L2 –Solving Quadratics by Completing the Square Unit 5

MPM2D

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Part 1: Investigation

Example 1: For the quadratic $y = x^2 + 6x + 8$

a) Determine the x-intercepts by factoring

b) Determine the vertex using the x-intercepts

c) Convert to vertex form by completing the square

d) Solve for the x-intercepts by rearranging the vertex form equation to isolate for x.

A quadratic equation in standard form, $0 = ax^2 + bx + c$, can be solved for x by first converting into vertex form, $0 = a(x - h)^2 + k$, by completing the square, then rearranging to isolate for x.

Part 2: Rational Solutions

Example 2: Solve each of the following equations by completing the square.

a) $0 = x^2 - 12x + 20$

b) $10 = 2x^2 - x$

Notice for each of the equations in this question there were ________________ solutions. That means that each of the equations could have been solved by ________________.

Part 3: Irrational Solutions

Example 3: Solve each of the following quadratic equations by completing the square.

a) $-3x^2 + 6x + 7 = 0$

b) $x^2 - 6x - 8 = 0$

Notice for each of the equations in this question there were only ________________ solutions. That means that each of the equations could **NOT** have been solved by ________________. This is why solving by completing the square is a useful strategy.

Part 4: Non-Real Solutions

Example 4: Solve the following quadratic equation

$$x^2 - 6x + 10 = 0$$

Notice that not all quadratics have _________________.

Part 5: Application

Example 5: For the quadratic $y = 2x^2 - 5x + 3$, determine the vertex, x-intercepts, and then sketch a graph of the function.