BLC150–Algebra Workshop Name:

Homework 10- Quadratic Equations and Graphs, pt. I

The Ur quadratic: $y = x^2$

y = x^2	
x	y
0	0
1	1
2	4
3	9
-1	1
-2	4
-3	9
1/2	1/4
-1/2	1/4

With the advent of computers, a new notation for exponents has come into fashion: x^2 = x^2. That little hat is shift-6. E.g. x^5 = x^5.

Plot some points. Choose some easy values for x and evaluate the y.

If x = 0, then y = 0

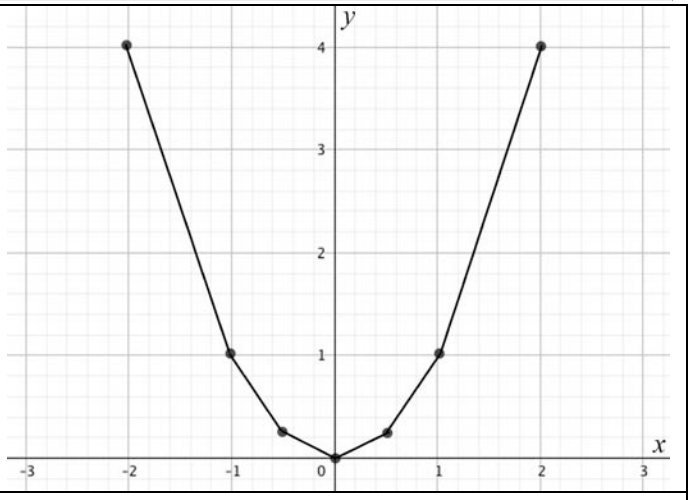
If x = 1, then y = 1

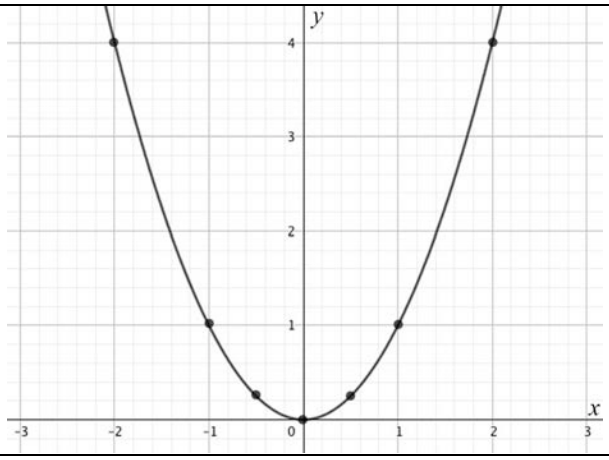
If x = -1, then y = 1, because -1(-1) = 1

If x = 2, then y = 4.

If x = -2, then y = 4, etc.

Now plot those points on a graph and connect the dots.



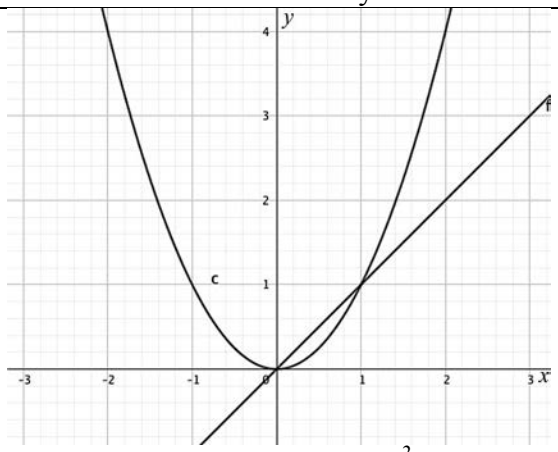


y = x^2	
x	y
0.00	0
0.25	0.0625
0.50	0.25
0.75	0.5625
1.00	1
1.25	1.5625
1.50	2.25
1.75	3.0625
2.00	4

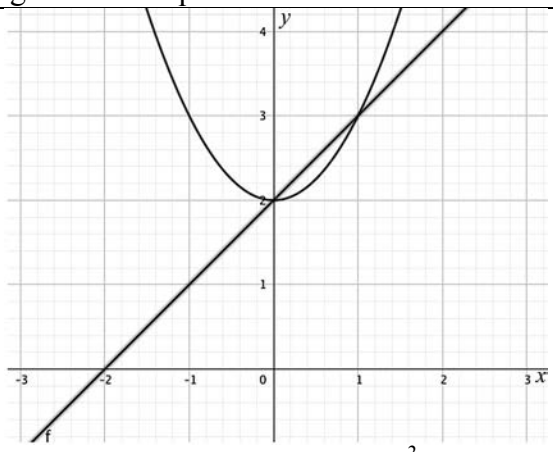
If you calculate a lot more dots, the graph will smooth out.

