

1.2 Linear Functions & Regression

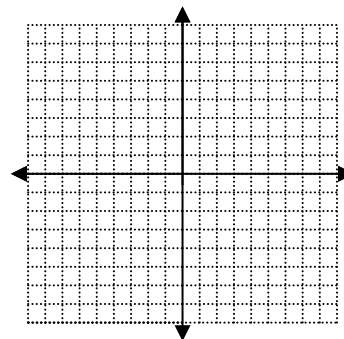
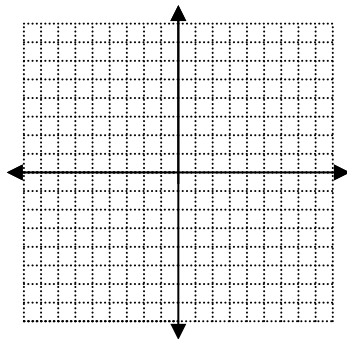
Pre-Calculus

Write your questions here!

Slope Intercept Form

Standard Form

Point Slope Form



Parallel and Perpendicular

Write the equation of the line that is perpendicular to $y = -\frac{2}{3}x + 5$ and contains (4,5)

Regression

Sandwich	Total Fat (g)	Total Calories
Hamburger	9	260
Cheeseburger	13	320
Quarter Pounder	21	420
Quarter Pounder with Cheese	30	530
Big Mac	31	560
Arch Sandwich Special	31	550
Arch Special with Bacon	34	590
Crispy Chicken	25	500
Fish Fillet	28	560
Grilled Chicken	20	440
Grilled Chicken Light	5	300

Predict the calories of the Grilled Cheese Burger that has 79 grams of fat.

Predict the fat grams of 800 calorie sandwich.

Quick Review of Graphs

Quadratic

Square Root

Cubic

Exponential

The table below lists the number of Americans (in thousands) who are expected to be over 100 years old for selected years.

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

1. Find the “friendly” window to view the scatterplot.
2. Determine the function that best represents the data.
3. Use regression to create a model. $y =$
4. Predict the number of 100 year old Americans in 2010.
5. Predict when will there be 80,000 one hundred year old Americans?

SUMMARY:

Now,
summarize
your notes
here!



Write the equation of the line in point slope form

1. contains the points (3,4) and (21,-15)

2. y-intercept = 4 and contains the point (14,27)

Write the equation of the line in slope intercept form

3. contains the points (-21,10) and (13,-7)

4. slope = -5 and contains the point (-12,20)

Write the equation of the line in slope intercept that is parallel to $y = 3x + 5$ and contains the point (12,-18)

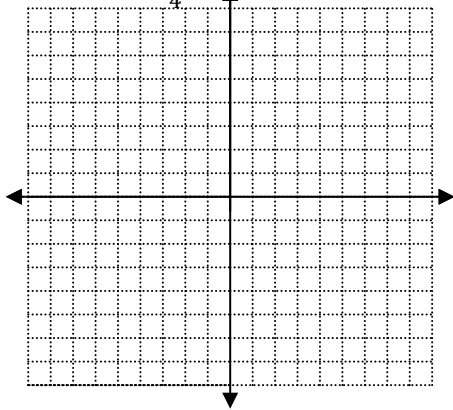
5.

Write the equation of the line in slope intercept that is perpendicular to $y = 3x + 5$ and contains (-12,21)

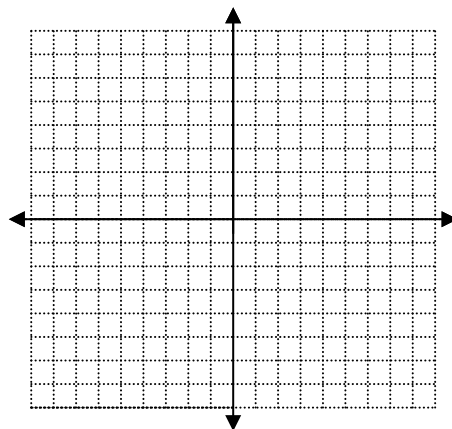
6.

