Algebra 1 Semester 2 Final--Study Guide

Name	Weight (lbs)	Pack Wt. (lbs)
Javier	146	44
Jeremiah	118	36
Xenia	112	35
Rufus	127	35
Paul	131	34
Maria	109	30
Estefanie	133	40
Emilio	139	44

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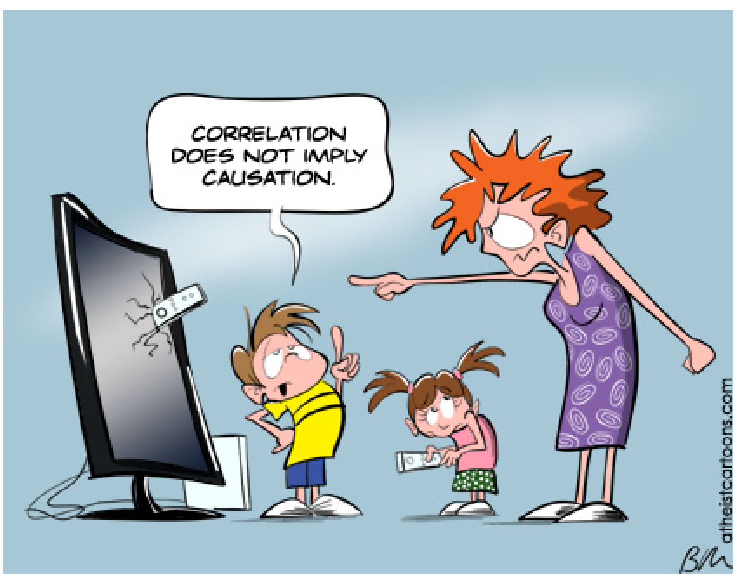
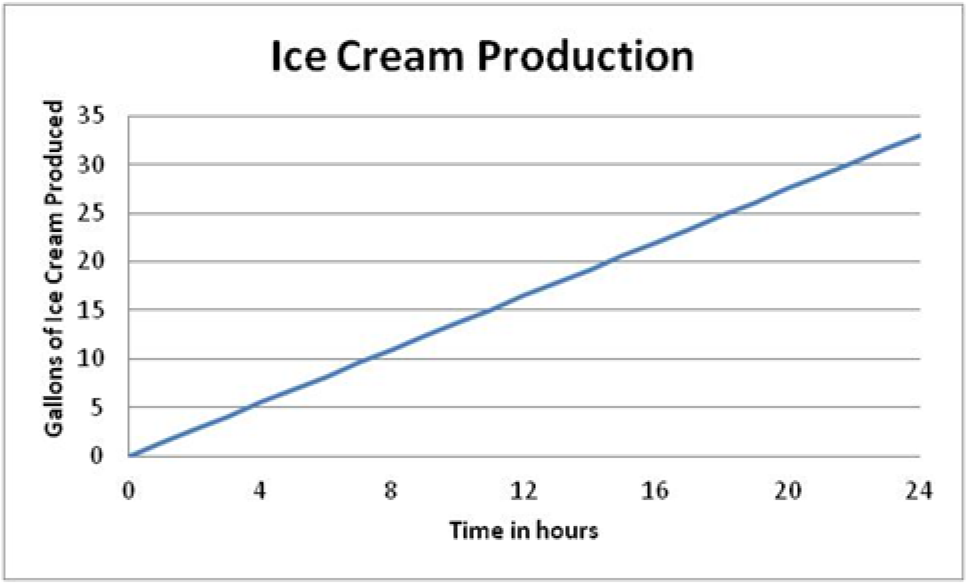
1) Many health professionals are concerned that students are developing back and shoulder problems caused by carrying backpacks that are too heavy. Some doctors have recommended that the weight of a student's backpack should not exceed 10% of the student's body weight. The body and backpack weights of the eight high school students are given above, along with a scatterplot of the data.
What can you say about the relationship between how much a studen t weighs, and how much their backpack weighs?

A) Heavier students always carry heavier packs.
B) Weighing more causes a student to carry a heavier backpack.
C) There is a strong negative correlation between a student's body weight and the weight of his or her backpack.
D) There appears to be a positive correlation between pack weight and body weight.



It seems to be true that heavier students tend to carry heavier backbacks. But, look at Paul--he's heavier than Xenia, but his backpack is lighter! So it can't be true that heavier students *always* have heavier backpacks. We all know short students who carry every textbook they have, and tall students who carry next to nothing.

However, it is true that there's a general upward trend to these data. It's likely that, if you weigh more, you can carry more. We call a relationship between two variables like this a *correlation*--when one thing is true, the other thing tends to be true (positive correlation) or false (negative correlation).



2) An ice cream factory can produce a certain number of gallons of ice cream each day of continuous operation. Its rate of production for ice cream is shown on this graph. If the factory operates continuously for 1000 hours, how much ice cream will it have produced?

There are many places to look on this graph to find how fast the ice cream factory produces ice cream. You could say it produces about 6 gallons in 4 hours (6/4 = 1.5 gallons per hour), or about 12 gallons in 8 hours (12/8 = 1.5 gallons per hour). The most accurate way to find the slope is to pick points that are far away from each other, so that'd be around 34 gallons in 24 hours (34 / 24 = 1.4 gallons per hour).

But, roughly speaking, the factory makes one-and-a-half gallons per hour for 1000 hours. Thats a total of 1.5 gal/hr x 1000 hr = 1500 gallons of ice cream.

x	-16	-12	-8	-4	0
y	38	30	22	14	6

3) Draw a graph containing the data found in the table above.

x is increasing and y is decreasing, so the slope of the line is negative because they're negatively correlated.

y changes by -8, so the rise is -8

x changes by +4, so the run is +4

That means the slope is rise/run = -2. Meanwhile, when x is zero, y is 6, so that means the y-intercept is 6.

