Making Math Green and Engaging!

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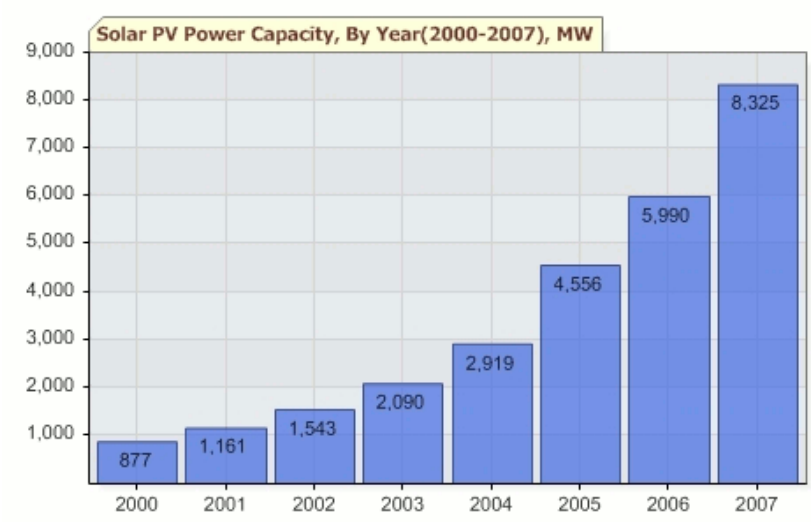
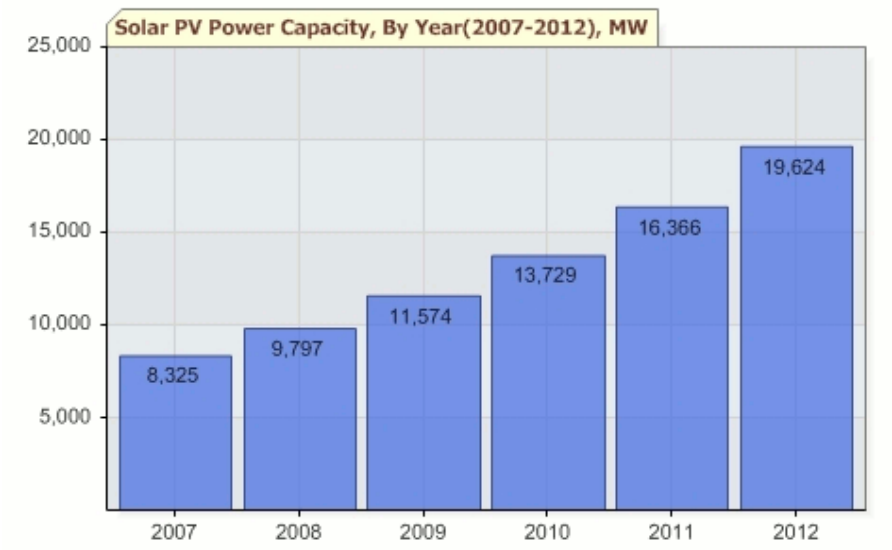
Solar Energy

Delta College solar energy data collected from http://www3.delta.edu/solar/

March 28th 2011

Global Solar Capacity data collected from
http://www.energyandcapital.com/articles/solar-stock-outlook/750





Project: Quadratic Modeling

From the Delta Weather Website Concerning Solar Energy Generated by Month

http://www3.delta.edu/solar/solarArchive.html

Energy Production - Annual Monthly Totals (kWh)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2007	- - -	- - -	- - -	- - -	- - -	- - -	1465.4	1121.3	1027.8	1127.9	689.0	557.9
2008	644.1	870.1	1306.2	1430.7	1402.0	1275.7	1415.6	1485.2	1220.3	1183.3	694.0	330.1
2009	520.1	499.4	1437.1	1236.5	1483.6	1324.6	1372.1	1348.1	1385.8	709.1	754.5	537.2
2010	566.4	731.9	1519.8	1326.2	1338.1	1268.0	1394.8	1337.6	1058.3	1226.6	730.1	533.8
2011	403.5	936.1	1283.8	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Use the data from 2008. Let your independent variable be the number of the month, (i.e. Jan=1, Feb=2 etc), and the dependent variable be the annual monthly totals in kWh.

