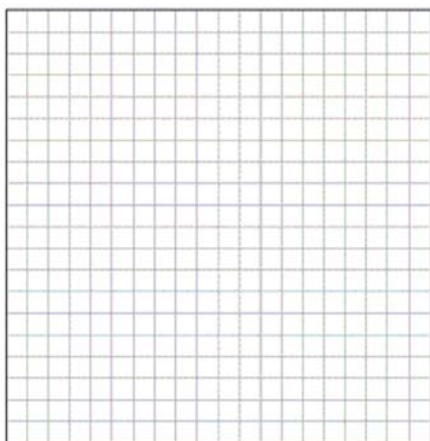
- a. Identify the type of function that each table appears to represent (e.g., quadratic, linear, exponential, square root, etc.).

- b. Explain how you were able to identify the function.

- c. Find the symbolic representation of the function.

- d. Plot the graphs of your data.

A		B		C	
$x$	$y$	$x$	$y$	$x$	$y$
1	5	1	6	1	3
2	7	2	9	2	12
3	9	3	13.5	3	27
4	11	4	20.25	4	48
5	13	5	30.375	5	75

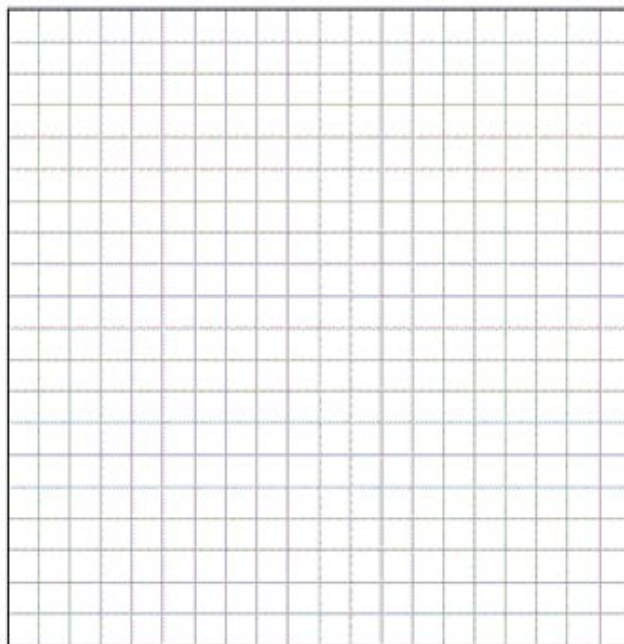


**Example 1**

Enrique is a biologist who has been monitoring the population of a rare fish in Lake Placid. He has tracked the population for 5 years and has come up with the following estimates:

Year Tracked	Year Since 2002	Estimated Fish Population
2002	0	1,000
2003	1	899
2004	2	796
2005	3	691
2006	4	584

Create a graph and a function to model this situation, and use it to predict (assuming the trend continues) when the fish population will be gone from the Lake Placid ecosystem. Verify your results, and explain the limitations of each model.



**Exercises**

1. Bella is a BMX bike racer and wants to identify the relationship between her bike's weight and the height of jumps (a category she gets judged on when racing). On a practice course, she tests out 7 bike models with different weights and comes up with the following data.

Weight (lbs.)	Height of Jump (ft.)
20	8.9
21	8.82
22	8.74
23	8.66
24	8.58
25	8.5
26	8.42
27	8.34

- a. Bella is sponsored by Twilight Bikes and must ride a 32 lb. bike. What can she expect her jump height to be?
- b. Bella asks the bike engineers at Twilight to make the lightest bike possible. They tell her the lightest functional bike they could make is 10 lb. Based on this data, what is the highest she should expect to jump if she only uses Twilight bikes?
- c. What is the maximum weight of a bike if Bella's jumps have to be at least 2 feet high during a race?

2. The concentration of medicine in a patient's blood as time passes is recorded in the table below.

Time (hours)	Concentration of Medicine (ml)
0	0
0.5	55.5
1	83
1.5	82.5
2	54

- a. The patient cannot be active while the medicine is in his blood. How long, to the nearest minute, must the patient remain inactive? What are the limitations of your model(s)?

- b. What is the highest concentration of medicine in the patient's blood?

3. A student is conducting an experiment, and as time passes, the number of cells in the experiment decreases. How many cells will there be after 16 minutes?

Time (minutes)	Cells
0	5,000,000
1	2,750,000
2	1,512,500
3	831,875
4	457,531
5	251,642
6	138,403

**Lesson Summary**

When given a data set, strategies that could be used to determine the type of function that describes the relationship between the data are

- Determine the variables involved and plot the points.
- After making sure the  $x$ -values are given at regular intervals, look for common differences between the data points—first and second.
- Determine the type of sequence the data models first, and then use the general form of the function equation to find the parameters for the symbolic representation of the function.

**Problem Set**

Research linear, quadratic, and exponential functions using the internet. For each of the three types of functions, provide an example of a problem/situation you found on the Internet where that function was used to model the situation or answer the problem. Include the actual function used in the example and webpage where you found the example.