The graph is a line that has a y-intercept of six, and which goes down 2 in y each time x goes up by 1.

Vendor	Number sold	Profit
James	36	10
Ricky	46	16
Claudia	56	22
Frank	66	28

4) Popcorn vendors at basketball games are paid for each bag they sell. The table above shows a list of popcorn vendors and the profit each person made one night. How much profit will a vendor make by selling 96 bags? Solve and show your work.

It is true that the profit goes up by $6 each time. Does that mean each bag of popcorn is $6?

It is also true that the number of bags of popcorn goes up by ten each time. That means it's $6 for *ten* bags of popcorn.

Follow the pattern in the number of popcorn sold. It goes 36, 46, 56, 66....then 76, 86, 96. That means we need to go three more steps up in this pattern.

$10, $16, $22, $28...then $34, $40, and $46. The answer is $46.

Number of customers, c	6	12	18	24	30	36
Amount of sales, s	$3.00	$6.00	$9.00	$12.00	$15.00	$18.00

5) The owner of a newspaper stand recorded the above data from one week. According to the data, write an equation that describes the relationship between the number of customers (*c*) and the amount of sales (*s*).

When the newspaper stand has 6 customers, it makes $3. What is the relationship there?

Look at the bigger numbers. 30 customers makes $15. What is the relation between these two numbers?

The stand makes half as much money as it has customers. Or, $ = 1/2 * Customers. Or, s = 1/2 c

Height (inches)	73	60	69	72	62	61
Arm Span (inches)	70	62	67	73	60	62

6) After gathering the height and shoe size data, Coach Lower decides to look at another measurement association. The above represents the heights and arm spans of students in his Physical Education class. Describe the association between height and arm span, if height is used as the independent variable (e.g. weak or strong, positive or negative association.)

A) There is a strong, positive association between height and arm span.
B) There is a weak, positive association between height and arm span.

C) There is a strong, negative association between height and arm span
D) The relationship between height and arm span does not appear to be linear.

To answer this, you have to imagine what the graph looks like. When height is 70, arm span is close to 70. When height is 60, arm span is close to 60. If you had a graph where x and y were always the same number, what would that look like?

For example:
(1,1)
(2,2)
(3,3)
(4,4)

what would this graph look like?

It's a straight line. And, the closer x and y are to being equal to each other, the closer they are to being on top of the line of best fit. When two variables almost always go up together, they are said to have a strong, positive association.

7) Solve the equation

$$x + 8 = 16.$$

Subtract 8 from both sides

x + 8 - 8 = 16 - 8

Cancel the opposites

x = 16 - 8

x = 8

8) Solve the equation

$$\frac{2}{3}x = 16$$

Multiply by 3
3 (2/3x) = 3 (16)

cancel opposites
2x = 3 (16)
2x = 48

divide 2
2x / 2 = 48 /2

cancel opposites
x = 48 / 2
x = 24

9) Solve the equation

$$4x - 12 = 20$$

Add 12

4x - 12 + 12 = 20 + 12

cancel opposites

4x = 20 + 12
4x = 32

divide 4
4x / 4 = 32 / 4

cancel opposites

x = 32 / 4
x = 8

10) What is the solution set of the equation

$$4x - (4 - x) = 5x$$

distribute

4x - 4 + x = 5x

put x's next to each other

4x + x - 4 = 5x

add like
5x - 4 = 5x

you can already see that there's no solution. There will never be a time when 5x - 4 will be equal to 5x.

subtract 5x

5x - 4 - 5x = 5x - 5x

cancel opposites

-4 = 0

now you can really see there's no solution. -4 will never be 0, it is not possible for any value of x to solve this equation.

11) Solve the inequality

$$3x - 3 > x + 7$$

collect letters on left side

3x - 3 - x > x + 7 - x

2x - 3 > 7

add 3

2x - 3 + 3 > 7+3

Cancel opposites

2x > 7 + 3
2x > 10

divide 2

2x / 2 > 10 / 2

cancel opposites

x > 10 / 2
x > 5

12) Solve the inequality

$$2(x-3)-6<4(x-7)$$

distribute

2x - 6 - 6 < 4x - 28

add like terms

2x - 12 < 4x - 28

collect letters on left side by subtracting 4x

2x - 12 - 4x < 4x - 28 - 4x

Cancel

2x - 12 - 4x < -28

Add like

-2x - 12 < -28

Add 12

-2x - 12 + 12 < -28 + 12

Cancel

-2x < -28 + 12
-2x < -16

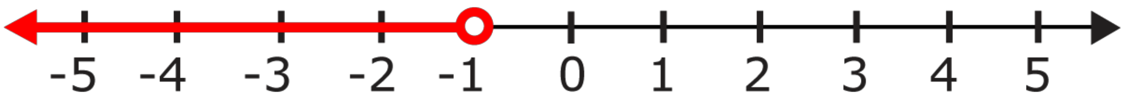
Divide -2. When you change the sign of -16 to +16 (by dividing by a negative), you change it from a small to a big number. So, change less than to greater than

-2x / -1 > -16 / -1
2x > +16
2x / 2 > 16 / 2

cancel

x > 8

13) Which inequality is graphed on this number line?