Graph the following

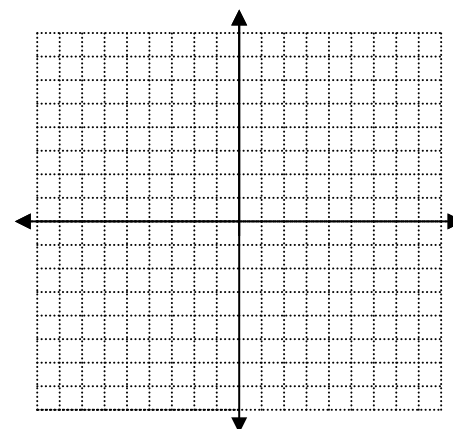
7. $f(x) = -\frac{3}{4}x - 1$



8. $2x - 3y = 12$



9. $4y = 5x - 8$



Enter the data in your calculator and create a scatterplot with a “friendly” window.

10. Every musical note has an associated frequency measured in hertz(Hz), or vibrations per second. The table shows the approximate frequencies of the notes in the octave from middle C up to the next C on a piano.

Note Name	C	C#	D	D#	E	F	F#	G	G#	A	A#	B	Next C
# above C	0	1	2	3	4	5	6	7	8	9	10	11	12
Frequency(Hz)	262	277	294	311	330	349	370	392	415	440	466	494	523

WINDOW

xmin= ymin=

xmax= ymax=

xscl= yscl=

a. Find a model that fits the data (linear, quadratic, exponential, abs. value, etc..).

b. Use regression and write the equation of your model. Round to nearest thousandth.

$y =$

c. Use the model to predict note 24.

d. Find the note with a frequency of 600 Hz. Hint graph $y = 600$. This makes a straight line at 600. The point of intersection is your solution!!!

11. Bob decides to find out how much soap a person uses in a day. Below is the data that he collected.

# of days used	0	1	4	5	6	7	8	9	11	12	17	19	20	21	22
Weight(grams)	124	121	103	96	90	84	78	71	58	50	27	16	12	8	6

WINDOW

xmin= ymin=

xmax= ymax=

xscl= yscl=

a. Find a model that fits the data (linear, quadratic, exponential, absolute value, etc...).

e. Use regression and write the equation of your model. Round to nearest thousandth.

$y =$

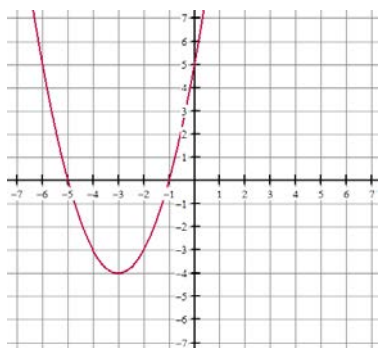
b. Use the model to predict when the soap will be gone.

c. Use the model to predict the weight after 14.2 days.

Review Skillz

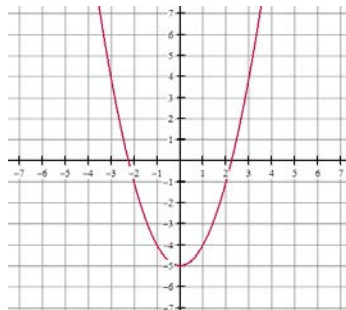
Write the equation of the quadratic function in vertex form, $y = a(x - h)^2 + k$. See example for a refresher!

Example:

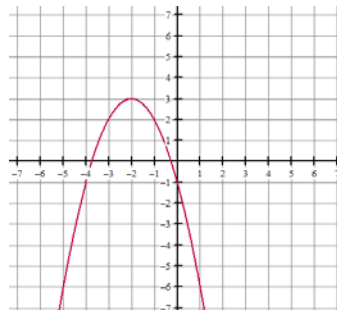


$y = (x + 3)^2 - 4$

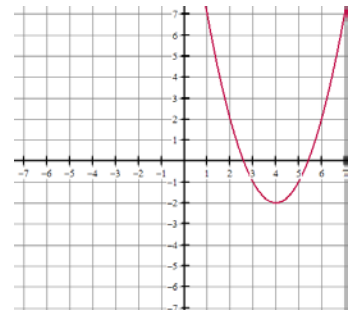
1.



