

# Units 11, 12, & 13 Exam Review

## Quadratic Functions & Applications

$$y = ax^2 + bx + c$$

- Standard form of a Polynomial**

- Exponents arranged in descending order (highest to lowest)

- Naming Polynomials**

- First Name based on degree
- Last Name based on number of terms

Degree	First Name
0	Constant
1	Linear
2	Quadratic
3	Cubic
4	Quartic
5	Quintic

Number of Terms	Last Name
1	Monomial
2	Binomial
3	Trinomial
4	Polynomial
5	Polynomial

- Simplifying Polynomials**

- Combine terms with the same exponent
- The exponent does NOT change when adding/subtracting terms; only the coefficients change!

- Multiplying Polynomials**

- FOIL
  - First, Outside, Inside, Last
- Squaring a Binomial
  - Multiply binomial times itself

$$(2x - 3)(x + 5) = 2x^2 + 10x - 3x - 15 = 2x^2 + 7x - 15$$

$$(8y^3 - y + 7) - (6y^3 + 3y - 3) = 8y^3 - y + 7 - 6y^3 - 3y + 3 = 2y^3 - 4y + 10$$

- Factoring Polynomials**

- Greatest Common Factors
  - Largest degree/number that can be factored out of ALL terms
- Given 4 terms – Grouping
  - Step 1: Factor out GCF of all 4 terms
  - Step 2: Group the first two terms together and the last two terms
  - Step 3: Factor out the GCF of each group

- Step 4: Your GCF's are one factor and what's in the ( ) are the other → Make sure the parenthesis match!

- Given 3 terms – Grouping and M|A Chart T-chart

- Factor out any GCF of all 3 terms
- Calculate "ac" and construct M|A chart
- Look for factors of "ac" that add up to "b"
- Rewrite "bx" term to make 4 terms using those values
- Group the

a · c      b

$$3x^2 + 10x + 3 \quad \begin{array}{c|c} 9 & 10 \\ \hline 9 \cdot 1 & \end{array} \quad 4x^2 - 81 = (2x+9)(2x-9)$$

$$(3x^2 + 9x) + (x + 3) = 3x(x+3) + 1(x+3) = (x+3)(3x+1)$$

- Given a subtracted binomial – use Difference of Squares

- Determine what is being squared
- Write the factors as conjugates (  x+  )(  x-  ) from what you determined was being squared in Step 1.

- Quadratics with a Calculator**

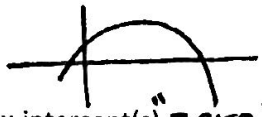
- Vertex: 2<sup>nd</sup> CALC → 3: minimum or 4: maximum
- X-intercepts: 2<sup>nd</sup> CALC → 2: zeros
- Y-intercepts or for a given x-value: 2<sup>nd</sup> CALC → 1: value

- Solving Quadratics**

- Solutions, Zeros, X-intercepts – all asking for same thing!
- Find the x-intercepts by graphing
- Factor the polynomial and set each factor equal to zero to solve

- Projectile Motion**

- What is the min/max? Find vertex
- When does it hit the ground? Find x-intercept(s) "zero"
- When is it at a certain height? Set equal to equation and subtract to get equal to zero, then find x-intercept(s)
- What height is it at certain time? Go to table, find x-value for that time



- Area/ Consecutive Integer Problems**

- Set length and width factors equal to area
- Solve by graphing or factoring (must be equal to zero first!)

### Graphs of Quadratic Functions

**Form:**  
 $y = ax^2 + bx + c$

- Where b or c can be zero.
- Always have the U-shape of a parabola.

**Axis of Symmetry**  $X = \#$

- Is the LINE that divides the graph into two matching parts.
- ALWAYS an EQUATION of a vertical line

**y-intercept**  $(0, \#)$

- The POINT where the parabola crosses the y-axis.
- Will always be just one value
- X-value is always zero:  $(0, \_)$

**x-intercept**  $(\#, 0)$

- The POINT(S) where the graph crosses the x-axis.
- There can be 0 x-intercepts, 1 x-intercepts, or 2 x-intercepts!
- Y-value is always zero

**Vertex**  $(x, y)$

- The highest (maximum) or lowest (minimum) POINT on the graph.
- Always a coordinate pair
- The vertex lies on the axis of symmetry.
- The x-value of your vertex is the SAME VALUE as the axis of