This is an open circle at -1, then an arrow pointing to numbers that are less than -1

x < -1

14) Your employer tells you that the salary for your new job will be at least $298 per week but not more than $615 per week. Write an inequality that shows this.

salary is more than (or equal to) $298
$x \geq 298$
or
$298 \leq x$

salary is less than (or equal to) $615
$x \leq 615$

So it is true both that
$298 \leq x$
$x \leq 615$

Or, because we're lazy
$298 \leq x \leq 615$

15) Which graph shows the solution to
$$2x + 3x + 5 \leq -20$$

collect like

5x + 5 $\leq$ -20

subtract 5

$5x + 5 - 5 \leq -20 - 5$

cancel

$5x \leq -25$

divide

$5x / 5 \leq -25 / 5$

cancel

$x \leq -25 / 5$
$x \leq 5$

16) Bobby solved the equation x + 3 = 3(x + 5) by making a t-chart. He put x + 3 on the left, and 3(x+5) on the right. Then, he started guessing different values for x, and keeping track of what x+3 and 3(x+5) were equal to each time by using the t-chart. He *did not stop* guessing when he found the correct solution for x. Which table below shows the best solution, and why?

x	x+3	3(x+5)
-5	-2	0
-4	-1	3
-3	0	6
-2	1	9

A) The solution is -3, because **x + 3** is 0 there.

x	x+3	3(x+5)
-7	-4	-6
-6	-3	-3
-5	-2	0
-4	-1	3

C) The solution is -6, because **x+3** and **3(x+5)** are the same there.

x	x+3	3(x+5)
-7	-4	-6
-6	-3	-3
-5	-2	0
-4	-1	3

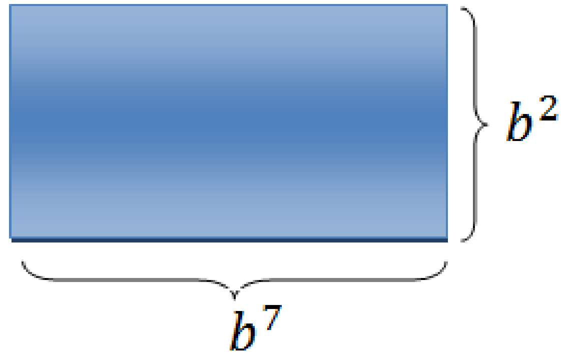
B) The solution is -3, because **x+3** and **3(x+5)** are the same there

x	x+3	3(x+5)
-10	-7	-15
-8	-5	-9
-4	-1	3
-2	1	9

D) The solution is -4, because **x+3** is -1 and **3(x+5)** is 3 there

Bobby guessed -7, -6, -5, -4. At -6, he found that x+3 was -3 and 3(x+5) was -3. So the left and the right sides of the equation were equal when x was -6.

17) Find the area of the rectangle.



a) b^5

b) b^9

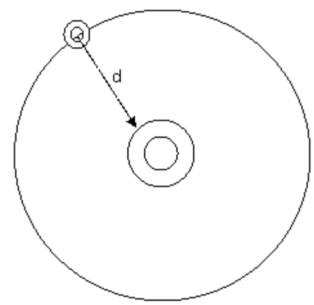
c) b^{18}

d) b^7

Area is length times width = (b^2)(b^7)

Just count the b's. b^2 = bb. b^7 = bbbbbbb. So (b^2)(b^7) = (bb)(bbbbbbb) = (bbbbbbbbb) = b^9

18) The planet Mercury is about d = 3.5 x 10^7 miles from the sun. The speed of light, c, is about 1.75 x 10^5 miles per second. Use the formula t = d / c to find out how many seconds, s, it takes for sunlight to travel from the sun to Mercury.



a) 2 x 10^9
b) 5 x 10^2
c) 2 x 10^{-2}
d) 2 x 10^2

t = d/c, so t = 3.5 x 10^7 / 1.75 x 10^5

That's 7 tens on top and 5 tens on bottom.

10 10 10 10 10 10 10
____
10 10 10 10 10

All but 2 tens cancel. The exponent on the tens is 2; the number is in the hundreds place

As for the coefficient, I don't know what it is--but 3.5 / 1.75 sure isn't equal to five.

19) What is the value of y in the following expression if x is -3?

$$y = \frac{x^6}{x^3}$$

expand

$$\frac{x\ x\ x\ x\ x\ x}{x\ x\ x}$$

All but 3 x’s cancel,

x ^ 3 = x x x

if x = -3 then

x x x = -3 -3 -3

That’s (-3*-3)*-3 = (+9)*-3 = -27

20) Which expression represents the product?

$$(-3x^3)^3(3x^5)$$

Two steps: expand the first term

-3x^3 = -3 x x x

That’s the base. You have that base 3 times in total

(-3x^3)^3 = (-3 x x x)(-3 x x x)(-3 x x x)

That’s three negative 3’s, and 9 x’s

(-3x^3)^3 = (-3)^3 x^9

OK so that’s the first term. Now, multiply that by 3x^5

[(-3x^3)^3][3x^5] = [(-3 x x x)(-3 x x x)(-3 x x x)][3 x x x x x]

That’s 3 negatives, four 3’s, and 14 x’s. We know (-1)^3 is -1, because 3 is odd. So

-3^4 x^14

21) The mass of the supermassive black hole at the center of our galaxy is 2,600,000 times that of our own sun. What is this number in scientific notation?

The first digit is two, and it’s in the millions place. So,

2.6 x one million

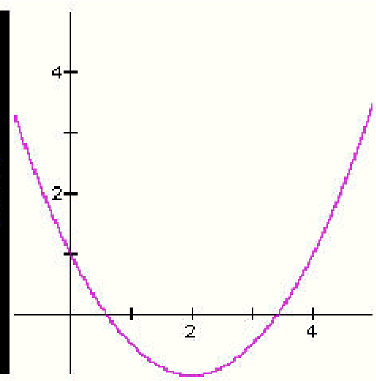
2.6 x 1,000,000

2.6 x 10^6

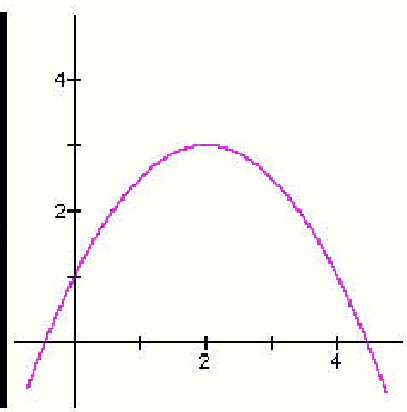
22) How would the graph be affected if the equation changed from

$y = 4x^2 + 8$ to **$y = -4x^2 + 8$**?

