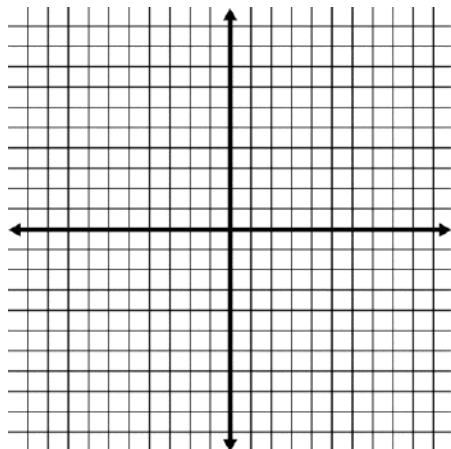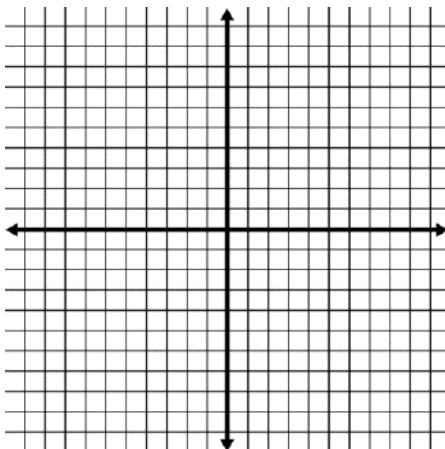NAME _____ DATE _____

Unit 6 Lesson 3 Model of Best Fit: Linear, Quadratic, or Exponential
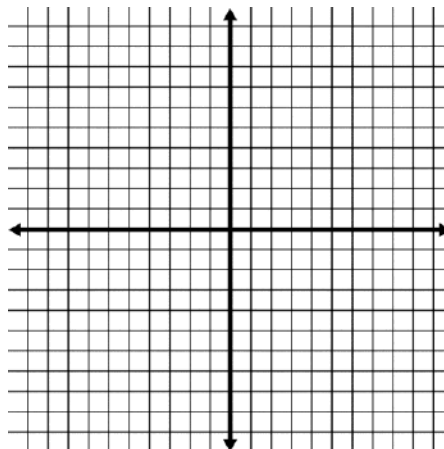
NOTES

| Linear Graph | Quadratic Graph | Exponential Graph |

Steps to deriving an equation using the TI-84 Plus

1. Enter the data
   STAT, EDIT, enter first row/column in L_1 and second row/column in L_2
2. If you want to view the data in a scatter plot
   2nd, STAT PLOT – make sure one is turned "ON"
   ZOOM #9 to see the data graphed
3. To see how strong a correlation when obtaining the equation (step 4)
   2nd CATALOG (above the "0"), DIAGONOSTIC ON, ENTER, ENTER (*you must see the word* DONE *on the screen*)
4. To obtain equation
   STAT, CALC, #4 for Linear, #5 for Quadratic, and #0 for Exponential
   The equation with the "r^2" value closest to ± 1 is the best fit for the data.
5. To see the equation along with the scatter plot
   Y = (put in the equation you obtained in step 4), then GRAPH

Examples – answer the three questions below for questions 1 – 4.

   a. Graph the data in the table below.
   b. Which kind of function best models the data (linear, quadratic or exponential)?
   c. Write an equation to model the data.

1.

x	0	1	2	3	4
y	-3	-2	-3	-6	-11

2.

x	y
0	-1
1	-2
2	-3
3	-4
4	-5

3.

Year	Estimated Population
0	91
1	70
2	54
3	42
4	32

4.

x	y
0	30
1	6
2	1.2
3	0.24
4	0.048

APPLICATIONS

5. a. Which kind of function best models the data?
    b. Write an equation to model the data.
    c. If the pattern shown in the table continues, what is the value of y for $x = 6$?
       Round to the nearest hundredth if necessary.

x	y
0	30
1	15
2	7.5
3	3.75
4	1.875

6. A kid won the boys' shot-putt gold medal for the fourth consecutive year in a row. His winning throw was 16.43 meters. A shot-putter throws a ball at an inclination of 45° to the horizontal. The following data represent approximate heights for a ball thrown by a shot-putter as it travels a distance of *x* meters horizontally.

Distance (m)	Height (m)
7	8
20	15
33	24
47	26
60	24
67	21

7) The table below lists the total estimated numbers of AIDS cases, by year of diagnosis from 1999 to 2003 in the United States

Year	AIDS Cases
1999	41,356
2000	41,267
2001	40,833
2002	41,289
2003	43,171

a) Find the line of best fit.

_____

b) How many cases will there be in the year 2006?

NAME _____ DATE _____

Unit 6 Lesson 3 PRACTICE: Choose Linear, Quadratic, or Exponential

Determine which function best models the data and write the equation.

1. (-1, 3), (1, 3), (3, 27), (5, 75), (7, 147)   2. (-2, 4), (-1, 2), (0, 0), (1, -2), (2, -4)

3.

x	y
-3	$\frac{9}{2}$
-2	2
-1	$\frac{1}{2}$
0	0

4.

x	y
-1	-2
0	-4
1	-6
2	-8

5.

x	y
-4	-4
-2	-1
0	0
2	-1

6. The cost of shipping computers from a warehouse is listed in the table below.

Number of Computers	50	75	100	125
Cost (dollars)	1700	2500	3300	4100

a) Determine which function best models the data.

b) Write the equation.

c) Using the equation, what is the cost of shipping 27 computers?

d) How many computers can be shipped for $5500?

7. During a scientific experiment, the bacteria count was take at 5-min intervals. The data shows the count at several time periods during the experiment.

Time Interval	0	1	2	3
Count	110	132	159	190

a)   Determine which function best models the data and write the equation.

b)   Using the equation, what is the count for 1 hr, 30 min after the start of the experiment?

8) At 1821 feet tall, the CN Tower in Toronto, Ontario, is the world's tallest self-supporting structure. Suppose you are standing in the observation deck on top of the tower and you drop a penny from there and watch it fall to the ground. The table below shows the penny's distance from the ground after various periods of time (in seconds) have passed. Where is the penny located after falling for a total of 10.5 seconds?

Time (seconds)	Distance (feet)
0	1821
2	1757
4	1565
6	1245
8	797
10	221

9) The table below lists the number of Americans (in thousands) who are expected to be over 100 years old for selected years. How many Americans will be over 100 years old in the year 2008?

Year	Number (thousands)
1994	50
1996	56
1998	65
2000	75
2002	94
2004	110

10) The concentration (in milligrams per liter) of a medication in a patient's blood as time passes is given by the data in the following table:

Time (Hours)	Concentration (mg/l)
0	0
0.5	78.1
1	99.8
1.5	84.4
2	50.1
2.5	15.6

a) What is the concentration of medicine in the blood after 4 hours have passed?