1. Make a scatter plot on graph paper. The axes and scale should be labeled clearly.
2. Sketch in an "eyeball best fit curve"
3. Choose a point to be the vertex and insert that point into the vertex form of a quadratic equation.
4. Use another point on the curve to calculate the "a" value, showing all calculations on the paper.
5. Write the equation of the curve in vertex form and in standard form.
6. Using your calculator, do a quadratic regression to come up with an equation in standard form that models this data. Compare your equation. and the regression equation.
7. Use the regression equation. to find the vertical intercept for your model and describe what this point means in the context of the problem.
8. Determine if there are any horizontal intercepts for the regression equation. and state why or why they don't exist.
9. Algebraically calculate the month(s) when your regression equation predicts that 1100 kWh of solar energy are collected at Delta. Are all of the solutions reasonable? What is a reasonable domain for our model?
10. Using your calculator, find the month(s) when the model predicts that no kWh of solar energy are collected at Delta. Compare your answer found algebraically and your answer found using the calculator technology. Does your answer sound reasonable?

This project created by Natascha Rivet Delta College

Municipal Waste and Recycling

Municipal Solid Waste Generated data http://www.epa.gov/epawaste/nonhaz/municipal/index.htm

Figure 2. MSW Recycling Rates, 1960 to 2009

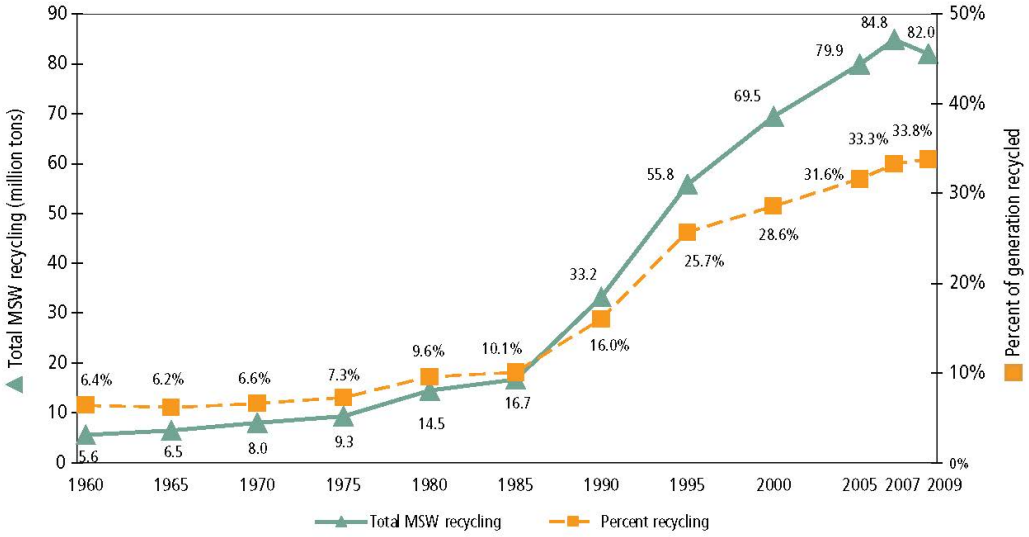
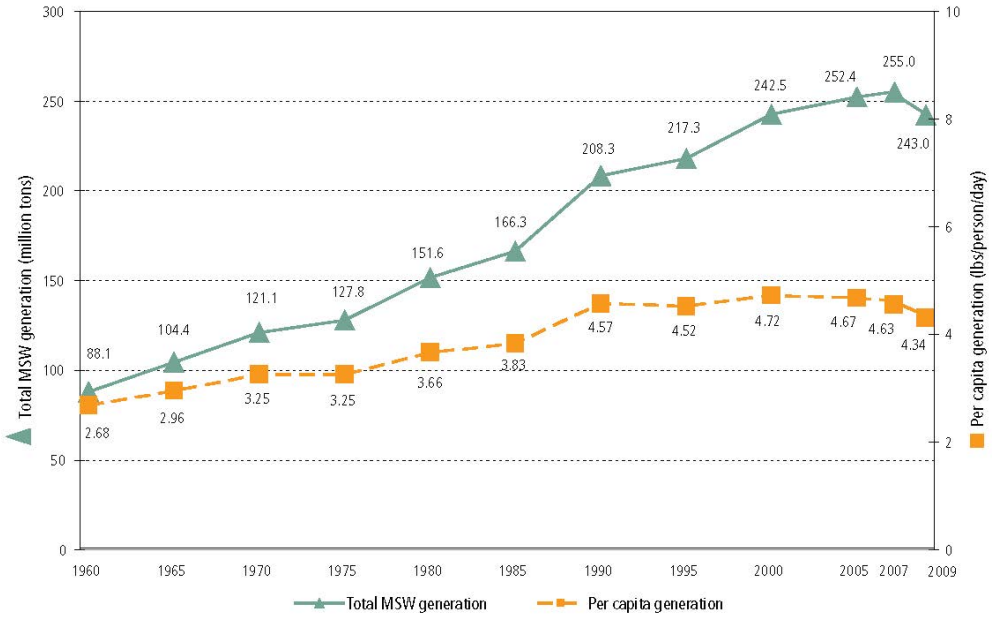


