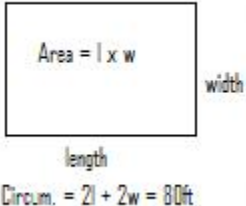# M^2=Math Mediator   Lesson 28: Factor Quadratics

Total Recall (Warm-up) (5 minutes approx.)	Total Recall: Exercise from yesterday's lesson on Graphing Quadratics. 1. What form is the quadratic $y = -0.25(x – 4)^2 + 6$ called? A. Vertex Form 2. Change $y = -2(x – 3)(x – 5)$ to standard form. A. $y = -2x^2 + 16x -30$
Group Activity: (15 minutes approx.)	Divide the class into small groups to perform this activity: Sally has 80 feet of fence to make a rectangular enclosure for her dogs. What are the dimensions that give the dogs the most area to run around in? How do you solve this for Sally? 1. You could try some various values and trial and error the solution. Draw a diagram to describe the situation and then create a table like below. Fill in the missing information on the table to see if you can see a trend: a. b.From the table it appears that 20 x 20 is best solution c.There is another method to solve this. First take the circumference equation and solve for length = 40 – w and then substitute that into the area equation: Area = (40 – w)w. This looks very much like a x-intercept quadratic that we have worked with. What are the roots? Answer: 0 and 40. At these points the area is zero. d.Graph the quadratic: $y = (40 – x)x$. Is there a maximum or minimum? Answer: There is a maximum at (20, 400). This is the solution to the maximum area dog enclosure for Sally. 20 x 20 feet.
Definitions and Terms (10 minutes approx.)	The function: $f(x) = y = -x^2 + 40x$ is a quadratic $-x^2 + 40x$ are two items added together, that is the term $-x^2$ and $40x$ are called monomials. Examples of monomials are: xy, x^2, 3, $4x$, and x^3z^2. $x + 5, z – 7$ these are binomials, or the sum of two monomials $x^2 + 4x + 4$ this is a trinomial, sum of three monomials • A quadratic function sets a particular trinomial expression equal to another variable: $y = ax^2 + bx + c$ (which is standard form). • Since a quadratic is a trinomial with a squared variable term; some people interchange the terms. Quadratic refers to the degree (or exponential number on the variable); where trinomial refers to expressions of three monomials added together. They are not always the same!

- It is often useful to find zeros (y = 0) of quadratics: y = 0 = (x + 2)(x-1); because between the zeros is the maximum or minimum, axis of symmetry and the vertex, due to the symmetry of these functions.

- Just as we used FOIL to distribute and multiply two binomials (i.e. (x + 3)(x – 1)) into a trinomial, quadratic x^2 + 2x – 3; it is very useful to be able to do the opposite, or FACTOR quadratics and easily find the zeroes:

- Not obvious what the zeroes are in quadratic form: y = 0 = x^2 + 2x – 1; but when factored the zeroes become obvious: y = 0 = (x + 2)(x – 1), because if either or both of the binomials are zero, then y is zero. If x + 2 is zero, then x = -2, and if x – 1 is zero, then x = 1.

Direct Instruction and Practice (10 minutes approx.)	Methods of Factoring Quadratics: Ex: x^2 – 5x - 36 **Method #1**: Make a table of the possible factors and then add them to get middle term: Factors: 36, -1 6, -6 13, -3 -9, 4 9, -4 Sums: 35 0 10 -5 5 -9 and 4 add up to -5, which is the middle term. x^2 – 5x – 36 = (x – 9)(x + 4) U-DO: x^2 + 2x – 35 find the factors: Answer: (x + 7)(x – 5) **Method #2**: Draw a rectangular diagram, or a couple of them, and fill in the blanks with known values and work at unknowns:
Practice and assessment: (10 minutes approx.)	Try both methods from above and see which one you prefer: demonstrate that you know how to use both: 1. x^2 + 3x – 10 Answer: x^2 + 3x – 10 = (x + 5)(x – 2) 2. x^2 – 9x + 20 Answer: x^2 – 9x + 20 = (x – 5)(x – 4)
Wrap-up (5 minutes approx.)	Wrap up closing comments and housekeeping.