BIG PICTURE of this UNIT:	• How do we WORK WITH & EXTEND the concept of "functions" • Why are quadratic equations written in different forms? • How do we EXTEND and APPLY our knowledge of quadratic functions, beyond the basics of IM2?

This lesson will be based upon a STUDENT DIRECTED DISCUSSION model ….. in your groups, you should be having DISCUSSIONS about how to think and work through and then present the solutions to the following questions. So, discuss & prepare solutions to the following questions. Record the key ideas of your discussions/solutions in your notebook. Then, once you have had your discussions, present your solutions on the board. Solutions do NOT necessarily NEED to be correct – they simply form the basis for DISCUSSIONS !!!! If your group has (i) multiple solutions that lead to the same answers OR (ii) same/different solutions that lead to different answers, present them ANYWAY!!

Higher Level Questions for More Complex Concepts OR an EXTENSION of basic concepts involved with Quadratic Functions.

1. If $f(x) = x^2 + kx + 3$, determine the value(s) of k for which the minimum value of the function is an integer. Explain your reasoning
2. Determine the relationship between b and c such that $x^2 + bx + c$ is a perfect square trinomial
3. If $y = -4x^2 + kx – 1$, determine the value(s) of k for which the maximum value of the function is an integer. Explain your reasoning
4. Find the minimum point of $y = x^2 – bx + 4$ using the c/s method
5. Find the maximum point of $y = c + 5x – x^2$ using the c/s method
6. Given $f(x) = ax^2 + bx + c$, use the C/S method to rewrite the equation in vertex form, $f(x) = a(x – h)^2 + k$, and thereby determine h and k in terms of a,b & c
7. Use the C/S method to rewrite $f(x) = ax^2 + bx + c$ in factored form, $f(x) = a(x – R_1)(x – R_2)$, and thereby determine R_1 and R_2 in terms of a, b, & c.
8. The nonzero roots of the equation $3x^2 – 4x + k = 0$ are in the ratio 3:1. Determine the roots and the value of k.

9. The point (0, 0) is on the parabola $y = 5x - x^2$. What other point on the parabola has x and y coordinates that are equal?

10. Find the minimum value of b in the QF $y = x^2 - bx + 4$ such that the quadratic has at least one real root.

11. Find the maximum value of c in the QF $y = c + 5x - x^2$ such that the quadratic has 2 real roots

12. Determine the value of *W* such that $f(x) = Wx^2 + 2x - 5$ has one real root. Verify your solution (i) graphically and (ii) using an alternative algebraic method.

13. Determine the value of *b* such that $f(x) = 2x^2 + bx - 8$ has no solutions. Explain the significance of your results.

14. Determine the value of c such that $f(x) = f(x) = x^2 + 4x + c$ has 2 distinct real roots.

15. Determine the value of c such that $f(x) = f(x) = x^2 + 4x + c$ has 2 distinct real rational roots.