First Differences:
- the differences between the *y*-values that correspond to consecutive *x*-values
- the ________________ of *y*-values with respect to the *x*-values
- if a constant value, the relation is ______ and the graph is a _____________
- the relation can be represented by _______________

Second Differences:
- the difference between consecutive first differences
- for a quadratic relation, second differences are ______________.
- the relation is quadratic and the graph is a ________________
- the relation can be represented by any form of the quadratic:
  - $y = a(x - h)^2 + k$ (__________ Form)
  - $y = ax^2 + bx + c$ (__________ Form)
  - $y = a(x - s)(x - t)$ (__________ Form)

Example 1

A snowboarder makes a run by travelling down one side of a parabolic curve and up the other. The table shows the height of the snowboarder as the distance from the starting point increases.

Horizontal Distance (m)	Height (m)	First Differences	Second Differences
0	10.8		
1	7.5		
2	4.8		
3	2.7		
4	1.2		
5	0.3		
6	0		
7	0.3		
8	1.2		
9	2.7		
10	4.8		
11	7.5		
12	10.8		

(a) Is this a quadratic relation? How do you know?

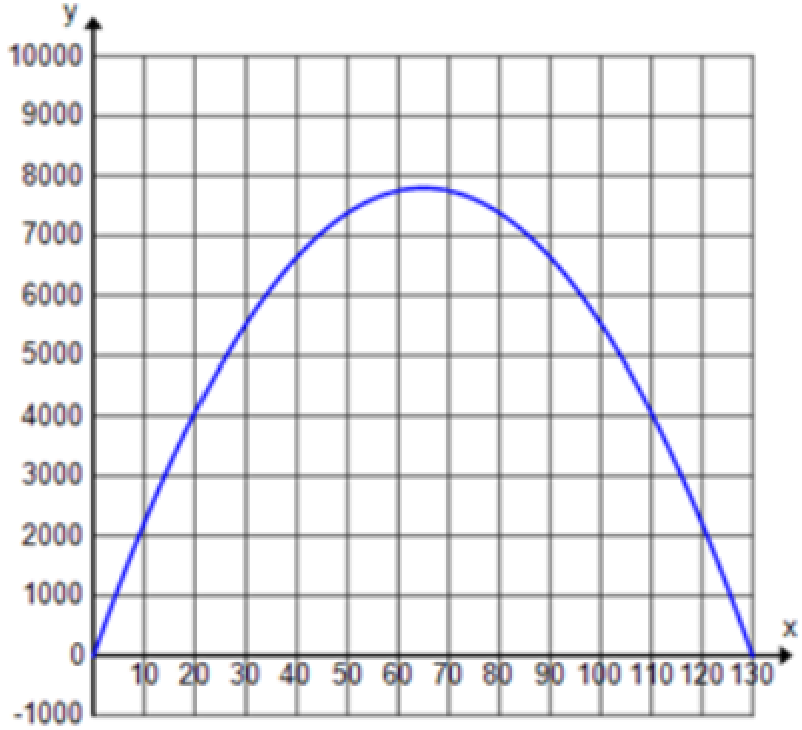
(b) Enter the table into Desmos to find an equation of the curve of best fit.

<u>Example 2</u>

Use the graph provided to complete the table of values.

Then input the table of values into Desmos to find an equation for the relationship.

X	Y
0	
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	



The equation is: ________________________

Why isn't the graph in Desmos exactly like the diagram?

Homework: Section 6.4 Handout