What's Going On?

Checking In

Minds on Graphing From a TOV

Action! Graphing $y = x^2$

Consolidation First and Second Differences

Learning Goal - I will understand how to graph quadratic functions in the form $y = ax^2$.

Minds on

Graphing from a TOV

What's a TOV?

A TOV is a **T**able **o**f **V**alues

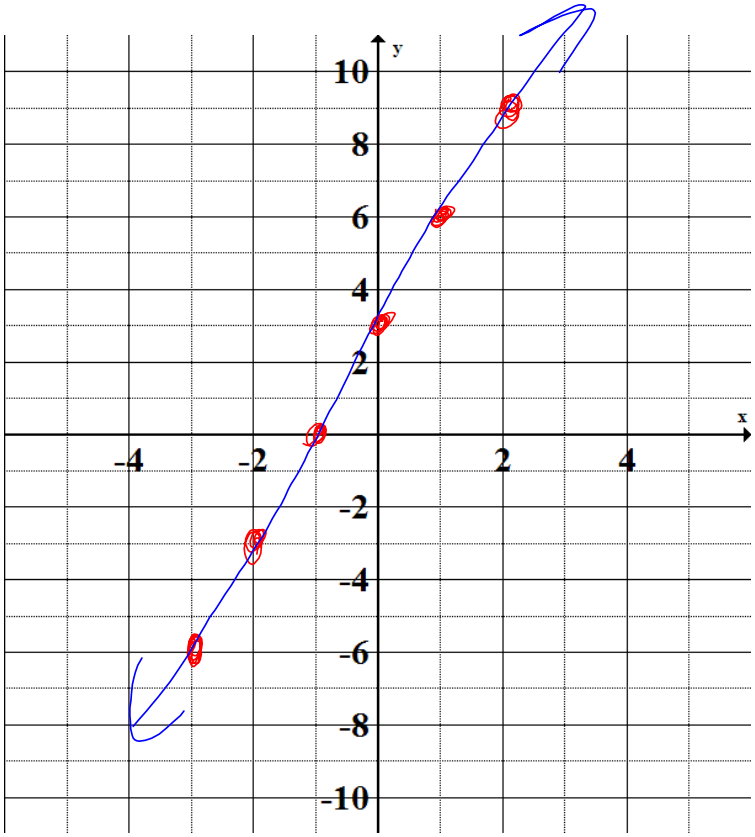
Basically it is a list of ***ordered pairs*** (points on a graph) for some function.

To graph, given a TOV, we just **plot the points**!

Minds on

Graphing from a TOV

x	y
-3	-6
-2	-3
-1	0
0	3
1	6
2	9



Action!

Graphing $y = x^2$

If you were asked to graph the function $y = x^2$, using a table of values, how would you do it?

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

Before we even do that, does anyone remember what kind of graph this will be?

parabola

First, start with some values for x!

I usually go with -3, -2, -1, 0, 1, 2...

$(-3)(-3) = +9$

Action!

Graphing $y = x^2$

If you were asked to graph the function $y = x^2$, using a table of values, how would you do it?

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

Now, find the value of y that goes with each x-value!

To do that, plug the x-value into the equation!

Action!

Graphing $y = x^2$

Notice the y-values!