Figure 1. MSW Generation Rates, 1960 to 2009



Project: Linear Modeling

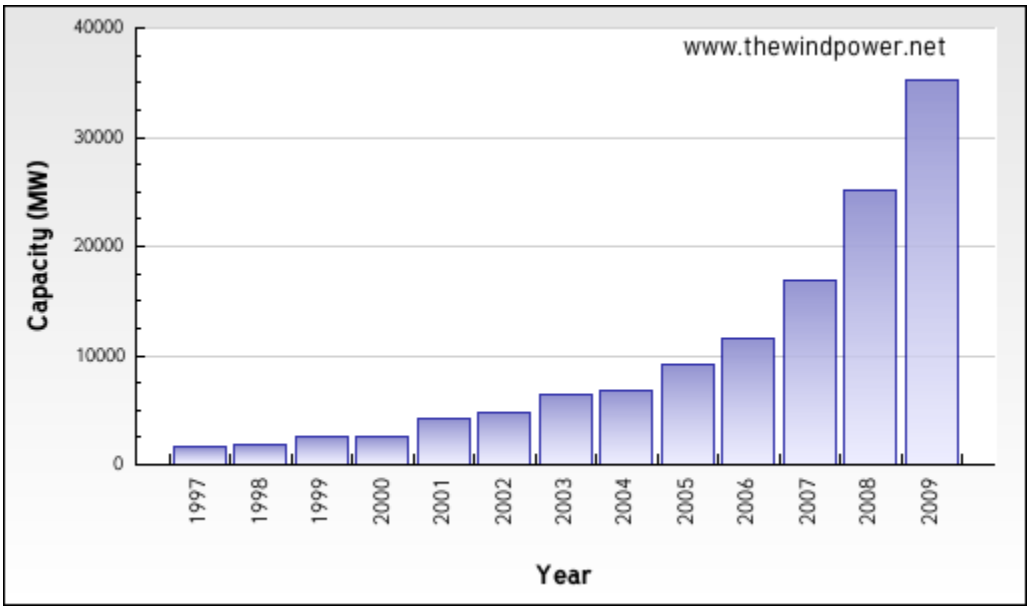
1. Plot the following set of ordered pairs.
2. Find "eyeball" best fit lines.
3. Use those lines to estimate the amount of solid waste generated in 1995.
4. Using your calculator, find the regression equation of the line that best describes each of the data sets.
5. Using the regression equation generated by your calculator state the slope and interpret the meaning of the slope of the line in the context of the problem. Be sure to include appropriate units.
6. Using the regression equation generated by your calculator state the y-intercept and interpret the meaning of the y-intercept of the line in the context of the problem. Be sure to include appropriate units.
7. Using the regression equation generated by your calculator estimate the amount of solid waste generated by the USA in 1995. Interpret the coordinates of this point in the context of the problem.

