<u>Date:</u>

<u>Chapter:</u> Chapter 5:1 --> Graphing Quadratic Functions

<u>Objectives:</u> Graph quadratic functions

Find and interpret the maximum and minimum

values.

Notes:

Eddie is organizing a charity tournament. He plans to charge a $20 entry fee for each of the 80 players. He recently decided to raise the entry fee by $5, and 5 few players entered with the increase. He used this information to determine how many fee increases will maximize the money raised.

A quadratic function can be used to represent this situation. What will happen? What will this graph look like?
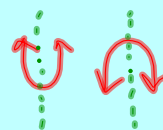
*__Quadratic Function__ = Greatest exponent is 2.

$$= f(x) = ax^2 \pm bx \pm c \text{ is standard form}$$

$$f(x) = x + 1$$

Three Parts to a Quadratic Function

1) Quadratic Term = ax^2

2) Linear Term = bx

3) Constant Term = c

*__Parabola__ = Graph of a quadratic function.

*__Axis of Symmetry__ = Line that goes through the parabola so that it divides it into 2 congruent parts; "fold line"

Axis of Symmetry Formula

-used to find the x of the vertex-

$x = \dfrac{-b}{2a}$

$$x^2 - 2x + 3$$

$$+(12)$$

Max   Min

*__Vertex__ = The point at which the axis of symmetry goes through; maximum or minimum point. (x, y)

*__Y-Intercept__ = C in standard form; where crosses y-axis.

*__Maximum__ = Greatest possible value of a function.

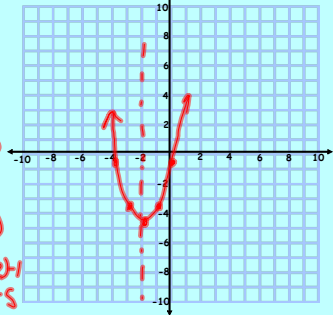*__Minimum__ = Lowest possible value of a function.

Examples:

Ex. 1 - Graph using a table of values.

a) $f(x) = x^2 + 4x - 1$

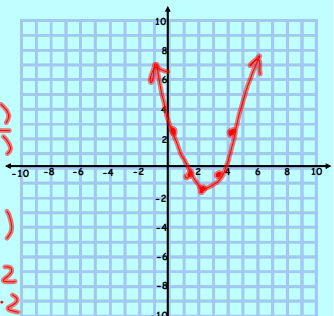| X	y
0	-1
-1	-4
-2	5
-3	-4
-4	-1

$x = \frac{-b}{2a}$

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

$x = -2$

$(-2, 5)$

$(-1)^2 + 4(-1) - 1$
$1 - 4 - 1 = -4$

$(-2)^2 + 4(-2) - 1$
$4 - 8 - 1 = -5$

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

X	y
4	2
3	-1
2	-2
1	-1
0	2

$x = \frac{-b}{2a}$

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

$x = 2$

$(2, -2)$

$1^2 - 4(1) + 2$ $2^2 - 4(2) + 2$
$1 - 4 + 2 = -1$ $4 - 8 + 2 = -2$

c) $f(x) = -5x^2 - 10x + 6$

X	y
1	-9
0	6
-1	11
-2	6
-3	-9

$x = \frac{-b}{2a}$

$x = \frac{-(-10)}{2(-5)}$

$x = \frac{10}{-10}$

$x = -1$

$(-1, 11)$

$-5(1)^2 - 10(1) + 6$
$-5 - 10 + b$
$-15 + b$

$-5(-1)^2 - 10(-1) + 6$
$-5(1) + 10 + b = 11$
$5 + 10 + b$
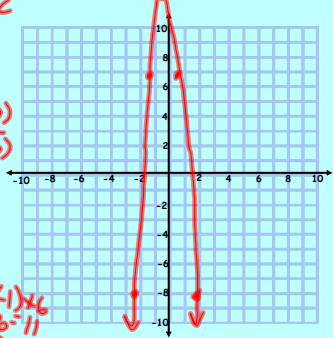
Ex. 2 - Determine the following a & b:

    1) If the function is a max. or min.

    2) State the max. or min.

    3) State the domain and range

a) $f(x) = -x^2 + 2x + 3$

max. $x = \frac{-b}{2a}$

$x = \frac{-2}{2(-1)} \rightarrow x = 1$

$R = \{y | y \le 4\}$

$D = \{x | x \text{ is } \mathbb{R}\}$

$(1, 4)$

$-(1)^2 + 2(1) + 3$
$-1 + 2 + 3$
4

min.

b) $f(x) = 4x^2 - 24x + 11$

$x = \frac{-(24)}{2(4)} = \frac{24}{8} = 3$

$(3, -25)$

$4(3)^2 - 24(3) + 11$
$4(9) - 72 + 11$
$36 - 72 + 11$

$D = \{x | x \text{ is } \mathbb{R}\}$

$R = \{y | y \ge -25\}$

Homework:

p. 254 (#12-30 Evens, 61, 66, 68, 69)