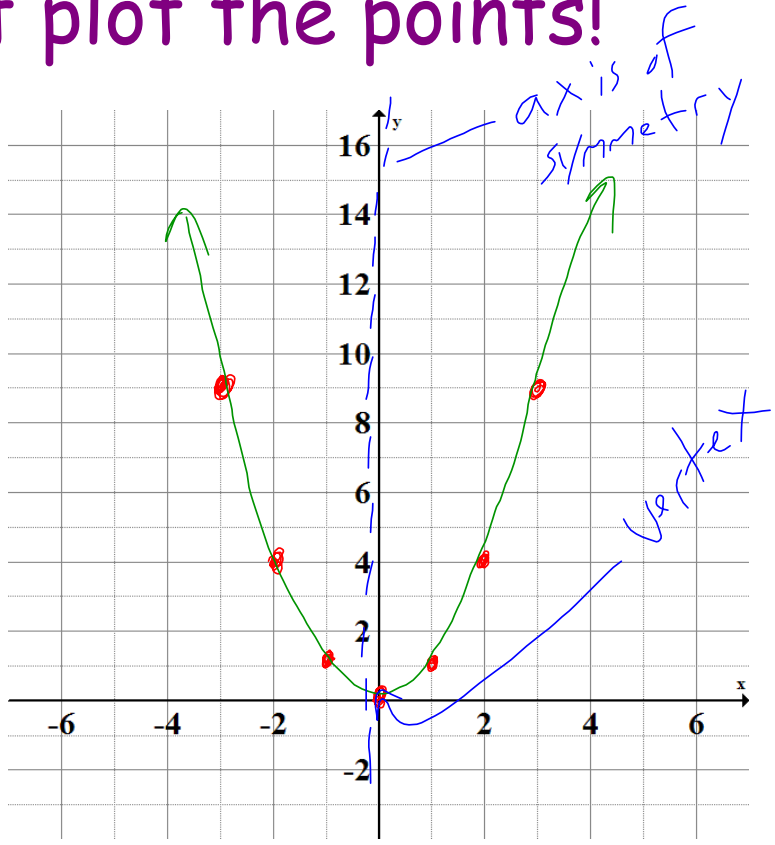
x	y
-3	9
-2	4
-1	1
0	0
+1	1
+2	4
+3	9

Action!

Graphing $y = x^2$

Now, just plot the points!

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



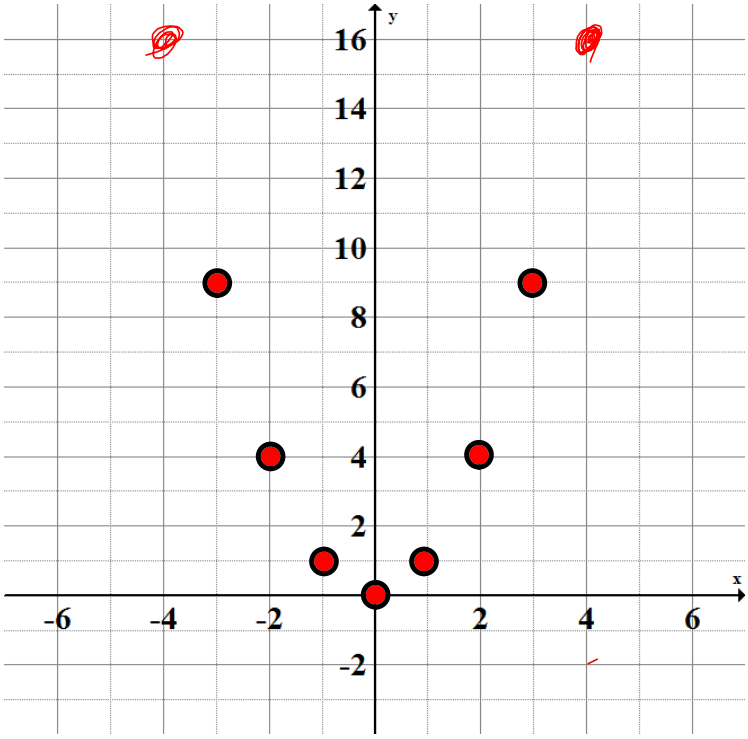
Action!

Graphing $y = x^2$

Once you have plotted the points, try and see if you can figure out a pattern among them.
(What would the next points be?)

