

**L1 (3.1) Introduction to Quadratic Relations**

---

In grade 9 you studied Linear Relations and now you will study Quadratic Relations. From the work that we have already done with quadratics, compare and contrast the two relationships.

LINEAR RELATIONS	QUADRATIC RELATIONS
Equation:	Equation:
Ex:	Ex:
Properties:	Properties:

Note: The highest exponent in a one-variable algebraic expression is called the degree.

What is the easiest way to graph something? Make a table of values (tov for short!)

Recall: To create a table of values (or TOV).

1. Pick a value for  $x$ .
2. Substitute the  $x$ -value into the equation.
3. Solve for  $y$ .
4. Repeat for several other values of  $x$ .
5. Plot each point  $(x, y)$  on the  $x$ - $y$  plane.

Ex.: Create a TOV for  $y = 2x + 1$

$x$	$y$	
-2		$\Delta y = y_2 - y_1$
-1		
0		
1		
2		

' $\Delta$ ' (delta) means "change in" or "difference".  
 $\Delta y$  is the change in  $y$ , or the first difference.

In a linear relationship, the first differences are \_\_\_\_\_.

Now let's look at quadratics!

Ex.: Create a TOV for  $y = x^2$

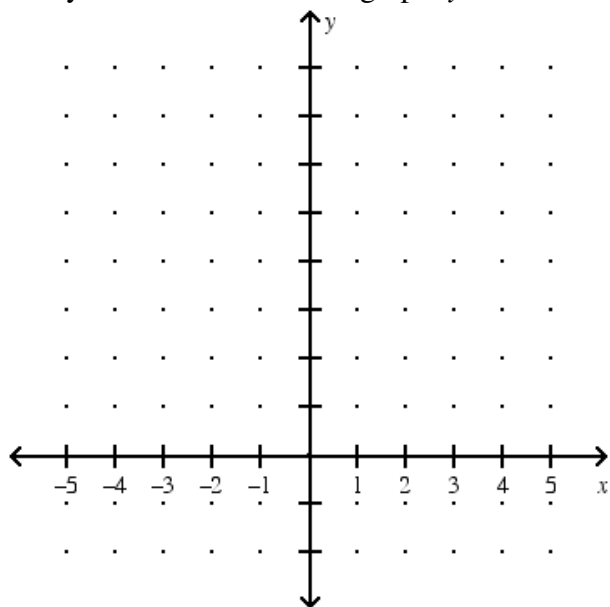
$x$	$y$		
-2		$\Delta y = y_2 - y_1$	$\Delta^2 y = \Delta y_2 - \Delta y_1$
-1			
0			
1			
2			

$\Delta^2 y$  is the change in  $\Delta y$ , or change in 1<sup>st</sup> differences.

$\Delta^2 y$  is the second difference.

In a quadratic relationship, first differences are \_\_\_\_\_  
 and second differences are \_\_\_\_\_.

Use your table of values to graph  $y = x^2$



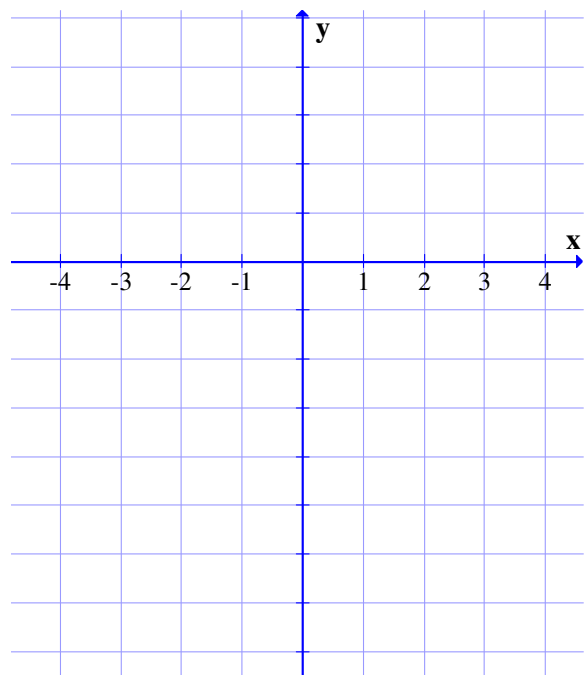
This shape is called a \_\_\_\_\_

Ex.: Create a TOV for  $y = -x^2 + 2x + 3$

$x$	$y$	$\Delta y = y_2 - y_1$	$\Delta^2 y = \Delta y_2 - \Delta y_1$
-2			
-1			
0			
1			
2			

