

Standard Form of a Quadratic Equation:  $f(x) = Ax^2 + Bx + C$ 

## I. Finding A

For each table below, find the 2<sup>nd</sup> difference.

x	f(x)	1st	2nd
-2	-16	<del>///</del>	<del>///</del>
-1	-4	12	<del>///</del>
0	0	4	-8
1	-4	-4	-8
2	-16	-12	-8

Equation:  $f(x) = -4x^2$

x	f(x)	1st	2nd
-2	5	<del>///</del>	<del>///</del>
-1	-1	-6	<del>///</del>
0	-3	-2	4
1	-1	2	4
2	5	6	4

Equation:  $f(x) = 2x^2 - 3$

x	f(x)	1st	2nd
-2	17	<del>///</del>	<del>///</del>
-1	6	-11	<del>///</del>
0	1	-5	6
1	2	1	6
2	9	7	6

Equation:  $f(x) = 3x^2 - 2x + 1$

Table Talk: What relationship do you notice between the value of A in the equation and the second difference from your table?

The value of A is  $\frac{1}{2}$  the second difference.

$\frac{1}{2}(-8) = -4$

$\frac{1}{2}(4) = 2$

$\frac{1}{2}(6) = 3$

## II. Finding C

x	f(x)
-2	10
-1	7
0	6
1	7
2	10

Equation:  $f(x) = x^2 + 6$

x	f(x)
-2	+3
-1	-3
0	-5
1	-3
2	3

Equation:  $f(x) = 2x^2 - 5$

x	f(x)
-2	9
-1	4
0	5
1	12
2	25

Equation:  $f(x) = 3x^2 + 4x + 5$

Table Talk: What relationship do you notice between the value of C in the equation and the y-intercept in your table?

The value of C and the y-intercept in the table are the same.

## III. Putting it all Together – Write a quadratic equation for each problem below.

1.

x	f(x)	1st	2nd
-2	16	<del>///</del>	<del>///</del>
-1	10	-6	<del>///</del>
0	8	-2	4
1	10	2	4
2	16	6	4

a) Write the quadratic equation to model the data in the table.

$$f(x) = 2x^2 + 8$$

b) Put your equation in y = in your calculator

c) Does the table (2<sup>nd</sup> → Graph) match your table? YES ☺

$$A = \frac{1}{2}(4) = 2$$

$$C = 8$$



2.

x	f(x)	1st	2nd
-2	24	///	///
-1	14	-10	///
0	8	-6	4
1	6	-2	4
2	8	2	4

a) Write the quadratic equation to model the data in the table.

$$f(x) = 2x^2 + 8$$

b) Put your equation in y = in your calculator

c) Does the table (2<sup>nd</sup> → Graph) match your table? NO!

$$A = 1/2(4) = 2$$

$$C = 8$$

WHY NOT? What are we missing?

$$f(x) = 2x^2 + Bx + 8$$

(1, 6)

$$6 = 2(1)^2 + B(1) + 8$$

$$6 = 2 + B + 8$$

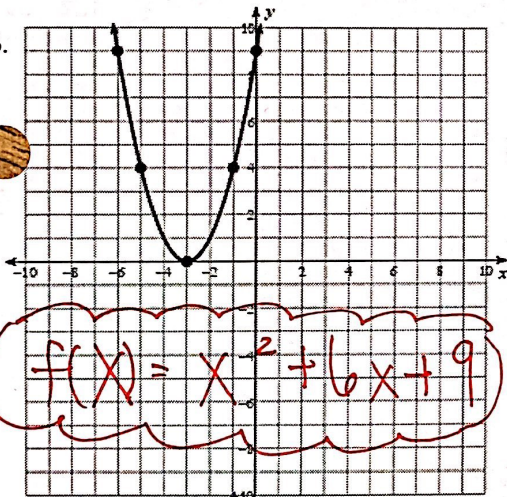
$$6 = 10 + B$$

$$B = -4$$

$$f(x) = 2x^2 - 4x + 8$$

Practice Problems: Write a quadratic equation that models the data for each problem.

3.



$$f(x) = x^2 + 6x + 9$$

4.

$$f(x) = 2x^2 + 12x + 22$$

x	y	1st	2nd
-5	12	///	///
-4	6	-6	///
-3	4	-2	4
-2	6	2	4
-1	12	6	4
0	22	10	4

$$A = 1/2(4) = 2$$

B = find

$$C = 22$$

$$f(x) = 2x^2 + Bx + 22$$

(-1, 12)

$$12 = 2(-1)^2 + B(-1) + 22$$

$$12 = 2 - B + 22$$

$$12 = 24 - B$$

$$-12 = -B$$

$$B = 12$$

Turn to page 1 of your workbook and write an equation to model the growth for the pattern in "Something to Talk About." 8

x	y	1st	2nd
1	1	///	///
2	3	2	///
3	6	3	1
4	10	4	1

$$f(x) = 1/2x^2 + 1/2x$$

$$A = 1/2(1) = 1/2$$

B = find

$$C = 0$$

$$f(x) = 1/2x^2 + Bx$$

(2, 3)

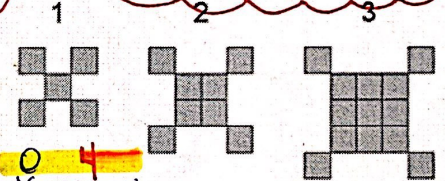
$$3 = 1/2(2)^2 + B(2)$$

$$3 = 2 + 2B$$

$$1 = 2B$$

$$B = 1/2$$

$$f(x) = x^2 + 4$$



x	y	1st	2nd
1	5	1	2
2	8	3	1
3	13	5	2
4	20	7	2

$$A = 1/2(2) = 1$$

B = find

$$C = 4$$

$$f(x) = x^2 + Bx + 4$$

(1, 5)

$$5 = (1)^2 + B(1) + 4$$

$$5 = 1 + B + 4$$

$$5 = 5 + B$$

$$B = 0$$