$4^2 =$

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

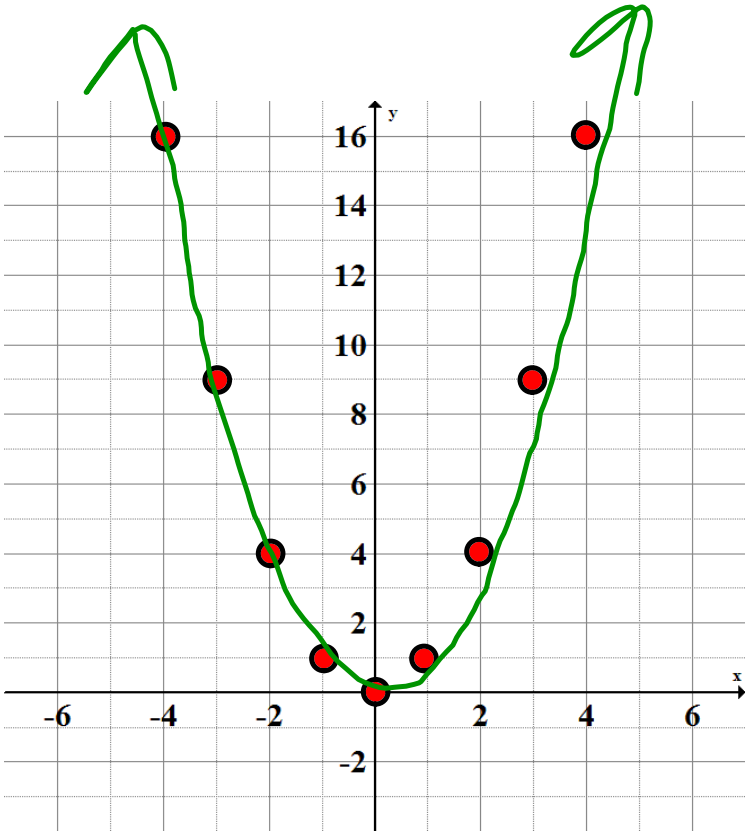


Action!

Graphing $y = x^2$

Now draw a **curve** through your points!

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

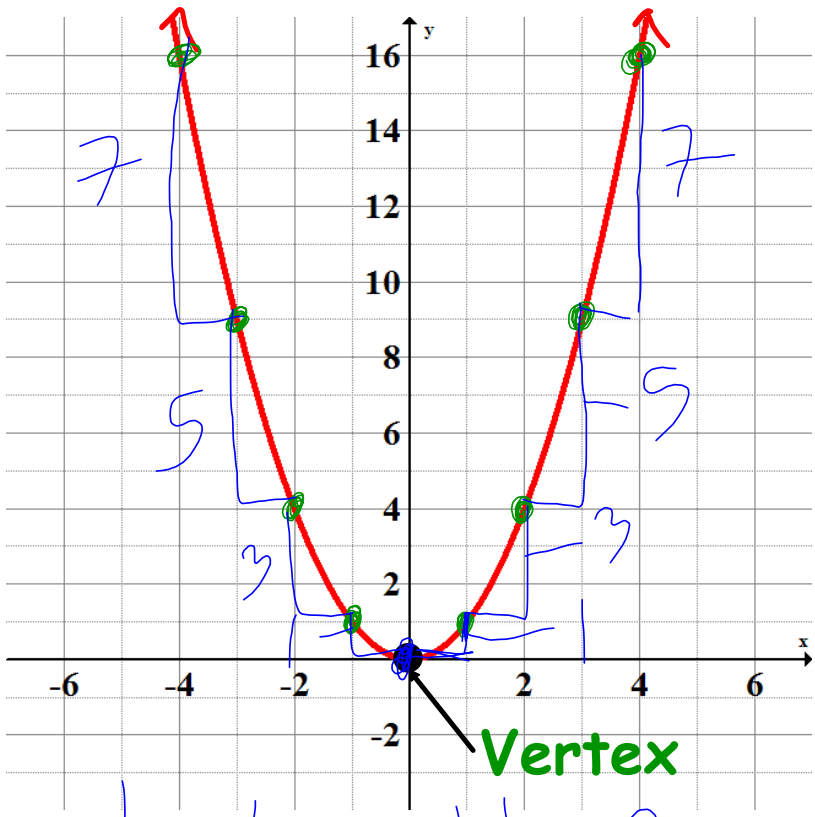


Action!

Graphing $y = x^2$ - Step Pattern

Table of Values?