A positive parabola (y=+4x^2)

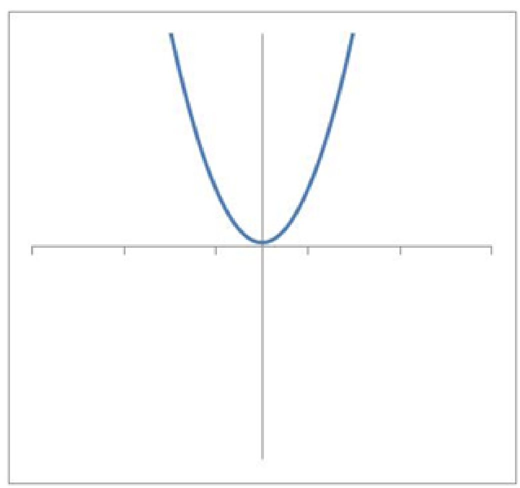


A negative parabola (y = -4x^2)

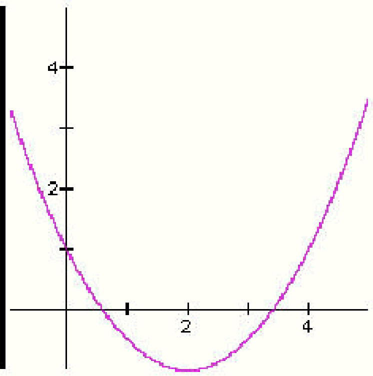


The leading term (y = ax^2) ‘a’ determines if the parabola extends upwards to positives, or downwards to negatives

23) Which equation best represents the graph to the right?

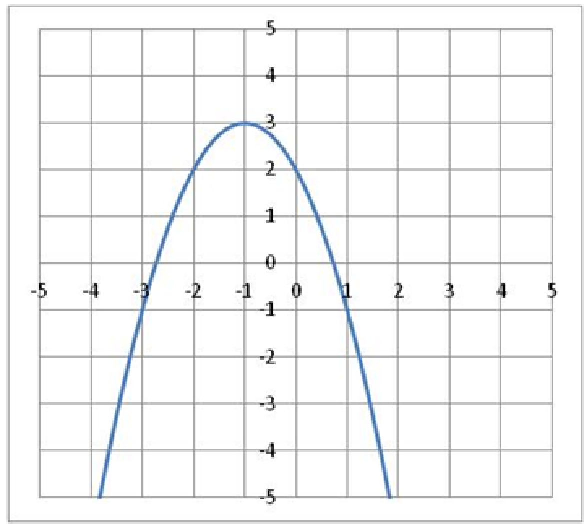


a: $\frac{1}{2}x^2 + 1$
b: $-x^2 - 1$
c: $-5x^2 - 1$
d: $\frac{-3}{2}x^2 + 1$

This is a positive parabola. The only positive parabola is A).

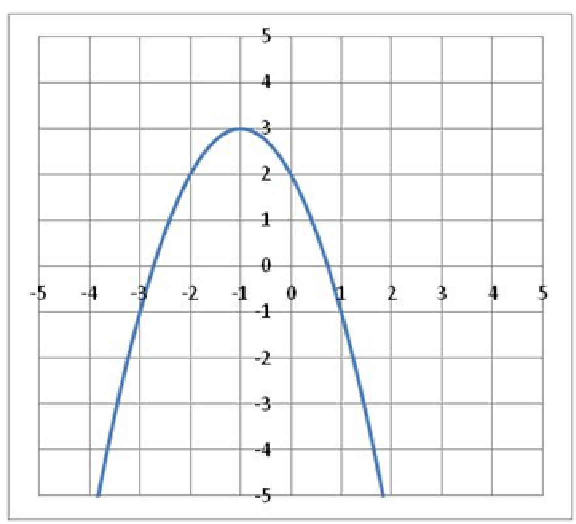
24) What is the vertex of the graph to the right?



The vertex is the middle of the parabola, at the point where the parabola intersects the axis of symmetry. (I just said ‘middle’ two different ways.)

It’s at (-1,3)

25) What is the y-intercept of the graph to the right?



It’s a little hard to see this y-axis. Go up from x = 0. The parabola is at y = 2 when x = 0; the y-int is (0,2)

26) Which function includes all of the coordinate points in the table below?

x	-3	-1	0	2	4
y	-10	-2	-1	-5	-17

Start guessing parabolas.

here's x squared:

x	-3	-1	0	2	4
y	9	1	0	4	16

so, -3*-3 is 9, -1*-1 is 1, 0*0 is 0, etc.

That doesn't work because we need all the numbers to be negative.
So, try NEGATIVE x squared

x	-3	-1	0	2	4
y	-9	-1	0	-4	-16

That's closer. We need -10 and we have -9. We need -2 and we have -1. We need -1 and we have 0.

What would you need to add or subtract from -x^2 to get this to work?

y = -x^2 + ???

27) What is the general form of a quadratic function?