Year (since 1950)	Municipal Solid Waste (Million Tons) Generated by USA	Municipal Solid Waste (pounds/person/day) Generated by Americans
10	88.1	2.7
15	104.4	3.0
20	121.1	3.3
25	127.8	3.3
30	151.6	3.7
35	166.3	3.8
40	208.3	4.6
50	242.5	4.7
55	252.4	4.7
57	255.0	4.6
59	243.0	4.3

MSW = municipal solid waste
Source: United States Environmental Protection Agency

Wind Capacity

Wind capacity data collected at http://www.thewindpower.net



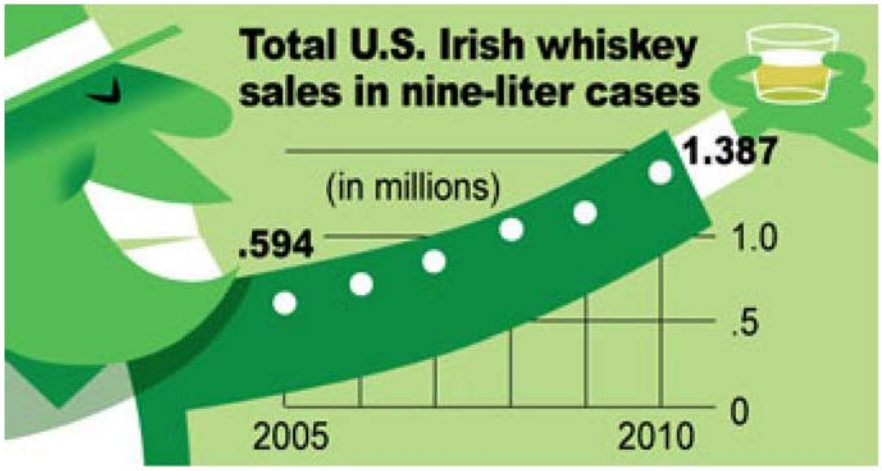
Year	Capacity (MW)	Growth (MW)	Growth (%)
1995	4800	-	-
1996	6100	1300	27.1
1997	7480	1380	22.7
1998	9667	2187	29.3
1999	13701	4034	64.4
2000	18040	4339	31.7
2001	24319	6279	34.9
2002	31181	6862	28.3
2003	41343	10162	32.6
2004	49463	8121	19.7
2005	59137	9674	19.6
2006	74178	15041	25.5
2007	93952	19775	26.7
2008	121328	27376	29.2
2009	158008	36680	30.3
2010	194154	36147	22.9

USA Today Snapshots

USA Today snapshots can be found at
http://www.usatoday.com/news/snapshot.htm

What a Story a Graph Can Tell Us developed by Richard Gerstin, Brown Mackie College

By Anne R. Carey and Alejandro Gonzalez, USA TODAY
Source: GHSA (www.ghsa.org)



By Anne R. Carey and Sam Ward, USA TODAY
Source: Distilled Spirits Council of the US

What a Story a Graph Can Tell Us!!

You have just been assigned as a writer on the USA Today staff.

One of the researchers on your staff has just brought you this graph.

Now you are responsible to write an article that describes this information.

Include in your article:

- **Describe the facts presented,**
- **Your interpretation of what has happened**
- **Your interpretation of why it has happened, and**
- **Your projection of what will happen if this trend continues into the future.**
- **Continue this graph to represent your future projection for this trend.**

Use correct spelling, grammar, punctuation, capitalization, proper sentence structure and neat handwriting so that I can read your work.