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



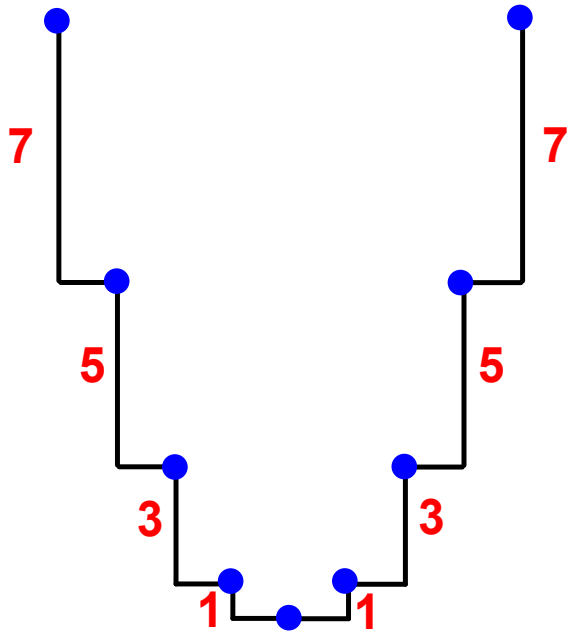
The general step pattern is 1, 3, 5, 7, ...

Action!

Graphing $y = x^2$ - Step Pattern

Table of Values?

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

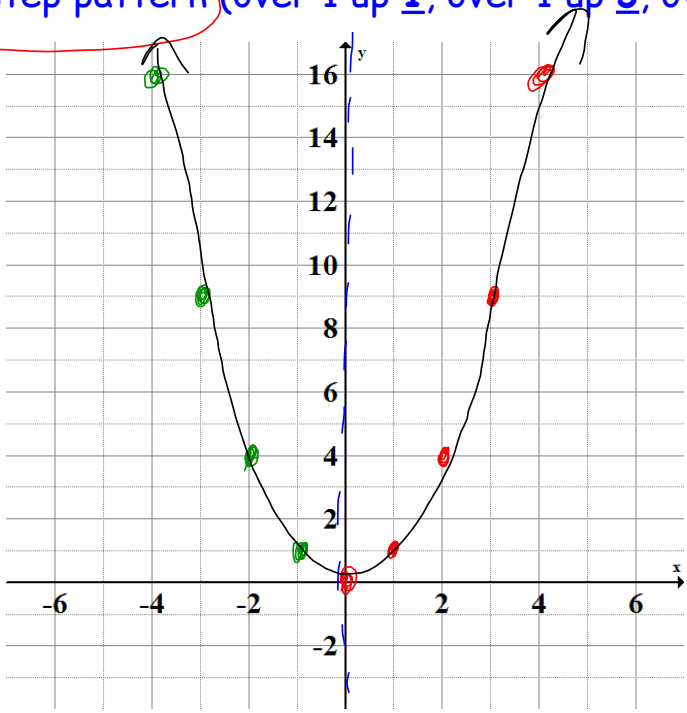


Action!

Graphing $y = x^2$

To graph the function $y = x^2$, plot the *vertex* at (0, 0).

Then use the step pattern (over 1 up **1**, over 1 up **3**, over 1 up **5**, etc...)



Consolidation

First and Second Differences

$$y = x^2$$

To calculate first differences, subtract consecutive y-values.

Specifically, subtract a given y-value ***from*** the ***next*** y-value.
(y2 - y1)

x	y	First Differences	Second Differences
-3	9	-5	+2
-2	4	-3	+2
-1	1	-1	+2
0	0	+1	+2
1	1	+3	
2	4		

Consolidation

First and Second Differences

$$y = x^2$$

The first differences give us the step pattern!

Notice that the second differences are ***constant***.

x	y	First Differences	Second Differences
-3			
-2			
-1			
0			
1			
2			

Consolidation

Summary

If the first differences in a table of values are equal, the equation forms a straight line.

If the second differences in a table of values are equal (and not 0) the equation forms a parabola.

Consolidation

Your turn!

I will give each of you a quadratic equation.

Complete the table of values, then graph your function!