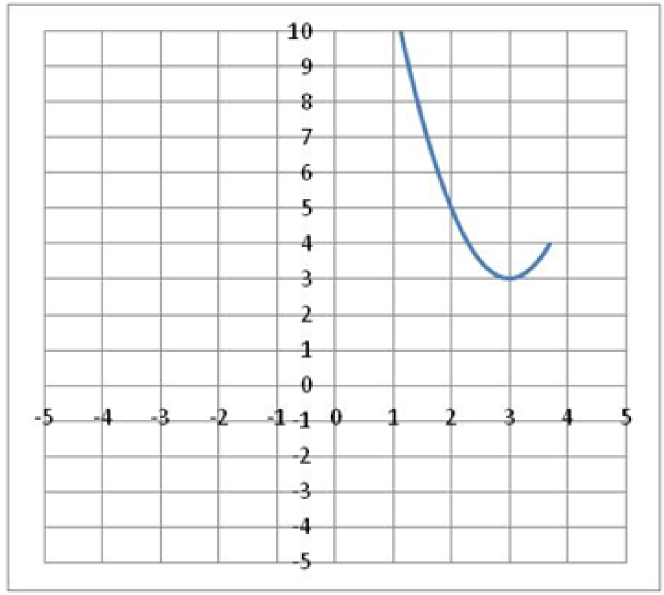
ax^2+bx+c

28) What is the technical term for the shape a quadratic creates?

a: u-shape
b: hyperbola
c: curve
d: parabola

The TECHNICAL term for x^2 (any function of degree 2) is parabolic. By the way, x^2 ('x squared') is called a quadratic because quad is another word for square.

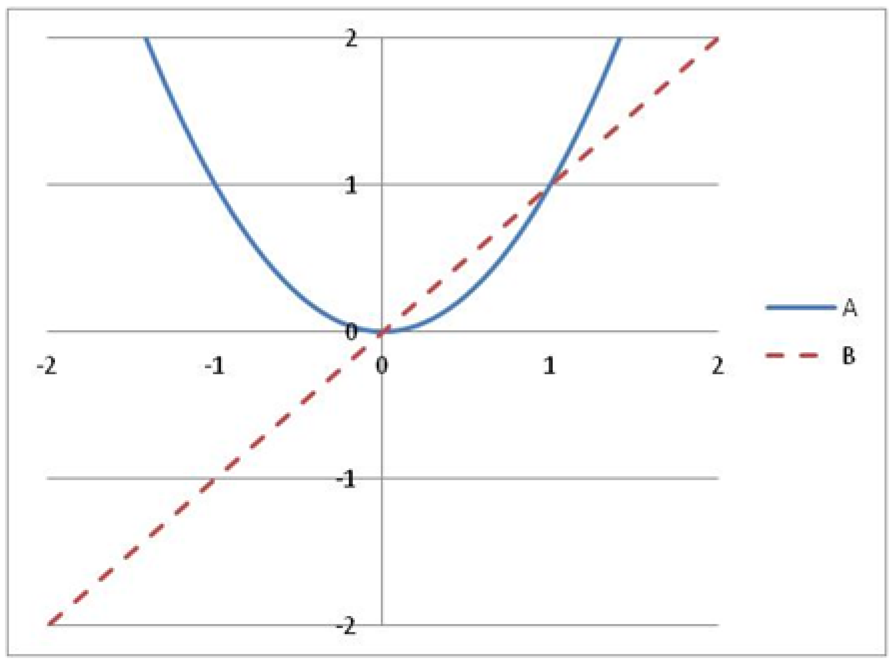
29) A portion of the quadratic equation $\mathbf{y = 2(x-3)^2 + 3}$ is shown above. One value where y is equal to 5 is x = 2. For which other value of x does y equal 5?



This should be a free question. Keep going on the parabola and it hits y = 5 at x = 4.

30) The diagram to the right displays two graphs: $\mathbf{y = x^2}$ and $\mathbf{y = x}$. Please match the labels with the correct equation **AND** determine the two points of intersection.

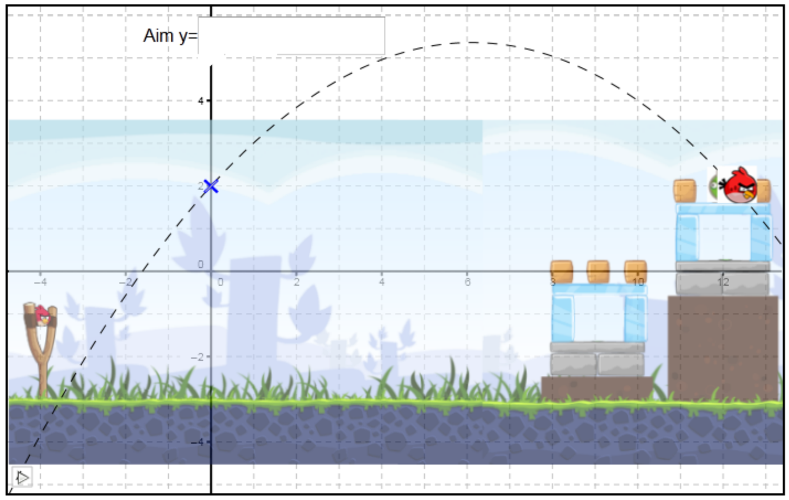
a: Label A is $y = x^2$ and Label B is $y = x$; (1,0) & (0,-1)
b: Label A is $y = x$ and Label B is $y = x^2$; (0,1) & (0,0)
c: Label A is $y = x^2$ and Label B is $y = x$; (1,-1) & (1,0)
d: Label A is $y = x^2$ and Label B $y = x$; (1,1) & (0,0)



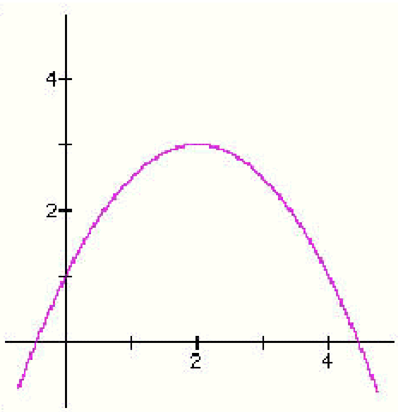
The two lines intersect where they run into each other. That’s at (0,0) and (1,1). The solid line is A and the dashed line is B.