Title of Article:

Written by:

Continued on the other side…

APP Wars

App war data collected from http://techcrunch.com/2011/02/21/861-5-percent-growth-android-puny/

Global Mobile Applications Store Ranking in 2010 and 2009
(Ranking by Revenue in Millions of U.S. Dollars)

2010 Rank	Store	2009 Revenue	2009 Share	2010 Revenue	2010 Share	Year-Over-Year Growth
1	Apple App Store	$769	92.8%	$1,782	82.7%	131.9%
2	BlackBerry App World	$36	4.3%	$165	7.7%	360.3%
3	Nokia Ovi Store	$13	1.5%	$105	4.9%	719.4%
4	Google Android Market	$11	1.3%	$102	4.7%	861.5%
	Total	**$828**	**100.0%**	**$2,155**	**100.0%**	**160.2%**

Source: IHS Screen Digest February 2011

Quick Polls

Texting polls

www.PollEverywhere.com

Classroom Activities

Algebra Tic-Tac-Times (Crouse/Sweeney Mathematics Teacher 5/91)

Slope Intercept Rummy (Leah Griffith Rio Hondo College)

Slope-Intercept Rummy

The concept addressed in this set of cards is to relate the slope-intercept form of an equation of a line with its graph by recognizing how the values of m and b affect the graph.

Activity 1: Remove all the slope-intercept form linear equations from the deck and lay them out in the middle of the playing area. Deal the rest of the cards to the players. It does not matter if some have more cards than others. The students should make sets of cards by placing the correct slope, *y*-intercept, and graph with the equation already on the table.

Activity 2: This is like Activity 1 except that the graphs are placed on the playing area for matching.

Activity 3: Each player is dealt 5 cards. During a turn, a player may begin a new set by placing an equation on the table; match an equation already on the table with its slope card, *y*-intercept card, or graph card; or pass. After playing a card, a card is drawn from the deck to return the hand to 5 cards. When a player places the fourth card on a set, s/he claims the set. The player with the most sets wins. On a second round, the students could begin each set with the graph instead of the equation. Or they could begin each set with either the equation or the graph.

I would appreciate your comments about how this activity works for you, what variations you devised, and how it can be improved. Thank you.