A computer graphing program is handy. I personally like GeoGebra: https://www.geogebra.org/?lang=en
It's free and easy to use. It can work without a link to the internet. I put a link on the web site. I suggest you get it and play around with it when you do homework.

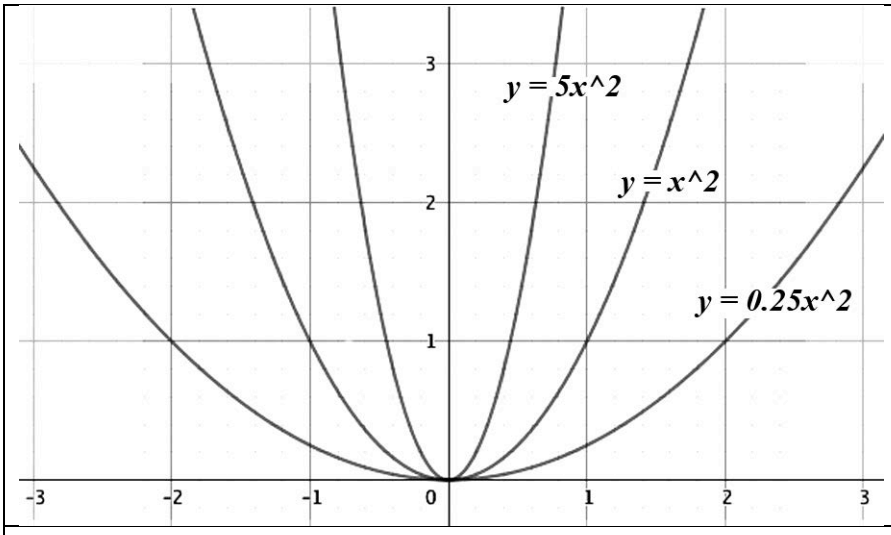
Like linear equations, quadratic equations move up and down when you add something to the Ur equation.



$y = x$ *and* $y = x^2$



$y = x + 2$ *and* $y = x^2 + 2$



In a linear equation a slope makes it steeper. $y = 5x$ is a steep slope. In a quadratic equation a similar concept isn't called slope, but it makes the parabola tighter. The higher the number, the more the curve tightens up.

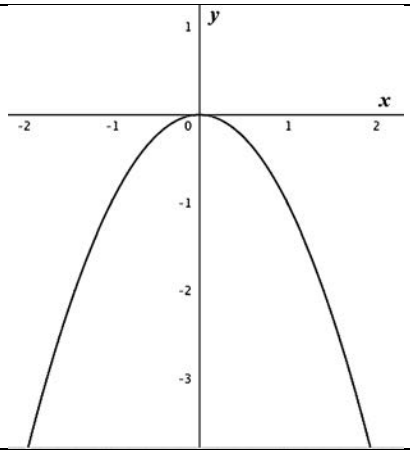
And a negative "quadratic slope" flips the smile over to a frown.

If the x^2 term is positive, then a smile.

If the x^2 term is negative, then a frown.

To the right is a graph of $y = -x^2$ *Sad. [y = -x^2]*

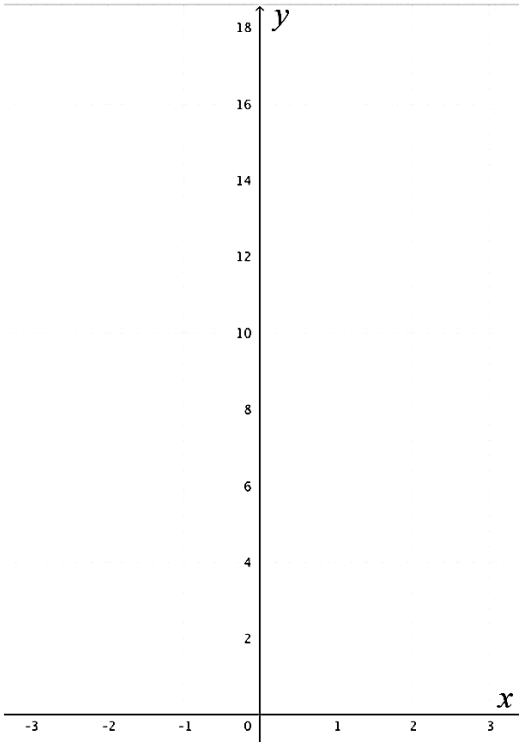
[The ones above are all happy.]