31) Which quadratic equation below would best be used for the Angry Birds scenario to the right?

a: $y = .25x^2 + .5x + 2$
b: $y = -.09x^2 + 1x + 2$
c: $y = 2x^2 + .5x - 1$
d: $y = -.34x^2 + .5x - 3$

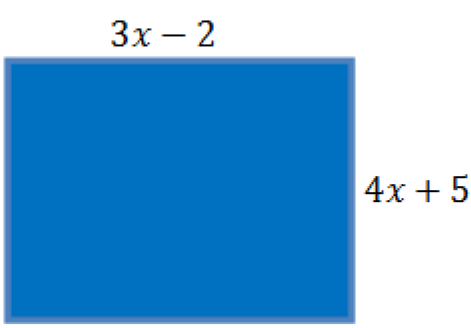


This is a negative parabola



It has also been moved up so that the y-intercept is 2. Which of these has a negative ‘a’, and was moved up by 2?

32) Which expression represents the area of the rectangle shown?



Area is length x width, so A = (3x - 2)(4x+5)

F: (3x)(4x)
O: (3x)(5)
I: (-2)(4x)
L: (-2)(5)

F: (3x)(4x) = 12x^2
O: (3x)(5) = 15x
I: (-2)(4x) = -8x

L: (-2)(5) = -10

Outside + Inside = 7x

All together,
12x^2 + 7x - 10

33) What is the product of $(6x-3)(-x+4)$?

(6x - 3)(-x + 4)

F: (6x)(-x)
O: (6x)(4)
I: (-3)(-x)
L: (-3)(4)

F: (6x)(-x) = -6x^2
O: (6x)(4) = 24x
I: (-3)(-x) = +3x
L: (-3)(4) = -12

-6x^2 + 24x + 3x - 12
-6x^2 + 27x - 12

34) Simplify: $4x(x+3)+(2x+5)(x-3)$

4x(x + 3)

F: (4x)(x)
L: (4x)(3)

F: (4x)(x) = 4x^2
L: (4x)(3) = 12x

4x(x+3) = 4x^2 + 12x

(2x + 5)(x - 3)

F: (2x)(x)
O: (2x)(-3)
I: (5)(x)
L: (5)(-3)

F: (2x)(x) = 2x^2
O: (2x)(-3) = -6x
I: (5)(x) = 5x
L: (5)(-3) = -15

(2x + 5)(x - 3) = 2x^2 - 6x + 5x - 15
(2x + 5)(x - 3) = 2x^2 - 1x - 15

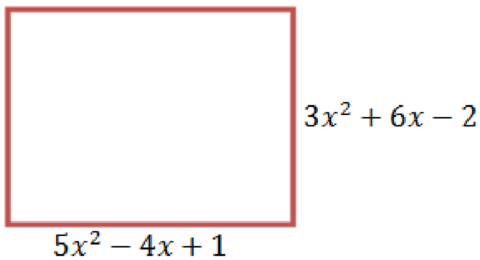
4x(x + 3)+(2x + 5)(x - 3)

4x^2 + 12x+ 2x^2 - 1x - 15

4x^2 + 2x^2 + 12x - 1x - 15

6x^2 + 11x - 15

35) Find the perimeter of a rectangle with a length of $3x^2 + 6x - 2$ and a width of $5x^2 - 4x + 1$.



Perimeter is twice the length, plus twice the height.

2($3x^2 + 6x - 2$)+2($5x^2 - 4x + 1$)

6x^2 + 12x - 4 + 10x^2 - 8x + 2

16 x^2 + 4x - 2

36) Simplify $(-4x^4 + 3x^3 - 7x^2 - x) + (-9x^3 + 7x^2 - 5x - 1)$.

Group powers
4th:
-4x^4
3rd:
+3x^3 - 9x^3 = -6x^3
2nd:
-7x^2 + 7x^2 = 0
1st:
-x - 5x = -6x

0th:
-1

-4x^4 - 6x^3 - 6x - 1

37) Which binomials are factors of $(x^2 + 7x + 12)$=0?

You wish to find two numbers that multiply to 12, and add to 7. They are 4 and 3.

(x+4)(x+3)

F (x)(x) = x^2
O (x)(3) = 3x
I (4)(x) = 4x
L (4)(3) = 12

38) Jenny has calculated the area of her house as the equation $10x^2 - 5x + 2$. She knows that the area of her bedroom can be calculated using the equation $2x^2 + 4x + 4$. What is the total area of the rest of Jenny's house?

Jenny's whole house has an area, say it's 100.

Jenny's bedroom has an area, say it's 10.

What is the area of the rest of Jenny's house, other than the bedroom?

100 - 10. You need to subtract the area of the bedroom from the area of the house.

House - Bedroom
$10x^2 - 5x + 2$ - ($2x^2 + 4x + 4$)

You have to subtract EACH TERM because you're subtracting THE WHOLE BEDROOM from the house

10x^2 - 5x + 2 - 2x^2 - 4x - 4

8x^2 - 9x - 2

39.) What are the factors of $(x^2 - 9) = 0$?

In standard form that's x^2 + 0x - 9

You want two numbers that multiply to -9, and add to 0

They are +3 and -3

(x+3)(x-3)

40.) Simplify: $\frac{(x-1)(x+5)}{(x+5)(x-5)}$

Simplify
12
__
36

You're looking for common factors:
12 = 1x12
2x6
3x4

36 = 1x36
2x18
3x12
4x9
6x6

The greatest common factor is 12

$$\frac{12}{36} = \frac{1x12}{3x12}$$

Cancel the 12's, and

$$\frac{12}{36} = \frac{1}{3}$$

Simplify

$$\frac{(x-1)(x+5)}{(x+5)(x-5)}$$

The common factor is (x+5). Cancel it, and

$$\frac{(x-1)(x+5)}{(x+5)(x-5)} = \frac{(x-1)}{(x-5)}$$

41.) Simplify: $6x(3x^3 + 5x^2 - 10x + 4)$

(6x)(3x^3) = 18 x^4

(6x)(5x^2) = 30 x^3

(6x)(-10x) = -60 x^2

(6x)(4) = 24x

1. Graphical representation 2. Exponent 3. Parabola 4. Correlation 5. Factor	a. The set of all points in a plane that are equidistant from a line, called the directrix, and a point not on the line, called the focus. It is the U-shape characteristic of polynomials of degree 2. b. The a numbers or expressions that can be multiplied by another number or expression to get N. For example, 3 and 4 are the ______ of 12 because 3 times 4 is 12. c. A number or a variable in an expression that represents how many times another number or variable in the expression is used as a factor in repeated multiplication. For example, in the expression 2 to the 5th power, the 5 is this and indicates that the 2 will be used as a factor 5 times: 2**2**2**2**2 d. Describes the strength of a relationship between two variables. It is a measure of how likely it is for one thing to happen, given than some other thing has happened e. A way of representing the relationship between two variables which draws their coordinates on a plane.