2.



3.



Write the equation in slope intercept form.	Write the equation of the line that is perpendicular to $y = -2x + 4$ and contains the point $(-2,-24)$
1. contains the points $(-4, 12)$ and $(12,-16)$	2.

NUMERICALLY

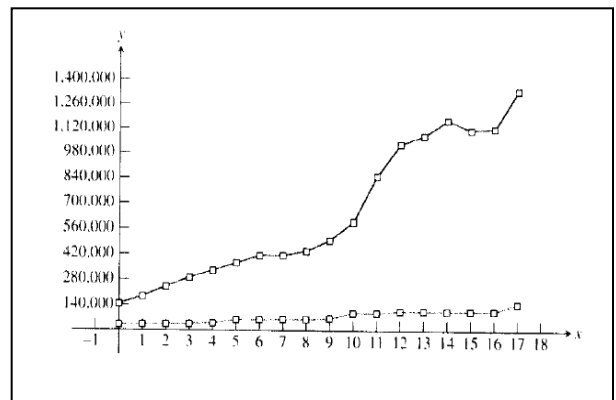
A physics student obtains the following data involving a ball rolling down an inclined plane, where t is the elapsed time in seconds and y is the distance traveled in inches.

t	0	1	2	3	4	5
y	0	1.2	4.8	10.8	19.2	30

3. What is the average velocity of the ball for the indicated time interval?
4. Which interval was the ball travelling fastest?
5. Predict the distance at 6 seconds. Justify your prediction.

GRAPHICALLY

The graph shows the minimum salaries in major league baseball over a recent 18-year period and the average salaries in major league baseball over the same period. Salaries are measured in dollars and time is measured after the starting year (year 0).



6. Which line is which, and how do you know?
7. After Peter Ueberroth's resignation as baseball commissioner in 1988 and his successor's untimely death in 1989, the team owners broke free of previous restrictions and began an era of competitive spending on player salaries. Identify where the 1990 salaries appear in the graph and explain how you can spot them.
8. The owners attempted to halt the uncontrolled spending by proposing a salary cap, which prompted a players' strike in 1994. The strike caused the 1995 season to be shortened and left many fans angry. Identify where the 1995 salaries appear in the graph and explain how you can spot them.

ALGEBRAICALLY

The following equation models US Air Travel from 1987 to 2000 where x stands for the number of years since 1987 and P stands for the number of passengers in millions.

$$P = 1.13x^2 + 3.1x + 443$$

9. How many passengers were there in 1991?
10. According to the algebraic model, when will the number of passengers reach 900 million?
11. Do you think that this algebraic model will still be valid in the year 2007? Explain why or why not.

NUMERICALLY, GRAPHICALLY, and ALGEBRAICALLY

The table shows the number of cellular phone subscribers in the US and their average local monthly bill in the years from 1988 to 2001. Make two scatter plots in your calculator showing the number of subscribers and the average local monthly bill as functions of time, letting time $t =$ the number of years since 1988. You will need to turn on a second STAT PLOT. Label your list as shown

12. One scatter plot looks linear. Use linear regression and write the equation of the model. Graph it.

$$y =$$

13. One scatter plot looks quadratic. Use quadratic regression and write the equation of the model. Graph it.

$$y =$$

14. Use your models to answer:
 - a. How many subscribers in 2010?

- b. When will the average local monthly bill be \$38.50?

L1 L2 L3

Year	Subscribers (millions)	Average Local Monthly Bill (\$)
1988	1.6	95.00
1989	2.7	85.52
1990	4.4	83.94
1991	6.4	74.56
1992	8.9	68.51
1993	13.1	67.31
1994	19.3	58.65
1995	28.2	52.45
1996	38.2	48.84
1997	48.7	43.86
1998	60.8	39.88
1999	76.3	40.24
2000	97.0	45.15
2001	118.4	45.56

15. Which model is better and why?