Exercise 9

1. Plot the following points for the quadratic equation, $y = 2x^2$. Then connect the dots smoothly.

y = 2x^2	
x	y
0	
1	
-1	
2	
-2	
3	
-3	



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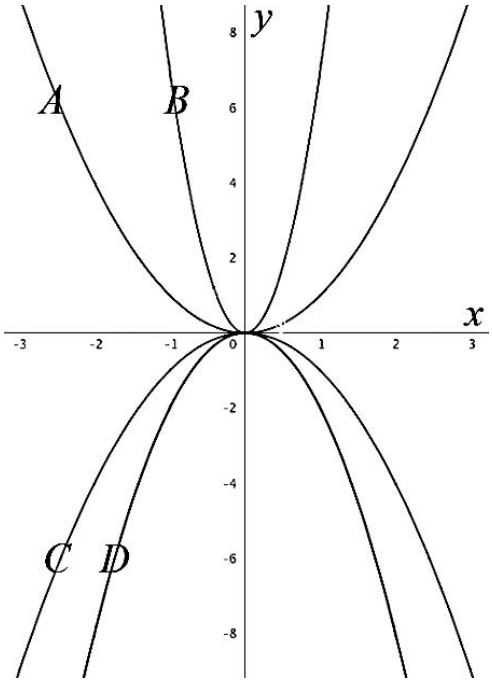
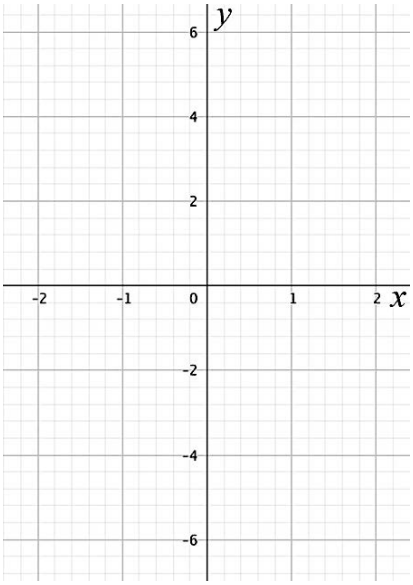
2. Identify which equation goes with which graph.

	Choose, A, B, C, or D. Refer to the graph.
$y = 7x^2$	
$y = x^2$	
$y = -x^2$	
$y = -2x^2$	



3. Graph the following two quadratic equations on the graph.

a. $y = 2x^2 - 2$ b. $y = -2x^2 + 2$



Just like in linear equations, you find the *y-intercepts* by setting $x = 0$.

Find the y-intercepts for the following.
Just solve for $x = 0$. Easy.

E.g. $y = 3.5x^2 - 8$	*y-intercept* is –8
1. $y = 4x^2 - 16$	
2. $y = x^2 + 16.3$	
3. $y = -3.5x^2 - 8$	
4. $y = 0.002x^2 + 7$	
5. $y = x^2$	

Find the *x* and *y-intercepts* for the following.
The *x-intercepts* are much trickier.
You set $y = 0$ and solve for x.

	x-intercepts	*y-intercept*	*Happy or Sad*
E.g. $y = 4x^2 - 16$ $0 = 4x^2 - 16$ $16 = 4x^2$ $x^2 = 4$ $x = \pm 2$	*x-intercept is -2 and +2.* *See the graph to the right.*	*-16*	*Happy* 0 0 *Because the x^2 term is positive.*
6. $y = x^2 - 4$			
7. $y = -x^2 + 4$			*Sad*
8. $y = -3x^2 + 27$			
9. $y = 2x^2 - 18$			
10. $y = x^2$