Name: _____

Teacher: _____

Class: _____

FORT STREET HIGH SCHOOL

2010

PRELIMINARY SCHOOL CERTIFICATE COURSE

ASSESSMENT TASK 2 – PART B

Mathematics Extension I

TIME ALLOWED: 45 MINUTES

Outcomes Assessed	Questions	Marks
Deduces the equation of a locus and describes it geometrically.	1	
Chooses and applies appropriate algebraic techniques to solve problems involving quadratic functions.	2	

Question	1	2	Total	%
Marks	/18	/18	/36	

Directions to candidates:

- Attempt all questions
- The marks allocated for each question are indicated
- All necessary working should be shown in every question. Marks may be deducted for careless or badly arranged work.
- Board – approved calculators may be used
- Each new question is to be started in a new booklet
- Write in blue or black pen only

Question 1: Locus and the Parabola (18 marks)

1. The point $P(x, y)$ moves so that it is equidistant from the lines $y = 2x - 1$ and $y = 4 - x$. Find the equation of the locus of P. [4]

2. For the parabola $x^2 = 2y$, find

   a. the vertex [1]

   b. the focal length a [1]

   c. the focus S [1]

   d. the equation of the directrix [1]

3. The point $P(x, y)$ moves so that it is twice as far from $K(2, 3)$ as it is from $L(-1, -4)$. Find the equation of the locus of P and describe it geometrically. [4]

4. For the equation $6x = y^2 + 18$:

   a. Express this equation in the form $(y - k)^2 = 4a(x - h)$ [2]

   b. Hence sketch the graph of this equation, clearly showing the vertex, focus and directrix. [4]

Question 2: The Quadratic Function (18 marks)

1. Find the maximum and minimum values of $2x^2 - 5x + 3$ on the domain $-2 \le x \le 2$ [3]

2. Solve $x^4 + \frac{16}{x^4} = 17$ [3]

3. Find the values of m for which $y = mx - 4$ is a tangent to $y = x^2 - x$ [3]

4. Find the value of m in the equation $3x^2 - 5x + m = 0$ such that one root is double the other. [3]

5. The roots of the quadratic equation $2x^2 - 11x + 5 = 0$ are α and β. Find the value of:

   a. Write down the values of $\alpha + \beta$ and $\alpha\beta$. [1]

   b. Find the value of $\alpha^2 + \beta^2$ [2]

6. The roots of the quadratic equation $3x^2 + 2x + 7 = 0$ are α and β. Find the equation whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$. [3]