

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

1. Use the table below to answer the following questions.

x	0	1	2	3	4	5	6
y	0	$\frac{3}{2}$	4	$\frac{15}{2}$	12	$\frac{35}{2}$	24

Handwritten differences between y-values:
 $0 \rightarrow \frac{3}{2}$ (+ $\frac{3}{2}$)
 $\frac{3}{2} \rightarrow 4$ (+ $\frac{5}{2}$)
 $4 \rightarrow \frac{15}{2}$ (+ $\frac{7}{2}$)
 $\frac{15}{2} \rightarrow 12$ (+ $\frac{9}{2}$)
 $12 \rightarrow \frac{35}{2}$ (+ $\frac{11}{2}$)
 $\frac{35}{2} \rightarrow 24$ (+ $\frac{13}{2}$)

A. Plot the points (x, y) in this table on a graph (except when x is 5).

B. The y-values in the table follow a regular pattern that can be discovered by computing the differences of consecutive y-values. Find the pattern and use it to find the y-value when x is 5.

y-values have differences that increase by 1

$$12 + \frac{11}{2} = \frac{35}{2}$$

C. Plot the point you found in Part B. Draw a curve through the points in your graph. Does the graph go through the point you plotted?

yes, $(5, \frac{35}{2})$

D. How is this graph similar to the graphs you drew in this lesson? How is it different?

Same basic shape

Curve appears to increase more rapidly than graph in exploratory challenge

E. Write the equation that represents this data. Use your equation to find the y-value when x is 5.

$(2, 4)$ $(4, 12)$ $(0, 0)$

$$y = ax^2 + bx + c \quad c = 0$$

$$4 = a(2)^2 + b(2) \rightarrow 4 = 4a + 2b \quad \xrightarrow{-2} \quad -8 = -8a - 4b$$

$$12 = a(4)^2 + b(4) \rightarrow 12 = 16a + 4b$$

$$4 = 8a$$

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

BACK SUB

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

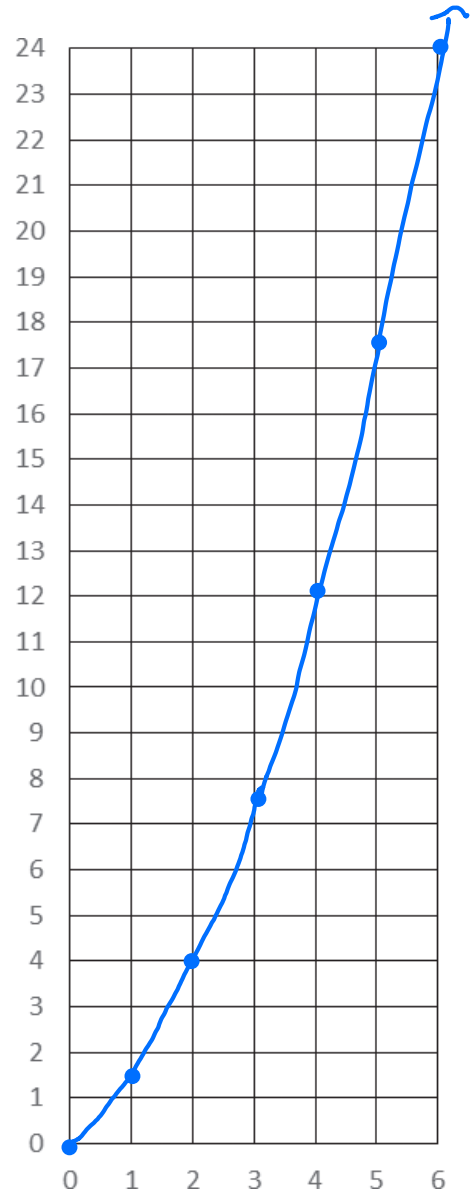
$$4 = 2 + 2b$$

$$2 = 2b$$

$$1 = b$$

$$y = \frac{1}{2}x^2 + x$$

$$\checkmark \frac{35}{2} = \frac{1}{2}(5)^2 + 5$$



negative leading coefficient

2. Find the equation of a parabola that opens down and has the x-intercepts $(-2, 0)$ and $(6, 0)$. Is there more than one possible equation?

$$y = -a(x+2)(x-6)$$

$$a > 0$$

3. Find the equation of a parabola that has a vertex of $(-3, -75)$ and contains the point $(2, 0)$. Is there more than one possible equation?

$$y = a(x+3)^2 - 75$$

$$0 = a(2+3)^2 - 75$$

$$0 = a(5)^2 - 75$$

$$0 = 25a - 75$$

$$75 = 25a$$

$$a = 3$$

$$y = 3(x+3)^2 - 75$$

$$y = 3(x+3)(x+3) - 75$$

$$y = 3(x^2 + 6x + 9) - 75$$

$$y = 3x^2 + 18x + 27 - 75$$

$$y = 3x^2 + 18x - 48$$

VERTEX TO
STANDARD
FORM

<p>EQUATIONS: VERTEX: $y = 3(x+3)^2 - 75$ STANDARD: $y = 3x^2 + 18x - 48$</p>

4. Find the equation of a parabola that has a vertex of $(3, -1)$ and a y-intercept of $(0, -8)$. Is there more than one possible equation?

$$y = a(x-3)^2 - 1$$

$$-8 = a(0-3)^2 - 1$$

$$-8 = a(-3)^2 - 1$$

$$-8 = 9a - 1$$

$$-7 = 9a$$

$$a = -\frac{7}{9}$$

$y = -\frac{7}{9}(x-3)^2 - 1$ $y = -\frac{7}{9}x^2 + \frac{14}{3}x - 8$
