

(A) Lesson Objectives

- a. Explore patterns in a set of numbers that exhibit linear and exponential relationships.
- b. Write equations that summarize the relationships that exist within a data set.
- c. Introduce the general equation of exponential growth/decay models

(B) Opening Exercise – Studying Number Patterns

- a. Consider the data presented in the tables below.
 - i. For each, write, in words, the pattern that you see in the **y** values in the data table
 - ii. For each, write an algebraic expression that summarizes this pattern (equation)

<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>0</td><td>-2</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>4</td><td>6</td></tr> <tr><td>6</td><td>10</td></tr> <tr><td>8</td><td>14</td></tr> </tbody> </table>	x	y	0	-2	2	2	4	6	6	10	8	14	<p>Pattern:</p> <p>Eqn:</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr><th>x</th><th>y</th></tr> </thead> <tbody> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>2.5</td></tr> <tr><td>3</td><td>2</td></tr> <tr><td>4</td><td>1.5</td></tr> <tr><td>5</td><td>1</td></tr> </tbody> </table>	x	y	1	3	2	2.5	3	2	4	1.5	5	1	<p>Pattern:</p> <p>Eqn:</p>
x	y																										
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b. Summarizing Conclusion →

(C) Exploring Other Types of Number Patterns

a. Consider the data presented in the tables below.

i. For each, write, in words, the pattern that you see in the **y** values in the data table

ii. For each, write an algebraic expression that summarizes this pattern (equation)

x	0	1	2	3	4	5	6
y	1	2	4	8	16	32	64

Pattern:

Eqn:

x	0	1	2	3	4	5	6
y	729	243	81	27	9	3	1

Pattern:

Eqn:

x	0	1	2	3	4	5	6
y	0.3	0.6	1.2	2.4	4.8	9.6	19.2

Pattern:

Eqn:

x	0	1	2	3	4	5	6
y	100	125	156.25	195.31	244.14	305.18	381.47

Pattern:

Eqn:

x	0	1	2	3	4	5	6
y	50	30	18	10.8	6.48	3.89	2.33

Pattern:

Eqn:

x	0	1	2	3	4	5	6
y	360	120	40	13.33	4.44	1.48	0.494

Pattern:

Eqn:

b. Summarizing Conclusion:

(D) Exploring Exponential Equations

a. For each word problem, answer the following three questions:

- i. How can you analyze the numeric data (no graphs) to conclude that the data is exponential? i.e. how do you know the data is exponential rather than linear?
- ii. Graph the data on a scatter plot
- iii. Write an equation to model the data. Define your variables carefully.

Mr. S has invested some money for Andrew's post-secondary education (not too hopeful for an athletic scholarship for my son!!!!)

Time (years)	0	1	2	3	4	5	6	7	8
Value of investment (000's \$)	8	8.480	8.989	9.528	10.0	10.706	11.348	12.029	12.751

The following data table shows the relationship between the time (in hours after a rain storm in Manila) and the number of bacteria (#/mL of water) in water samples from the Pasig River:

Time (hrs)	0	1	2	3	4	5	6	7	8
# of Bacteria	100	196	395	806	1570	3154	6215	12600	25300

The value of Mr. S's car is depreciating over time. I bought the car new in 2002 and the value of my car (in thousands) over the years has been tabulated below:

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
Value	40	36	32.4	29.2	26.2	23.6	21.3	19.1	17.2

The following data table shows the historic world population since 1950:

Year	1950	1960	1970	1980	1990	1995	2000	2005	2010
Pop (in millions)	2.56	3.04	3.71	4.45	5.29	5.780	6.09	6.47	6.85