Name: _____   **Chapter 3 Test**

Communication

[4]   1.   (a)   Fill in the differences below:

x	y	1st Differences	2nd Differences
-2	9		
−1	0		
0	3		
1	0		
2	9		

(b)   Is the function linear, quadratic or neither? _____

[2]   2.   Describe the characteristics that the family of parabolas $f(x) = a(x - 2)(x + 3)$ have in common.

[3]   3.   Determine the <u>number and the types</u> of zeros the function $f(x) = -3x^2 - 9x - 8$ has.

Knowledge

4.   Simplify each of the following:

[3,3]   (a) $3\sqrt{6}(\sqrt{8} - 3\sqrt{3}) - \sqrt{27}$ (b) $\sqrt{45} - 4\sqrt{12} - \sqrt{125} + 2\sqrt{48}$

[3]   5.   (a)   Express $f(x) = -3x^2 - 12x + 36$ in <u>vertex form</u> using any method you'd like.

[1]   (b)   What is the vertex of $f(x)$? _____

[1]   (c)   Is the vertex a maximum or a minimum? _____

[3]   6.   (a)   Find the equation of the inverse of $f(x) = \frac{1}{4}(x-4)^2 - 6$.

[2]   (b)   Determine the value of $f^{-1}(-5)$.

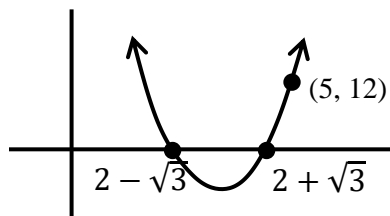[1]   (c) Is the inverse a function?

[2]   (d) State the domain and range of the inverse relation.

Thinking

[3]   7.   Solve $2x^2 - 1 = -4x$ for x. Express your answers in <u>exact</u> terms, no approximate decimals:

[4]   8.   Find the values of k so that $x^2 + kx + k + 3 = 0$ will have one root.

[5]   9.   Determine the equation of the quadratic in standard form with roots $2 - \sqrt{3}$ and $2 + \sqrt{3}$ that passes through (5, 12).

Application

[5]   10. In a right-angle triangle, the hypotenuse is 1cm longer than double the shortest side. The third side is 2cm shorter than the hypotenuse. What is the length of every side?

[5]   11.   Theodore is a digital artist. In his next piece he wants to make a face with a smile in the shape of a parabola. He wants the bottom of the smile to be located at a point (4,2) on the grid he has drawn. What is an equation of for all the possible parabolas that fit this criteria?

If Theodore knows that he wants to have the edge of the smile be located at (1,5), what is the exact equation he will need to use?

12. Analysis of a Linear/Quadratic System, given the line $y = -x + 3$ and the quadratic function $f(x) = x^2 - 2x - 3$. Show your **algebraic** solutions in the chart below and graph on the final page.

Finding the parabola's vertex: **3 [K]**	Finding x- and y- intercepts of the line: **2 [K]**
Find the parabola's x-intercepts: **3 [K]**	Finding point(s) of intersection (if any) of the Quadratic and linear functions: **5 [A]**

Analysis of Parabola   **7 [K]**

Direction of Opening   _____

y-intercept   _____

MAX MIN value of y is   _____

And occurs when x is   _____

Domain: _____

Range: _____

Equation of the axis
 of symmetry   _____

Draw a large sketch of the parabola and the line on the graph below. Label the vertex of the parabola, ALL intercepts and any point(s) of intersection.   **5 [A] 3[C]**