6. When working with exponents, this is the number or expression that is used for repeated multiplication, as indicated by the exponent. In 2 to the fourth power, this is 2.
   a. Base
   b. Factor
   c. Degree
   d. Parabola
7. A line that divides a region into 2 parts in such a way that one half is a reflection or mirror image of the other part.

a. Polynomial
b. Line of Symmetry
c. Coefficient
d. Base

8. When a number is added to its this, the sum is always zero. For example, +4 and -4 are this because their sum is zero.
   a. Degree
   b. Multiplicative Inverse
   c. Coefficient
   d. Additive Inverse
9. The point at which a parabola crosses its axis of symmetry; the bottom or top of a parabola.
   a. Line of Symmetry
   b. Correlation
   c. Parabola
   d. Vertex of a parabola
10. A way of representing the relationship between two variables which abbreviates them as letters, in an equation or rule.
    a. Graphical representation
    b. Correlation
    c. Numerical representation
    d. Symbolic representation
11. Numerical representation → A way of representing the relationship between two variables which draws their coordinates on a plane.

    True False
12. Multiplicative Inverse → When a number is added to its this, the sum is always zero. For example, +4 and -4 are this because their sum is zero.

    True False
13. Polynomial → A sum of terms that are numbers, variables, or products of numbers and variables with nonnegative integral exponents.

    True False

14. Degree → The greatest exponent in a polynomial

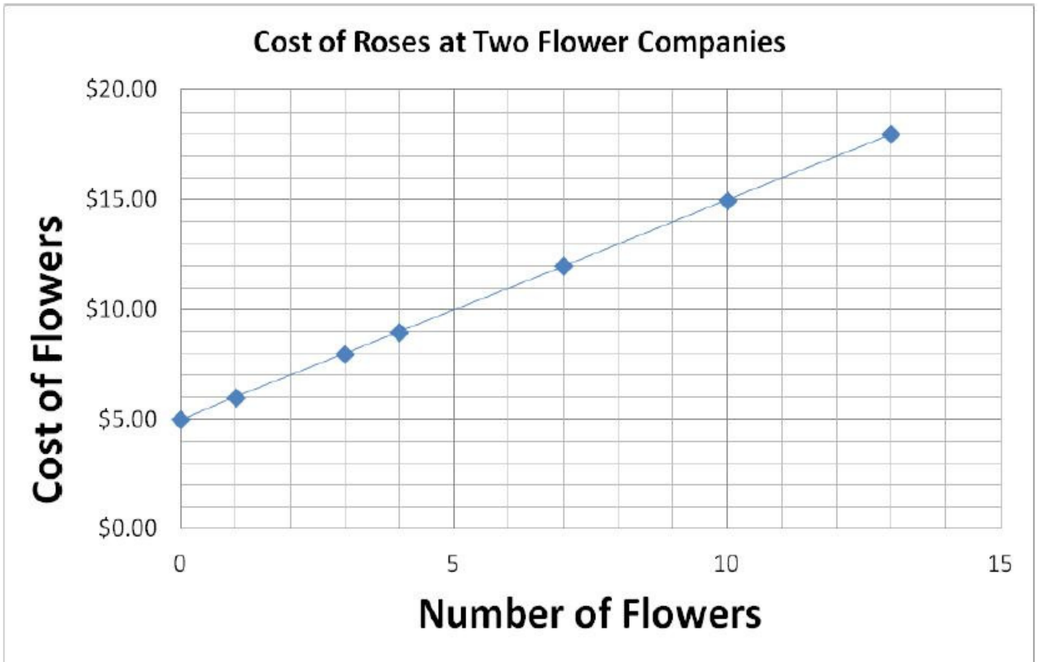
    True False

15. Coefficient → A number or a variable in an expression that represents how many times another number or variable in the expression is used as a factor in repeated multiplication. For example, in the expression 2 to the 5th power, the 5 is this and indicates that the 2 will be used as a factor 5 times: 2**2**2**2**2

    True False

http://quizlet.com/22435780/semester-2-final-vocabulary-flash-cards/

Number of Roses	Roses-R-Red	Flower Power
0		$10.00
1		$10.50
3		$11.50
4		$12.00
7		$13.50
10		$15.00
13		$16.50



Above is information for two different flower companies. On the left is a data table which shows the cost of Roses at **'Flower Power'**, for different numbers of roses. On the right is a graph, and it shows the cost of Roses at **'Roses-R-Red'**.

How much does one flower cost at Roses-R-Red? Where did you look to find this?
How much does Flower Power start out costing? Where did you look to find this?

In this problem, you need to find out when the two companies cost the same amount. There are many different strategies for doing this.

1) Use whatever strategy you would like to answer: How many roses would you need to buy for the two companies to cost the same amount? Include any drawings, computations, graphs, or tables you used in coming to your conclusions.

In a moment, you are going to write a paragraph to argue that the strategy is the best one for solving this problem. First, however, you need to plan it out. Start by listing at least five vocabulary words from the class you plan on using. Your plan should have a topic sentence (What was the solution, and why was my strategy the best?), three support sentences (What vocabulary or ideas from the class does this strategy apply? Where does it fit into all the things I learned this year? What do I remember from the time I was learning it?), and an explanation or concluding sentence.

