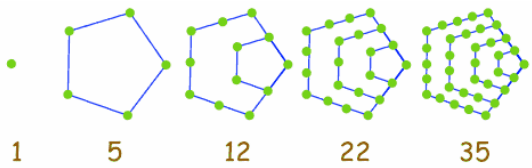


(A) Lesson Objectives

- a. Graph scatter plots by hand and by technology from collected data
- b. Analyze data gathered by looking at first differences, constant ratios and/or constant second differences
- c. Introduce the key features of the graphs of quadratic relations

(B) Data Analysis Strategy – Pentagonal Numbers

a. In Pentagonal Numbers Station #6, you were given the following diagram and data set:



Pattern #	1	2	3	4	5	6
# of dots	1	5	12	22	35	???

- b. We can PREDICT the number of dots in the next several diagrams/patterns → many of you looked for patterns in the # of dots data → _____.
- c. So the key point now in our NUMERIC DATA ANALYSIS will be → A relation (or a data set) is **quadratic** if

(C) Properties of Quadratic Relations → Graphs

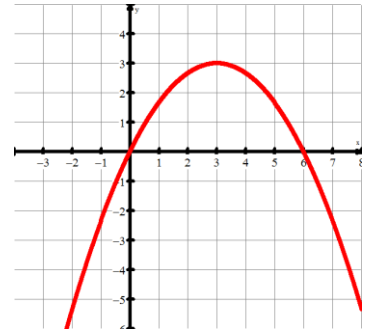
Now let's look at Station #3 (Optimizing Area/Perimeter). Here is a sample data set and scatter plot:

<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">Width</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>35</td> <td>40</td> </tr> <tr> <td>Area</td> <td>200</td> <td>350</td> <td>450</td> <td>500</td> <td>500</td> <td>450</td> <td>350</td> <td>200</td> </tr> </table> <p style="margin-top: 10px;">Key Terms:</p> <p>(a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	Width	5	10	15	20	25	30	35	40	Area	200	350	450	500	500	450	350	200	
Width	5	10	15	20	25	30	35	40											
Area	200	350	450	500	500	450	350	200											

(D) Working With Graphs of Quadratic Relations

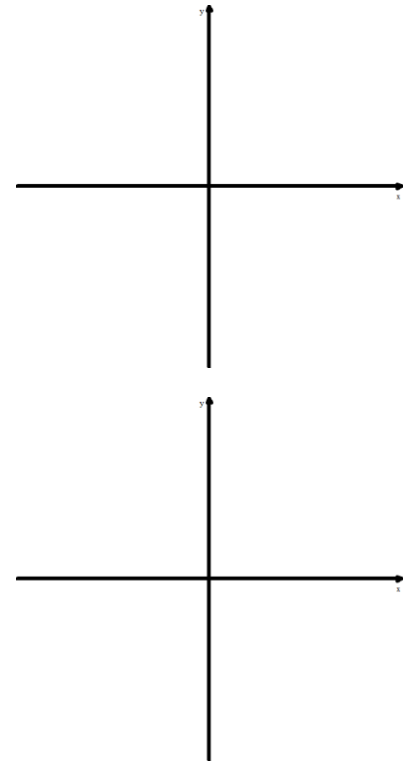
a. Graphs of quadratic relations are called : _____.

b. Ex 1 → Examine the graph of the quadratic relation below:



- i.** What are the co-ordinates of the vertex?
- ii.** What is the optimal value?
- iii.** What is the equation of the axis of symmetry?
- iv.** What are the zeroes of the relation?
- v.** What would be the sign of the second differences?

c. Ex 2 → Two parabola each have zeroes of 1 and 11. One has a maximum value of 12, the other has a minimal value of -6. Sketch the 2 parabolas on the same axes.



d. Ex 3 → A relation is defined by the equation $A = 24L - L^2$. For this relation:

- i.** Write the equation in factored form by removing the GCF.
- ii.** Determine the zeros.
- iii.** State the equation of the axis of symmetry.
- iv.** Graph it on the GDC and determine the optimal value.
- v.** Sketch the parabola, labeling the key features

e. Ex 4 → A soccer ball is kicked up into the air. Its height above the ground is approximated by the equation $h = 30t - 5t^2$, where h is height in meters and t is time in seconds.

- i.** What are the zeroes of the relation? What do they MEAN in the context of the problem?
- ii.** What are the co-ordinates of the vertex? What does it MEAN in the context of the problem?
- iii.** What is the height of the ball after 2 seconds?
- iv.** When does the ball reach a height of 40 m?
- v.** Use this information above to sketch the parabola, labeling the key features

(E) Homework: