Chapter 2 (and some of 3) Semester Final Test Guide

Quadratics all over the place!

- There are a lot of problems on the final related to quadratics.
- When graphing the key attributes of the parabola are:
    1. Axis of symmetry: the vertical line the splits the parabola in half
    2. Vertex: the point at which the parabola turns direction, i.e. its min or max
    3. *x*-intercepts: where the parabola crosses the *x*-axis
    4. *y*-intercept: where the parabola crosses the *y*-axis
    5. Remember the vertex and axis of symmetry lie exactly halfway between the *x*-intercepts
    6. The sign of the leading term tells you if the parabola opens up or down
- Focus on the main forms a quadratic can be written in and what each form gives you:

Quadratic Form	Function notation	Description
Vertex form (2.2a)	$f(x) = a(x-h)^2 + k$	• Instantly gives you the vertex: (h, k) • Instantly gives you the axis of symmetry: $x = h$ • The sign of a tells you if it opens up or down
Quadratic form (2.2a)	$f(x) = ax^2 + bx + c$	• Instantly gives you the y-intercept: c • Instantly gives you the axis of symmetry: $x = \frac{-b}{2a}$ • The sign of a tells you if it opens up or down • Vertex is at $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right)$
Intercept form (2.2c)	$f(x) = a(x-p)(x-q)$	• This is the quadratic in factored form! • Instantly gives you the *x*-intercepts: $(p, 0)\ and\ (q, 0)$ • Instantly gives you the axis of symmetry: $x = \frac{p+q}{2}$ • The sign of a tells you if it opens up or down • Remember the vertex and axis of symmetry lie exactly halfway between the *x-intercepts*!

- Understand the connection between parabola min/max values and the vertex. Know how to find the vertex: it is at the core of many problems.
- You will have a few word problems related to quadratics. Remember these type of word problems are typically related to dropping an object or throwing/shooting an object (L2.2c, L3.1a, L3.1b are a few that include examples). How long does it take the dropped object to hit the ground (the ground will be the x-axis so solve the function for zero)? How far will the thrown object go (find the x-intercepts) or how high will it go (find the vertex)?