Unit 3 Quadratics EOC Quick Review

GCF:

- The greatest number that can be divided into each term
- The largest group of variables that can be taken out of each term.

Example 1: $-15n - 10$

$-5(3n + 2)$

Example 2: $90x^2y + 20x^3 + 30x^2$

$10x^2(9y + 2x + 3)$

Factoring and Solving when a = 1

- Equation must be in standard form $ax^2 + bx + c$
- Equation must be set equal to zero
- Find what multiplies to be your c term, but will add to be your b term

Example 1: $x^2 - 8x + 12 = 0$

+ * → 1 12, 2 6, 4 3

FACTORS $(x-2)(x-6) = 0$

Solutions $x - 2 = 0$, $x = 2$ | $x - 6 = 0$, $x = 6$ * zero product property

Example 2: $b^2 + 13b + 47 = 5$

$-5 \quad -5$

$b^2 + 13b + 42 = 0$

$(b+6)(b+7) = 0$

$b = -6 \quad b = -7$

Factoring and Solving when a >1

- Equation must be in standard form $ax^2 + bx + c$
- Equation must be set equal to zero
- First look for a GCF
- No GCF present, use the "X" method
- Factor by grouping
- Simplify and Solve

Example 1: $3k^2 - 10k - 8 = 0$

a · c: -24 *, -12, 2, + -10, b

$(3k^2 - 12k) + (2k - 8) = 0$

$3k(k - 4) + 2(k - 4) = 0$

FACTORS: $(3k+2)(k-4) = 0$

Zeros: $k = -\frac{2}{3} \quad k = 4$

Example 2: $7b^2 + 15b - 5 = -7$

a · c: 14 *, 14, 1, + 15, b

$7b^2 + 15b + 2 = 0$

$(7b^2 + 14b) + (b + 2) = 0$

$7b(b + 2) + 1(b + 2) = 0$

$(7b+1)(b+2) = 0$

$b = -\frac{1}{7} \quad b = -2$

Special cases: Difference of Squares

- Present when you have only 2 terms
- Look for perfect squares
- Must have a + and a – minus

Example 1: $9x^2 - 1$

$(3x - 1)(3x + 1)$

Example 2: $25x^2 - 4y^2$

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

Solving by Square Roots:

- Must isolate the square term first – do so by solving using SADMEP
- Square root both sides
- Must have a + and a – answer

Example 1: $6x^2 - 2 = 22$

$6x^2 = 24$

$\sqrt{x^2} = \sqrt{4}$

$\boxed{x = \pm 2}$

Example 2: $0 = (x-3)^2 - 2$

$+2 \qquad +2$

$\sqrt{2} = \sqrt{(x-3)^2}$

$\pm\sqrt{2} = x - 3$

$\boxed{x = 3 \pm \sqrt{2}}$

Solve by Completing the Square:

- Used to convert from standard from to vertex form
- Two methods to Complete the Square
- Once completed solve by using square roots

* Find Min|Max
* Find vertex $\Big\}\ x = -\frac{b}{2a}$

Example 1: $m^2 - 6m - 84 = 10$

$m^2 - 6m = 94$ ① Move constant

② half Middle

$(m-3)^2 = 94 + 9$ ③ Square and add it

9 $(m-3)^2 = 103$ ④ CTS

$(m-3)^2 - 103 = 0$ V: (3, -103)

Min: y = -103

Example 2: $m^2 - 6m - 84 = 10$

$m^2 - 6m - 94 = 0$

$x = \frac{6}{2(1)} = 3$ y = -103

$a(x-h)^2 + k$

$(x-3)^2 - 103$

Quadratic Formula:

- Can be used to solve any quadratic equation in standard form
- Equation must be set equal to zero
- Find the discriminant first: Positive = 2R, Negative = NRS, Zero = 1R

Example 1: $n^2 + 10n - 24 = 0$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$b^2 - 4ac$

$(10)^2 - 4(1)(-24)$

196

2R

$\frac{-10 \pm \sqrt{196}}{2(1)}$

$\frac{-10+14}{2}$ 2 $\frac{-10-14}{2}$ -12

Example 2: $b^2 + 12b + 14 = 4$

$b^2 + 12b + 10 = 0$

$b^2 - 4ac$

$(12)^2 - 4(1)(10)$

104

2R

$x = \frac{-12 \pm \sqrt{104}}{2}$ < 4, 26

$x = \frac{-12 + 2\sqrt{26}}{2} = -6 \pm \sqrt{26}$

Word Problems:

- Key Words → Ground, water, surface: you are finding the x intercepts so use the Quadratic Formula
- Key Words → highest/lowest point, time at max/min: you are finding the x value or substituting to find the max/min y value so use x = -b/2a

Transformations:

$a(x-h)^2 + k$

Reflection −
Stretch > 1
Shrink < 1 frac

Left +
Right −

up
down

Graphing Characteristics:

Domain: $(-\infty, \infty)$ Vertex: (3, 2)

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

Range: $(-\infty, 2)$

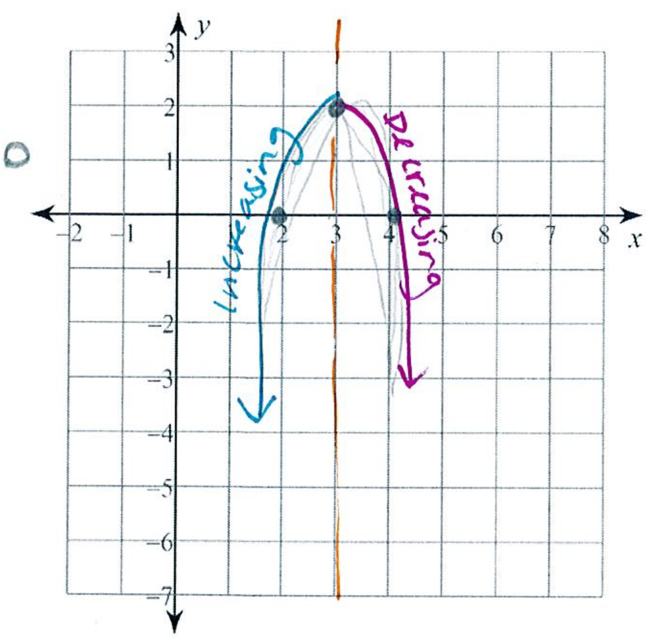
x intercepts: (2, 0) (4, 0)

y intercepts: (0, -16) ← when x = 0

Max or Min: y = 2

Increasing: $(-\infty, 3)$

Decreasing: $(3, \infty)$



End Behavior: $x \to \infty$ $y \to -\infty$
increases decreases
$x \to -\infty$ $y \to -\infty$
decreases decrease

Rate of Change: $\frac{y_2 - y_1}{x_2 - x_1}$

Transformations: Reflection, stretch 2, Right 2, up 2