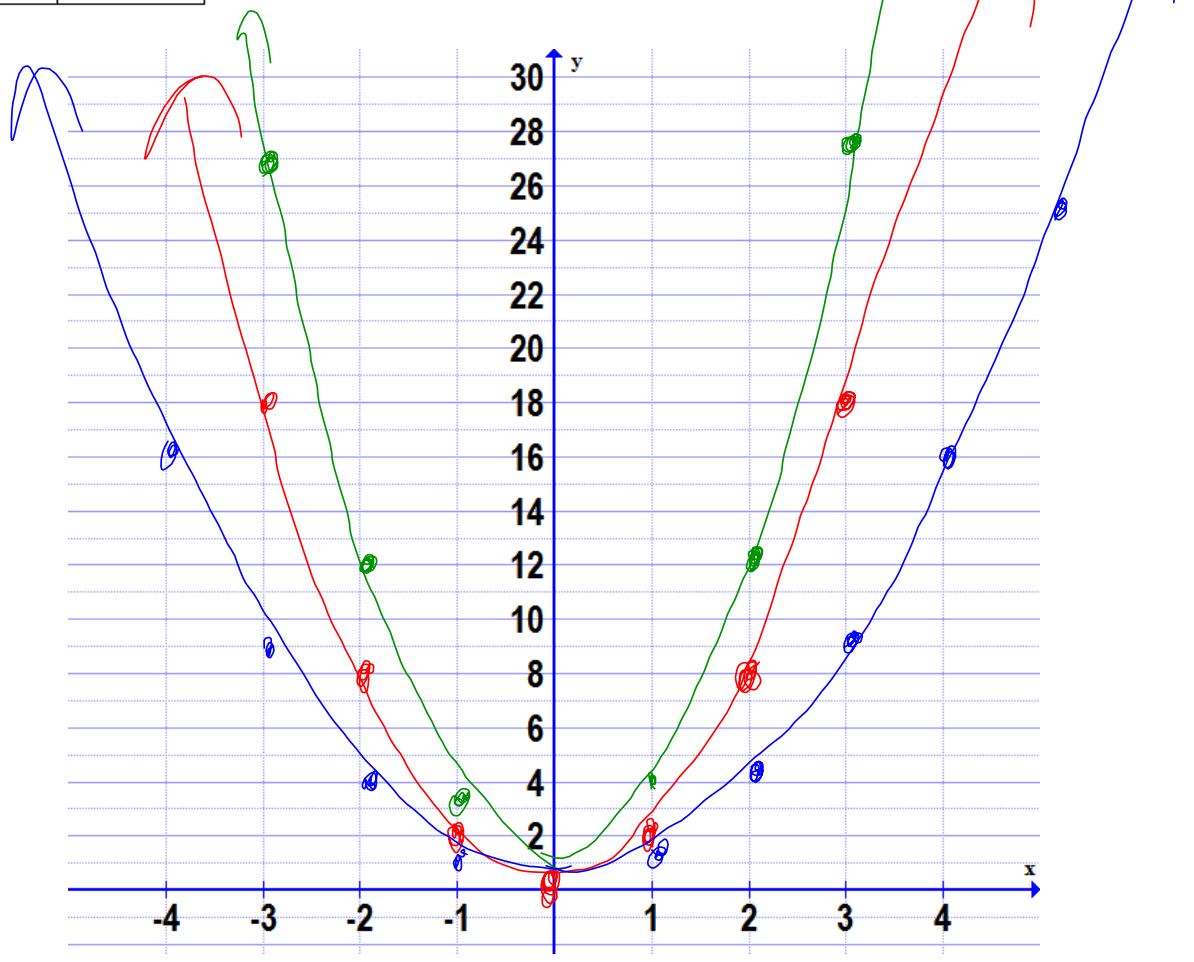
x	y	First Differences	Second Differences
-3	18		
-2	8		
-1	2		
0	0		
1	2		
2	8		

$y = 2x^2$

(1)

$y = 3x^2$

$y = x^2$



x	y	First Differences	Second Differences
-3			
-2			
-1			
0			
1			
2