Use your table of values to graph

$$y = -x^2 + 2x + 3$$



In a quadratic relationship,

first differences are \_\_\_\_\_

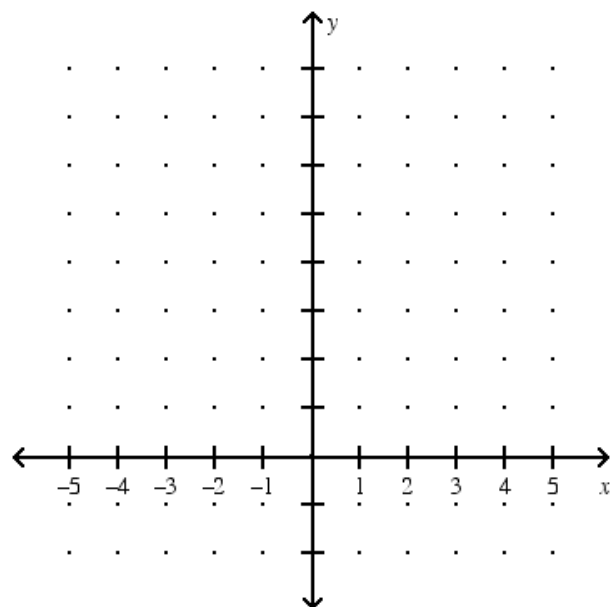
and second differences are \_\_\_\_\_.

Ex.: Create a TOV for  $y = 2(x - 1)(x + 1)$

$x$	$y$	$\Delta y = y_2 - y_1$	$\Delta^2 y = \Delta y_2 - \Delta y_1$
-2			
-1			
0			
1			
2			

Use your table of values to graph

$$y = 2(x - 1)(x + 1)$$



In a quadratic relationship,

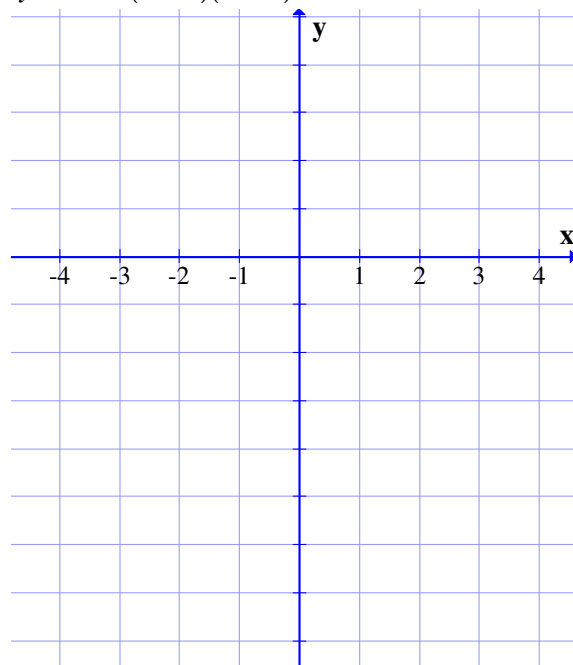
first differences are \_\_\_\_\_

and second differences are \_\_\_\_\_.

Ex.: Create a TOV for  $y = -0.4(x - 3)(x + 2)$

$x$	$y$	$\Delta y = y_2 - y_1$	$\Delta^2 y = \Delta y_2 - \Delta y_1$
-2			
-1			
0			
1			
2			

Use your table of values to graph  
 $y = -0.4(x - 3)(x + 2)$



In a quadratic relationship,

first differences are \_\_\_\_\_

and second differences are \_\_\_\_\_.

Can you predict from the equation that the parabola is opening up? \_\_\_\_\_ If yes, how?

\_\_\_\_\_

\_\_\_\_\_

Can you predict from the equation that the parabola is opening down? \_\_\_\_\_ If yes, how?

\_\_\_\_\_

\_\_\_\_\_

Can you predict from the equation the value of the second differences? \_\_\_\_\_ If yes, how?

\_\_\_\_\_

\_\_\_\_\_

Assigned Work:

p. 137 # 1, 2, 3, 4, 5ab, 6, 7