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Math 1.1 Unit 1.1: Quadratics and Functions

Centre for Learning and Performance Technologies
University of Queensland

Quadratic and cubic functions generally can be solved, factored and graphed by simple manipulation of their equations. This is known as **shifting or translating** a graph. You should note the accuracy of this method (see Algebra 1). The first section will focus here on a method known as **completing the square** to identify the vertex and other points of a parabola.

Exercise 10: The function $y = x^2 + 6x + 10$ is shown already graphed on the grid below. Consider the questions below regarding $y = x^2 + 6x + 10$.

(a) Using the method of completing the square, write the equation in vertex form $y = (x - h)^2 + k$.

(b) Based on the graph of $y = x^2 + 6x + 10$, sketch its related to produce the graph of $y = x^2 - 6x + 10$.

(c) Sketch the graph of $y = x^2 - 6x + 10$ by using its vertex form. What are the coordinates of its vertex point (mark)?

Exercise 11: Using your calculator and the window shown below, sketch the graphs of the simple quadratic $y = x^2 + 2x + 1$, and $y = x^2 - 2x + 1$.

Every quadratic takes form $y = ax^2 + bx + c$ has vertex point at:

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State _____ Date _____

Completing the Square and the Standard Form of a Quadratic Equation

Parabolas and graphs more generally, can be moved horizontally and vertically by simple translations of their equations. This is known as **shifting** or **translating** a graph. You should read this thoroughly in Chapter 10 on Algebra 1. The first exercise will require you to use a method known as **completing the square** to obtain different opening quadratics of a parabola.

Exercise 48: The function $y = x^2 - 4x + 4$ is shown already graphed on the grid below. Consider the quadratic whose equation is $y = x^2 - 8x + 16$.

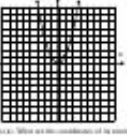
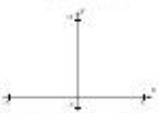
(a) Using the method of **completing the square**, write the equation in vertex form $y = (x - h)^2 + k$.

(b) Sketch the graph of $y = x^2 - 8x + 16$ on the grid below. It should be obtained by **shifting** the graph of $y = x^2 - 4x + 4$.

(c) Sketch the graph of $y = x^2 - 4x + 4$ on a grid by using its vertex form $a(x - h)^2 + k$. What are the coordinates of its vertex point (h, k) ?

Exercise 49: Using your calculator and the window shown below, sketch the graphs of the simple quadratics $y = x^2$, $y = x^2 + 4$, and $y = x^2 - 4$.

Every equation in the form $y = a(x - h)^2 + k$ has its vertex point at _____

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