The Graphing Form of a Quadratic Function Part 3

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PRE-CALCULUS 11
QUADRATIC FUNCTIONS
THE GRAPHING FORM OF A QUADRATIC FUNCTION PART 3

A. Definitions

1. **general form:** any quadratic function that can be written in the form:
$y = ax^2 + bx + c$ or $f(x) = ax^2 + bx + c$.

2. **standard form:** any quadratic function that can be written in the form:
$y = a(x-p)^2 + q$ or $f(x) = a(x-p)^2 + q$

3. **x-intercept:** the place where the shape crosses the x-axis. These are also referred to as the roots or zeros of the function.

4. **y-intercept:** the place where the shape crosses the y-axis. In the general form of the quadratic function the c value represents the y-intercept.

5. **vertex:** the highest or lowest point of a quadratic function

6. **axis of symmetry:** the imaginary line, through the vertex, that divides the quadratic function into two perfect halves

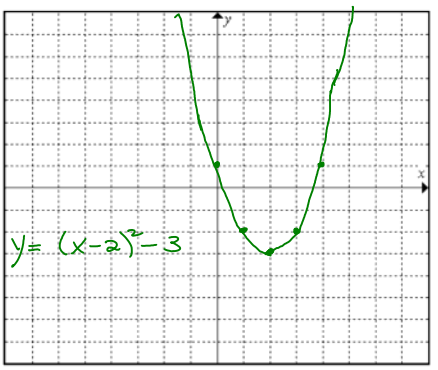
B. The Standard Form (Graphing Form) of a Quadratic Function

1) Graph the following quadratic functions. Then state the domain and range.

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

$a = 1$
$p = 2$
$q = -3$
vertex $(2, -3)$
Over 1, Up 1
Over 2, Up 4.

Domain: $x \in R$.
Range: $y \geq -3$



b) $y = \frac{1}{2}(x+3)^2 - 5$

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

$p = -3$

$q = -5$

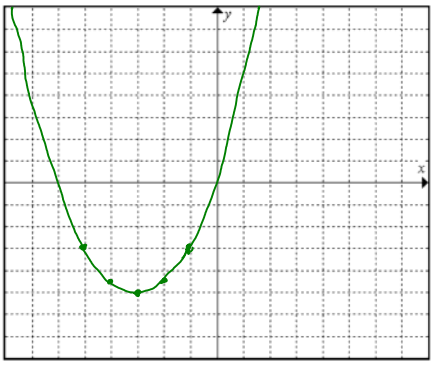
Vertex $(-3, -5)$

Over 1, Up $1\left(\frac{1}{2}\right) = \frac{1}{2}$

Over 2, Up $4\left(\frac{1}{2}\right) = 2$

Domain: $x \in R$.

Range: $y \geq -5$



c) $y = -2(x-1)^2 + 6$

$a = -2$

$p = 1$

$q = 6$.

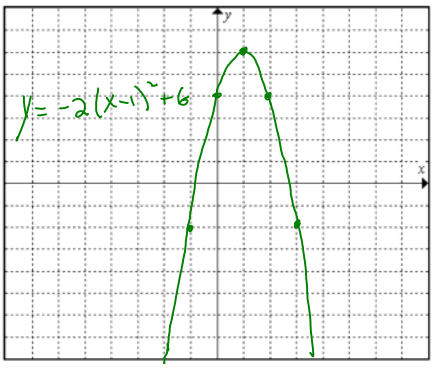
Vertex $(1, 6)$

Over 1, Up $1(-2) = -2$

Over 2, Up $4(-2) = -8$

Domain: $x \in R$.

Range: $y \leq 6$



4) Write the equation of a quadratic function with the given characteristics:

Vertex $(2, -3)$ (p, q) and passing through the point $S(4, 5)$ (x, y)

$y = a(x-p)^2 + q$

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

$(5) = a((4)-2)^2 - 3$

$5 = a(2)^2 - 3$

$5 = 4a - 3$

$+3 \quad +3$

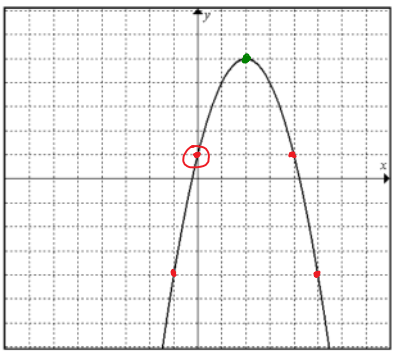
$\frac{8}{4} = \frac{4a}{4}$

$a = 2$.

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

5) Determine the equation of the quadratic function.

a)



vertex $(\overset{p}{2},\overset{q}{5})$

$y = a(x-p)^2 + q$

$y = a(x-2)^2 + 5$

$(1) = a((0)-2)^2 + 5$

$1 = a(-2)^2 + 5$

$1 = 4a + 5$

$-5 \quad -5$

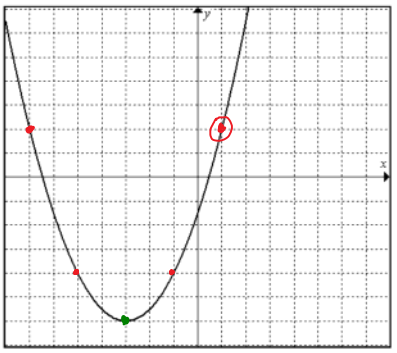
$\frac{-4}{4} = \frac{4a}{4}$

$a = -1$

Point $(\overset{x}{0},\overset{y}{1})$

$y = -(x-2)^2 + 5$

b)



vertex $(\overset{p}{-3},\overset{q}{-6})$

$y = a(x-p)^2 + q$

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

$(2) = a((1)+3)^2 - 6$

$2 = a(4)^2 - 6$

$2 = 16a - 6$

$+6 \quad +6$

$\frac{8}{16} = \frac{16a}{16}$

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

Point $(\overset{x}{1},\overset{y}{2})$

$y = \frac{1}{2}(x+3)^2 - 6$

Assignment: Pg. 286 #7 - 9