

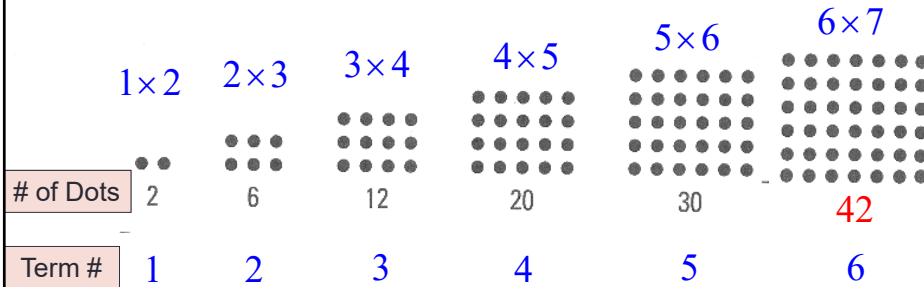
4-3:MODELING WITH QUADRATIC FUNCTIONS

Mr. Gallo
Algebra 2

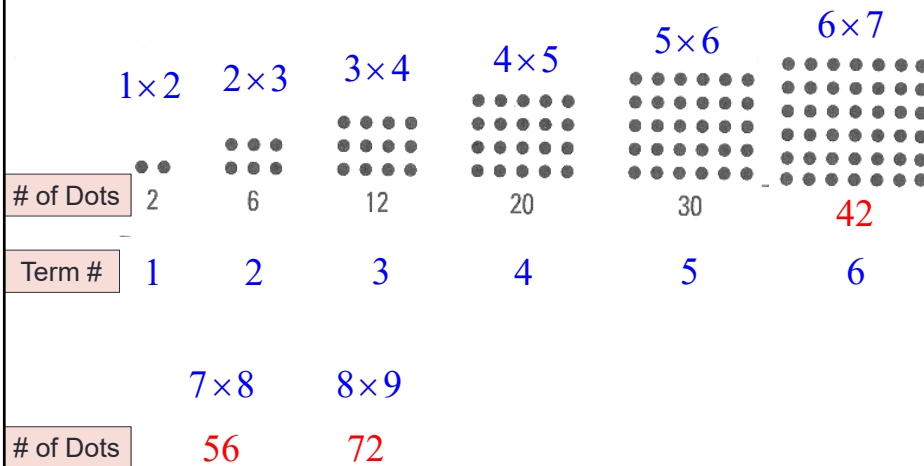
A parabola contains points $(0,0)$, $(-1,1)$ and $(1,5)$.
What is the equation of this parabola in standard form?

Draw the rectangular number next in the series:

1. The following pictures illustrate the first five numbers in a sequence we shall call the “rectangular numbers.”

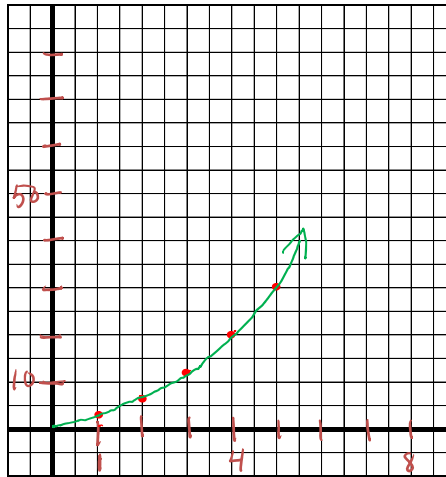


Find the next two rectangular numbers:



Complete the table for the values given and graph the data:

Term Number	Total dots
1	2
2	6
3	12
4	20
5	30



1) What equation does the graph suggest?
A Quadratic (parabola)

2) Plot the data in your calculator.

Press: **STAT>EDIT>L₁**

Enter the data under **Term Number**.

3) Use the arrow keys to move through to **L₂**. Enter the data you found under **Total Dots**.

4) Set an appropriate window for the values.

5) View the graph: Does it resemble your hand made graph?

5) Calculate the equation of the line of best fit:

Press: **STAT>CALC>#5 QuadReg**

6) Choose the Lists that your data is stored under. (Ex. L₁, L₂) Press: Enter

The equation is of the form:

$$y = ax^2 + bx + c$$

a = 1

b = 1

c = 0

Final equation: $x^2 + x$

7) Enter the equation of the line under

Y= $x^2 + x$

8) Graph the equation. Does it fit the data?

Yes, the parabola graphed goes through the points.

9) Use your equation to calculate the 100th term in the series.

$$x^2 + x = 100^2 + 100 = 10,100$$

4-5: QUADRATIC EQUATIONS

Algebra 2
Mr. Gallo

Ways to Solve Quadratic Equations

1. Solve by Factoring
 - Set the equation equal to 0 and factor
2. Solve with Tables
 - Enter the equation into Y=
 - Create a Table and look for x value when $y = 0$
3. Solve by Graphing
 - Enter equation into Y=
 - Graph equation and use zero function to find x value when $y = 0$.

Solve by Factoring

What are the solutions of the quadratic equation
 $x^2 + 3x - 18 = 0$

$$x^2 + 3x - 18 = 0$$

$$(x + 6)(x - 3) = 0$$

$$x + 6 = 0$$

$$x = -6$$

$$x - 3 = 0$$

$$x = 3$$

The solutions to $x^2 + 3x - 18 = 0$ are $(-6, 0)$ and $(3, 0)$

Solve Using a Table

What are the solutions of the quadratic equation
 $10x^2 + 2x - 46 = x - 4$

Enter the quadratic equation $10x^2 + x - 42 = 0$
into the calculator and create a table.

Find the x values which have a y value of 0.

The solutions to $10x^2 + 2x - 46 = x - 4$
are $(2,0)$ and $(-2.1,0)$

Solve by Graphing

What are the solutions of the quadratic equation
 $5x^2 - 8 = 18x$

$$5x^2 - 8 = 18x$$

$$5x^2 - 18x - 8 = 0$$

Enter the quadratic equation $5x^2 - 18x - 8 = 0$
into the calculator and graph it.

Use the zero function to find the x values which
have a y value of 0.

The solutions to $5x^2 - 18x - 8 = 0$ are $(-0.4,0)$ and
 $(4,0)$

Solve by Graphing

What are the solutions of the quadratic equation
 $5x^2 - 8 = 18x$

Enter the quadratic equation $5x^2 - 8$ into the calculator as Y_1 and $18x$ into the calculator as Y_2 and graph them.

Use the **Intersect** function to find the x values where the lines intersect.

The solutions to $5x^2 - 8 = 18x$ are $(-0.4,0)$ and $(4,0)$

The function $f(x) = -0.002x^2 + 0.77x$ models the path of a baseball, where $f(x)$ gives the height of the ball and x gives the distance from where it is hit in feet.

a. How far does the ball travel before hitting the ground?

385 feet

b. How high does the ball go?

about 74 feet

c. What is a reasonable domain and range for such a function?

Domain= $[0,400]$ and Range= $[0,100]$