Leah Griffith
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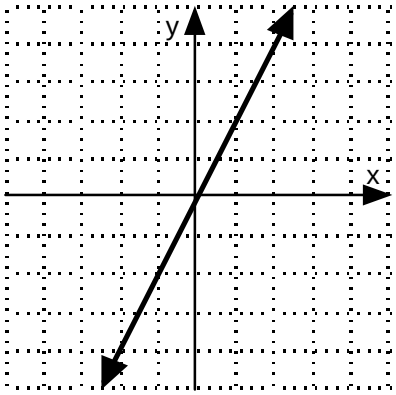
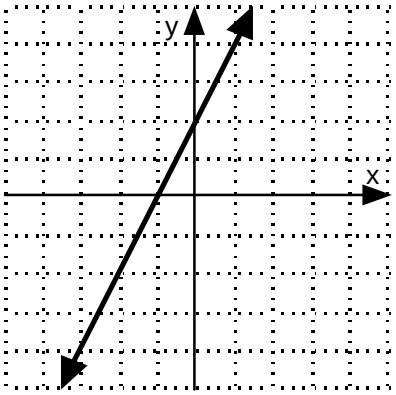
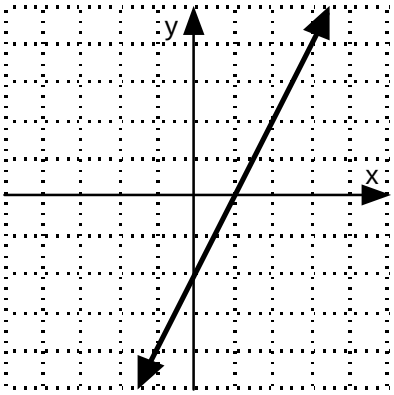
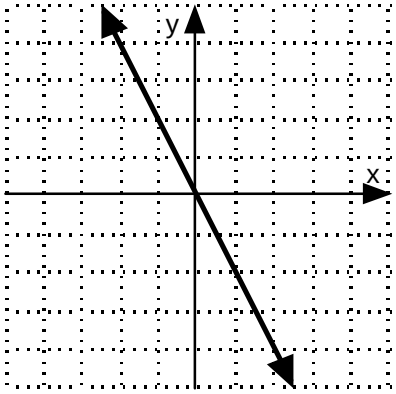
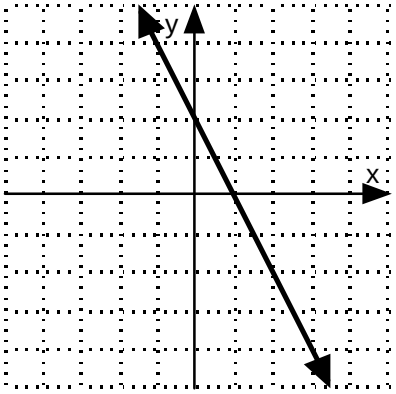
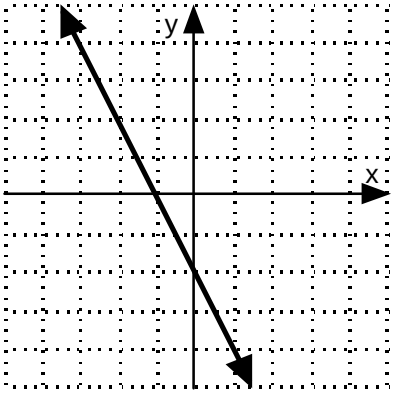
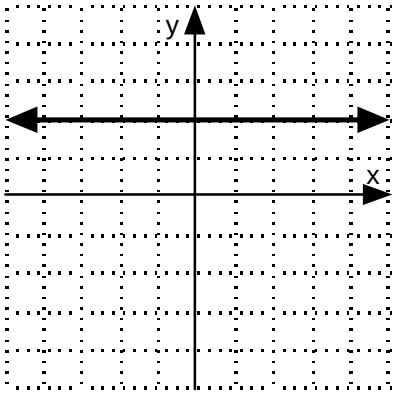
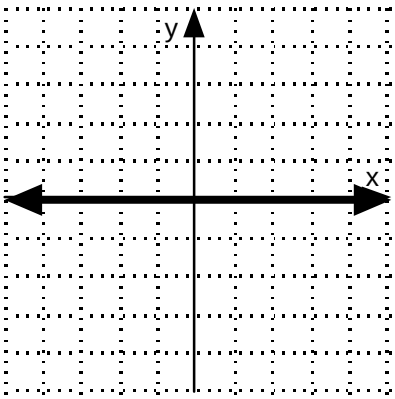
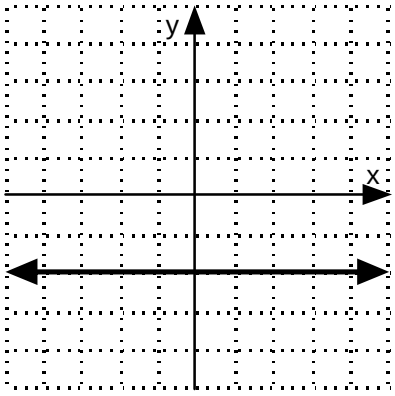
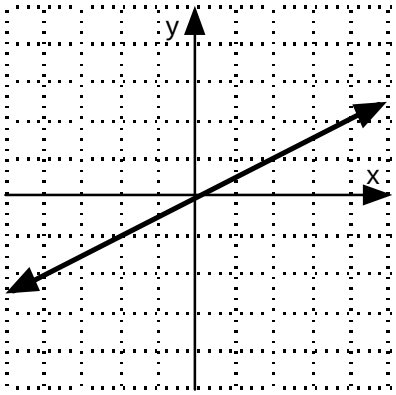
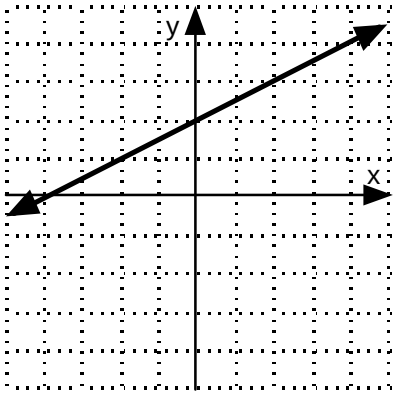
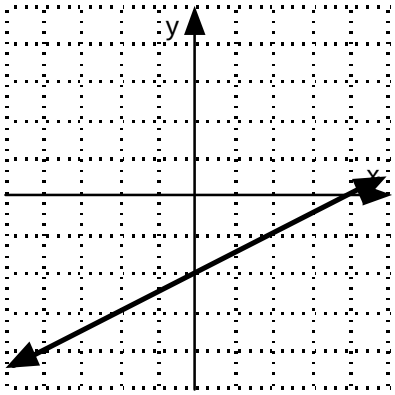
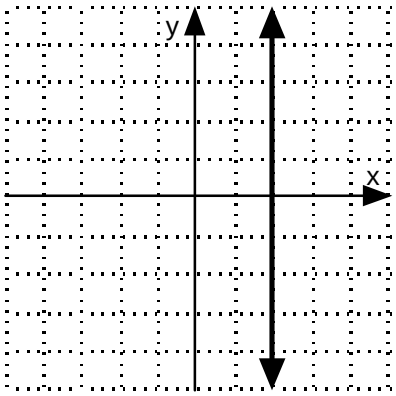
m = 2 slope	m = 2 slope	m = 2 slope
m = -2 slope	m = -2 slope	m = -2 slope
m = 0 slope	m = 0 slope	m = 0 slope

$m = \frac{1}{2}$	$m = \frac{1}{2}$	$m = \frac{1}{2}$
slope	slope	slope
Slope undefined	No y-intercept	(0,2)
slope	y-intercept	b = 2
		y-intercept
(0,2)	(0,2)	(0,2)
b = 2	b = 2	b = 2
y-intercept	y-intercept	y-intercept

(0,0) b = 0 y-intercept	(0,0) b = 0 y-intercept	(0,0) b = 0 y-intercept
(0,0) b = 0 y-intercept	(0,-2) b = -2 y-intercept	(0,-2) b = -2 y-intercept
(0,-2) b = -2 y-intercept	(0,-2) b = -2 y-intercept	$y = 2x + 2$

$y = -2x + 2$	$y = 2$	$y = \frac{1}{2}x + 2$
$x = 2$	$y = 2x$	$y = -2x$
$y = 0$	$y = \frac{1}{2}x$	$y = 2x - 2$

$y = -2x - 2$	$y = -2$	$y = \frac{1}{2}x - 2$
		
		

 y x	 y x	 y x
 y x	 y x	 y x
 y x		

Algebra Tic-Tac-Times

$x^2-7x+12$	x^2-3x+2	x^2-16	$x^2+8x+16$	x^2-x
x^2+5x+4	x^2-4x	x^2+2x-3	x^2+x	x^2-1
$x^2-8x+16$	x^2-5x+6	x^2-4x+4	$x^2+7x+12$	x^2-2x-8
x^2-4	x^2+2x	x^2-6x+9	x^2-9	x^2+3x-4
x^2-2x+1	x^2-2x-3	x^2-2x	x^2	x^2+5x+6
x^2-6x+8	x^2+4x+4	x^2+2x-8	x^2+3x	x^2-4x+3
x^2+6x+9	x^2+x-2	x^2+4x+3	x^2-x-2	x^2-3x
x^2-3x-4	x^2+x-12	x^2-x-6	x^2+4x	x^2+6x+8
x^2+3x+2	x^2+2x+1	x^2-5x+4	x^2-x-12	x^2+x-6

$x-4$ $x-3$ $x-2$ $x-1$ x $x+1$ $x+2$ $x+3$ $x+4$

Number of Players: 2 people or teams, one red, one blue
Object: cover 3 boxes in a row, vertically, horizontally, or diagonally
Rules: Red picks 2 factors, covers one with red, one with blue, names their product, and covers that product with a red chip. Blue moves the blue factor chip leaving red's factor chip unchanged, names and covers the product with a blue chip. Each player moves only the factor chip of his/her color. (Crouse/Sweeney Mathematics Teacher 5/91)