

Write the equation in slope intercept form.	Write the equation of the line that is perpendicular to $y = -2x + 4$ and contains the point $(-2, -24)$
<p>1. contains the points $(-4, 12)$ and $(12, -16)$</p> $m = \frac{\Delta y}{\Delta x} = \frac{(12) - (-16)}{(-4) - (12)} = \frac{28}{-16} = \frac{7}{-4}$ $y - y_1 = m(x - x_1)$ $y - (12) = \frac{7}{-4}(x - (-4))$ $y - 12 = -\frac{7}{4}x - 7$ $y = -\frac{7}{4}x + 5$	<p>2.</p> $m = -2$ $\perp m = \frac{1}{2}$ $y - y_1 = m(x - x_1)$ $y - (-24) = \frac{1}{2}(x - (-2))$ $y + 24 = \frac{1}{2}x + 1$ $y = \frac{1}{2}x - 23$

NUMERICALLY

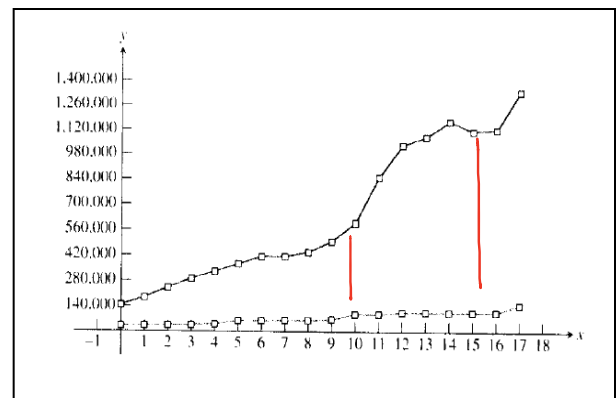
A physics student obtains the following data involving a ball rolling down an inclined plane, where t is the elapsed time in seconds and y is the distance traveled in inches.

time (seconds)	t	0	1	2	3	4	5
Distance (inches)	y	0	1.2	4.8	10.8	19.2	30

- What is the average velocity of the ball for the indicated time interval? $m = \frac{\Delta y}{\Delta x} = \frac{(30) - (0)}{(5) - (0)} = \frac{30}{5} = 6 \text{ in/sec}$
- Which interval was the ball travelling fastest? *The interval from 4 to 5*
- Predict the distance at 6 seconds. Justify your prediction.
43.2 inches. The quadratic regression predicted it

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).



- Which line is which, and how do you know?
The bottom curve is minimum salaries. I know this because minimum values must be below average values.
- 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.
It appears that "10" is 1990. Both the minimum and average salaries are starting to grow faster (bigger slope) at this time.
- 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.
I'd guess this happened at $x=15$, because the average salary declined this year.

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?

473,480,000 passengers

10. According to the algebraic model, when will the number of passengers reach 900 million?

Year 2005.785

11. Do you think that this algebraic model will still be valid in the year 2007? Explain why or why not.

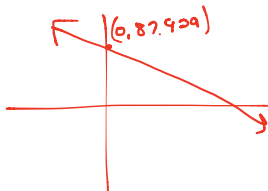
According to rita.dot.gov, 769.4 million Americans flew in 2007 so the model is a little off.

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.

$$y = -4.193x + 87.929$$



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

$$y = .863x^2 - 2.732x + 4.649$$



14. Use your models to answer:

- a. How many subscribers in 2010?

362,662,418 subscribers

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

Year 1999.789

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?

The number of customers is a better model. The price model starts to get inaccurate around 1999 because it predicts a lower price than reality.