

How do you write quadratic equations given data in a table?

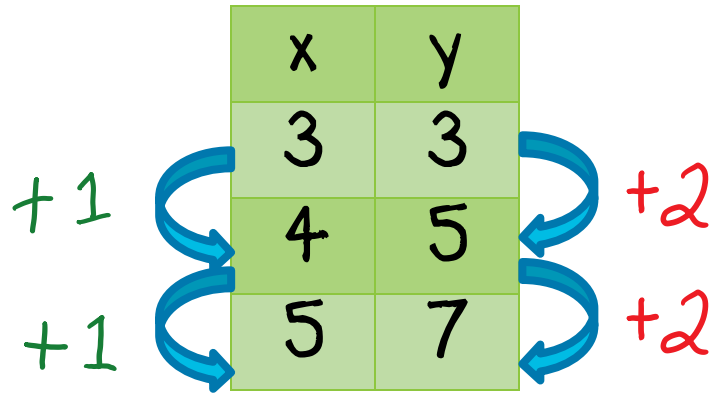
x	0	1	2	3	4
y	4	10	12	10	4

In this lesson you will learn
how to write a quadratic
equation by finding a
pattern in a table.

Let's Review

A constant rate of change in y indicates a linear pattern.

	x	y	
	3	3	
+1	4	5	+2
+1	5	7	+2



$$m = \frac{2}{1}$$

$$m = 2$$

Let's Review

Use a point from the table to solve for the y-intercept.

x	y
3	3
4	5
5	7

$$y = 2x + b$$

$$7 = 2(5) + b$$

$$7 = 10 + b$$

$$-3 = b$$

$$y = 2x - 3$$

Let's Review

Solving systems of equations.

$$\begin{array}{r} 3x + 2y = 16 \\ - (3x + 12y = 36) \\ \hline -10y = -20 \\ y = 2 \end{array}$$

$$\begin{array}{l} x + 4y = 12 \\ 3(x + 4y) = 3(12) \\ 3x + 12y = 36 \end{array}$$

Let's Review

Solving systems of equations.

$$x + 4y = 12$$

$$x + 4(2) = 12$$

$$x + 8 = 12$$

$$x = 4$$

$$(4, 2)$$

Let's Review

General form of a quadratic function

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

A Common Misunderstanding

Writing a linear equation

$+1$



x	0	1	2	3	4
y	4	10	12	10	4

$+6$



$y = \text{X}x + 4$

Core Lesson

First, find the second difference.

x	0	1	2	3	4
y	4	10	12	10	4

Diagram illustrating the calculation of the second difference for the sequence of y-values (4, 10, 12, 10, 4) corresponding to x-values (0, 1, 2, 3, 4).

First differences (calculated between consecutive y-values):

- From 4 to 10: $+6$
- From 10 to 12: $+2$
- From 12 to 10: -2
- From 10 to 4: -6

Second differences (calculated between consecutive first differences):

- From $+6$ to $+2$: -4
- From $+2$ to -2 : -4
- From -2 to -6 : -4

The second difference is constant at -4 .

Core Lesson

Find the constant, "c".



x	0	1	2	3	4
y	4	10	12	10	4



$$c = 4$$

Core Lesson

Create a pair of equations

x	0	1	2	3	4
y	4	10	12	10	4

$$y = ax^2 + bx + 4$$

$$10 = a + b + 4$$

$$6 = a + b$$

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

$$10 = 9a + 3b + 4$$

$$6 = 9a + 3b$$

Core Lesson

Solve the pair of equations

$$6 = a + b$$

$$-3(6 = a + b)$$

$$-18 = -3a - 3b$$

$$6 = 9a + 3b$$

$$\underline{-18 = -3a - 3b}$$

$$-12 = 6a$$

$$-2 = a$$

Core Lesson

Solve the pair of equations

$$6 = a + b$$

$$6 = -2 + b$$

$$8 = b$$

Core Lesson

Write the quadratic equation

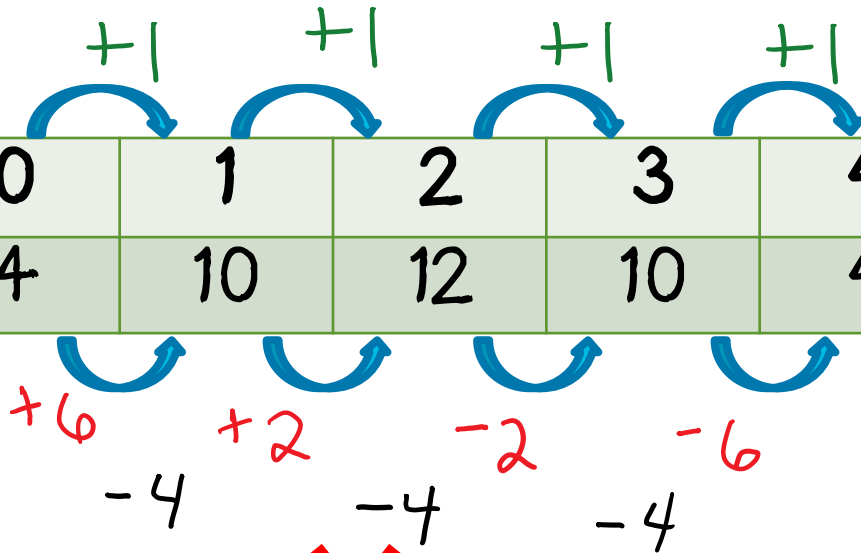
$$a = -2, b = 8, c = 4$$

$$y = -2x^2 + 8x + 4$$

A Common Misunderstanding

Misusing the second difference

x	0	1	2	3	4
y	4	10	12	10	4



$y = -x^2 + 4$

In this lesson you learned
writing quadratic equations by
finding the pattern in a table.