Worksheet 1

The parabola

1. Rewrite each equation in standard form $y = ax^2 + bx + c$ and identify the values of a, b and c.

1.1 $y = 2(x - 1)^2 + 3$ **1.2** $f(x) = -(x - 1)^2 + 12$

1.3 $y = a(x - p)^2 + q$

2. Rewrite each of the following in turning point form $y = a(x - p)^2 + q$. Identify the value of a, p and q.

2.1 $y = 2x^2 + 2x + 1$ **2.2** $g(x) = 3x^2 + 3x$

2.3 $f(x) = ax^2 + bx + c$

3. Make a sketch of each equation. Clearly indicate the turning point and show the axis of symmetry.

3.1 $y = (x - 2)^2 + 3$ **3.2** $y = -7(x + 2)^2 - 7$

3.3 $y = x^2 + 6x + 5$

4. Determine the range and domain of each function in question 3.

4.1 $y = (x - 2)^2 + 3$ **4.2** $y = -7(x + 2)^2 - 7$

4.3 $y = x^2 + 6x + 5$

5. Draw a rough sketch graph of a parabola using the following information.

5.1 $a > 0$, $r_1 < 0$ and $r_2 > 0$

5.2 $a > 0$, the graph reaches a minimum at (2; 1)

5.3 $a < 0$, $r_1 = r_2 = 4$

6. Determine whether each equation has one root, two roots or no roots.

6.1 $y = 3x^2 + 2x$ **6.2** $f(x) = (x + 1)^2 + 2$

6.3 $g(x) = 3(x - 2)(x + 2)$ **6.4** $h(x) = ax^2 + bx + c$ where $4ac = -1$

The hyperbola

1. Sketch the graph of each function on a separate axis. Clearly indicate the asymptotes and intersection points with the axes, if any.

1.1 $y = \frac{2}{x}$ **1.2** $y = \frac{1}{x} - 1$

1.3 $y = \frac{-3}{x - 3} + 2$

2. Use your sketches in question 1 to determine the range and domain for the following.

2.1 $y = \frac{2}{x}$ **2.2** $y = \frac{1}{x} - 1$

2.3 $y = \frac{-3}{x - 3} + 2$

3. If A is the point of intersection of the asymptotes, determine the value of the hyperbolic function $y = \frac{a}{x - p} + q$.

3.1 A = (3; 1) and $a = 1$ **3.2** A = (0; 0) and $a = -1$

3.3 A = (−1; −1) and $a = 3$ **3.4** A = (0; 3) and $a = 2$

3.5 A = (−1; 0) and $a = -2$

4. Determine the lines of symmetry of each function.

4.1 $y = \frac{1}{x}$ **4.2** $y = \frac{1}{x} - 2$

4.3 $y = -\frac{1}{x} + 3$ **4.4** $y = \frac{3}{x + 2} + 4$

4.5 $y = \frac{4}{x - 3} - 2$

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