Introduction to Regressions (Day 6–7)

Regression Equation: an equation of a function (linear, exponential, etc..) that plotted points follow or create. (calculator command creates equations)

Correlation Coefficient (*r*#): this number describes the strength of the equation in regards to the plotted points. ***A PERFECT*** fit equation will have a $r = 1$ or $r = -1$ depending on _______ of line or growth of an exponential curve.

(These concepts will be expanded further later in the year; these are just the basics needed for today)

HOW TO USE A CALCULATOR TO CREATE LINEAR AND EXPONENTIAL EQUATIONS

What do we need?

- Linear Equations: **2 exact points from table, graph or word problem**
- Exponential Equations: **3 exact points from table, graph or word problems**

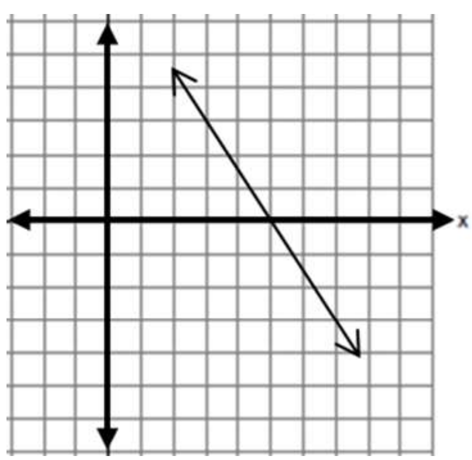
Steps in Calculator: (need to turn Diagnostics On in calculator to get *r*#)

- **Put points in a list (STAT- EDIT)**
- **Choose either LinReg (Linear Equ) or ExpReg (Exponential Equ) (STAT-CALC)**
- **VERIFY it is a PERFECT fit equation by looking at *r*#. MUST = ±1 to be perfect**
- **Write equation stated by filling in the appropriate values for the coefficients**
- EXPLAIN IN WORDS **the steps you did to get the equation since no math was involved in writing the equations.**

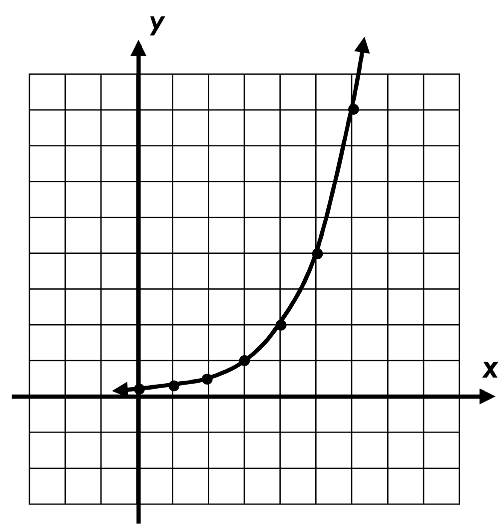
Write an equation of the GRAPHED functions below.

- Identify the type of function (Linear or Exponential)
- Identify and write down the correct number of points needed for each function
- Follow the steps above for the calculator.

1.



2.



3. Write an equation of a line that goes through the points (–2, –11) and (3, 14).

4. Write the equation of the exponential function that goes through the following points:

(–1, 16) (2, 6.75) (1, 9)

5. Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n^{th} day.

6. Write an exponential function $f(x)$ for the table shown.

x	0	1	2	3
$f(x)$	13	39	117	351

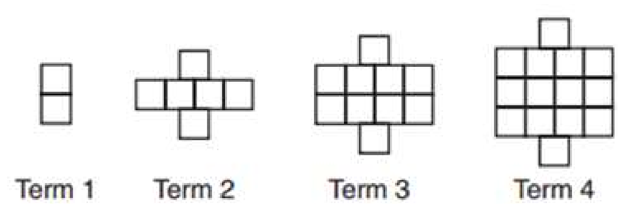
7. The table below shows the amount of a decaying radioactive substance that remained for selected years after 1990.

Years After 1990 (x)	0	2	5	9	14	17	19
Amount (y)	750	451	219	84	25	12	8

a) Write an exponential regression equation for this set of data, rounding all values to the nearest hundredth.

8. Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d.

9. The illustration below shows of a pattern of blocks. Write an equation to represent this model.

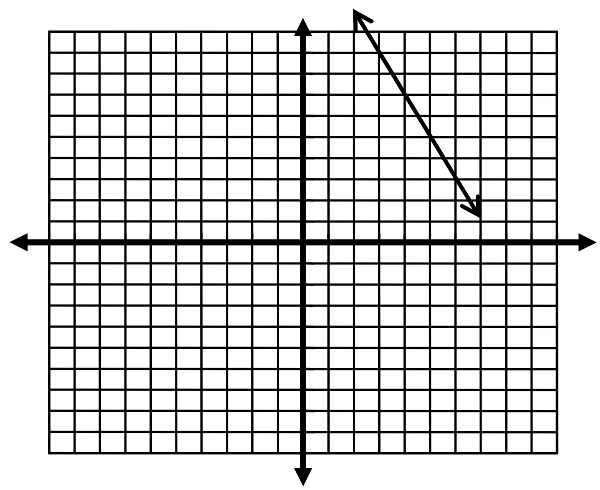


Classwork 6–7

1. Write an equation of a line that goes through the points (–7, 1) and (–1, –2).

2. Write an exponential equation that goes through (–4, 192), (–3, 48), and (–1, 3).

3. Write an equation of the graph below.



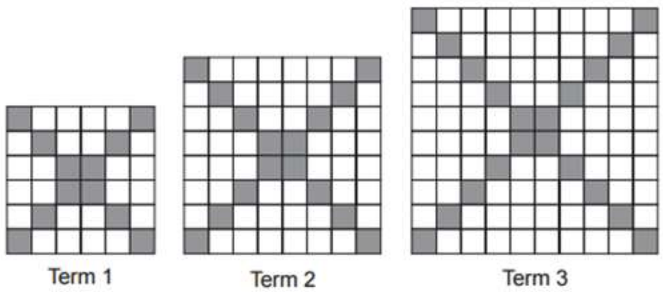
4. A sunflower is 3 inches tall at week 0 and grows 2 inches each week. Write an equation of a function that could be used to determine the height, $f(n)$, of the sunflower in n weeks.

5. An application developer released a new app to be downloaded. The table below gives the number of downloads for the first four weeks after the launch of the app. Write an exponential equation that models this data.

Number of Weeks	1	2	3	4
Number of Downloads	120	180	270	405

6. Caitlin has a movie rental card worth $175. After she rents the first movie, the card's value is $172.25. After she rents the second movie, its value is $169.50. After she rents the third movie the card is worth $166.75. Assuming the pattern continues, write an eqation to define $A(n)$, the amount of money on the rental card after *n* rentals.

7. The diagrams below represent the first three terms of a sequence.



Assuming the pattern continues, which formula determines $f(n)$, the number of shaded squares in the n^{th} term?

(1) $f(n) = 4n + 12$
(2) $f(n) = 4n + 8$
(3) $f(n) = 4n + 4$
(4) $f(n) = 4n + 2$

8. Write an equation of the function graphed below. Explain how you determined your equation.