2) Write a paragraph, explaining how you answered the question, "How many roses would you need to buy for Flower Power to cost the same amount as Roses-R-Red?"

3) There are *many* strategies for figuring out how many roses would cost the same amount from the two companies. Solve the problem again, but this time you *must* use the fact that the slope of Roses-R-Red is $1.00, and the intercept of Flower Power is $10.00, as part of your solution.

Help for planning your paragraph

Topic Sentence

- Describe the problem and its solution

Support Your Point-You *must use* three vocabulary terms from the class. Your support may include:

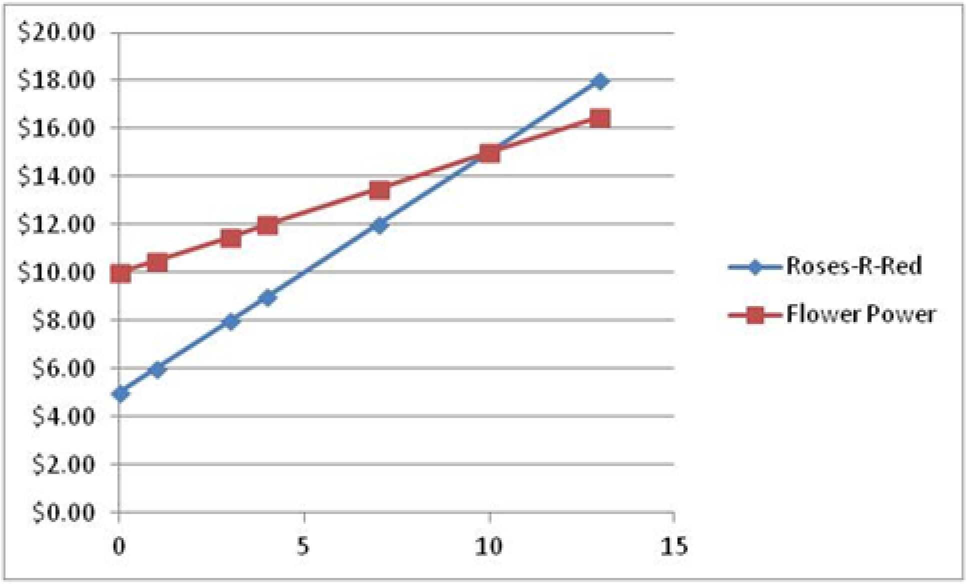
- when did you learn this strategy
- why do you prefer this strategy over other strategies
- personal experiences and/or
- logical arguments/facts

Explain Your Support- Explain & elaborate why you picked this particular strategy for solving the problem

- Another way to say this is…
- What I mean by this is…
- This shows that…
- The reason for this is that…
- This is important because…
- In other words…
- For example,

Strategy 1: Graphical representation

Move the data from the table to the graph:



The two lines intersect at (10,15). So the solution is x = 10 flowers

<u>Vocabulary may include:</u>

Intersect

Graphical representation

Coordinates

Independent and dependent variable

System of equations

By now, you have probably figured out that solving systems of equations by graphing is easy, especially with a calculator or computer graphing program. Graphing has two added advantages:

- By graphing, you can see what is happening, as in the last example in which the lines were parallel.
- Graphing also works well for systems that involve equations that are not linear. You will study those kinds of systems later in your mathematical career.

Strategy 2: Numerical representation

Move the data from the graph on to the table

Number of Roses	Roses-R-Red	Flower Power
0	$5.00	$10.00
1	$6.00	$10.50
3	$8.00	$11.50
4	$9.00	$12.00
7	$12.00	$13.50
10	$15.00	$15.00
13	$18.00	$16.50

The two companies are equal at $15, so that's 10 roses

<u>Vocabulary may include:</u>

Intersect

Numerical representation

Table

Substitute

Pattern (first difference)

Slope, intercept (rate, start)

Independent and dependent variable

System of equations

Using a table is easier for people who are good at looking for a pattern, or for people who are good at substituting different values of x into an equation so they can try many x's quickly. Also, it is easy to see where the companies are equal because they're just equal there. However, it may be more difficult in this case, because the number of roses did not increase at a constant rate in this table.

Strategy 3: Symbolic representation (MUST be used to answer question #3, if not before)

Roses-R-Red
Slope: $1 per rose
Intercept: $5
Model: y = 1x + 5
Flower Power
Slope: $0.50 per rose
Intercept: $10
Model: y = 0.50x + 10

The companies are equal when:

Roses-R-Red = Flower Power
1x + 5 = 0.50x + 10

Subtract 0.50x from both sides
1x + 5 – 0.50x = 0.50x + 10 – 0.50x

Cancel opposites
1x + 5 – 0.50x = 10

The like terms are
1x – 0.50x + 5 = 10
0.50x + 5 = 10

Subtract 5 from both sides
0.50x + 5 – 5 = 10 – 5

Cancel opposites
0.50x = 10 – 5
0.50x = 5

Divide 0.50
0.50x / 0.50 = 5 / 0.50

Cancel opposites
X = 5 / 0.50
X = 10 roses

<u>Vocabulary may include:</u>
Slope
Intercept
Model
Slope-intercept form
System of equations
Multiplicative inverse
Additive inverse

Using a symbolic representation is easier because, once you get to know the solution really well, you can apply it to all sorts of situations. There are a million things that can be represented as linear relationships, and you could graph or use a table for every single one of them and not understand how they were all alike. The symbolic representation uses symbols to represent things. Also, the steps of solving a linear equation like this can just be memorized and used the same way each time.

Strategy 4: Verbal representation

Some students may just be able to ‘think up’ the solution. They need to verbalize how they figured out the solution.