Student Number: _____

Class Teacher (*circle*): DL GP RBL

YEAR 11 MATHEMATICS

Preliminary Assessment Task 1

March 2008

Arithmetic, Algebra, Functions and Relations

Syllabus Topics to be covered in this task: 1.1, 1.2, 1.3, 1.4
4.1, 4.2, 4.3 (not locus), 4.4

Syllabus Outcomes to be addressed in this task: P2, P3, P4, P5

- Time allowed: 50 minutes
- There are three questions, each worth 14 marks
- The mark value of each part is indicated in [**…**] next to that part
- **Start each question on a new page**

Question 1: Start a new page [14 marks]

(a) Write $\dfrac{5.3^2 - 2.4^3}{2 \times 5.3 \times 2.4}$ correct to three significant figures. **[1]**

(b) Solve $12a - \dfrac{7a-2}{4} = -5$ **[2]**

(c) Write $0.\dot{2}0\dot{4}$ as a simplified fraction. **[2]**

(d) Factorise completely:

(i) $x^2 - y^2 + 4x + 4y$ **[2]**

(ii) $2a^3 + 54$ **[2]**

(iii) $9x^2 - 30x + 25$ **[2]**

(e) Simplify $3\sqrt{45} - \sqrt{80} + \sqrt{125}$ **[2]**

(f) Express $\dfrac{1}{4\sqrt{7}}$ with a rational denominator in its simplest form. **[1]**

Question 2: Start a new page [14 marks]

(a) If $2\sqrt{63}-\sqrt{28}=\sqrt{a}$, find the value of a. **[2]**

(b) (i) Draw a sketch of the graph of $y=\sqrt{x}$ **[1]**

(ii) Find the range of the function above. **[1]**

(c) (i) Solve simultaneously: **[2]**

$$x+y=15$$
$$2x^2+2y^2=250$$

(ii) What is the geometric significance of your answer from part (i)? **[1]**

(d) State the domain for each of the following functions **[2]**

(i) $y=\sqrt{16-x}$

(ii) $y=\dfrac{1}{x-1}$

(e) Solve $3x^2-19x-14=0$ **[2]**

(f) By first completing the square, find the centre and radius of the circle $x^2+y^2-2x-4y=20$ **[3]**

Question 3: Start a new page [14 marks]

(a) Given that $f(x) = x^2 - 2x + 4$, find $f(-4) + f(2)$. **[2]**

(b) For the parabola $y = (x+2)(x-6)$

(i) Find the x intercept(s) **[1]**

(ii) Find the y intercept(s) **[1]**

(iii) Find the axis of symmetry **[1]**

(iv) Find the co-ordinates of the vertex **[1]**

(v) Sketch the parabola, showing the above features. **[2]**

(c) A function is defined by the following **[3]**

$$f(x) = \begin{cases} x^2 & \text{for } x < -3 \\ 3 & \text{for } -3 \le x \le 3 \end{cases}$$

Neatly sketch $y = f(x)$ showing all features.

(d) Simplify $\dfrac{x^3 - 27}{x^2 - 25} \times \dfrac{x^2 + 5x}{x^2 + 8x + 16} \div \dfrac{x^2 + 3x + 9}{x^2 - x - 20}$ **[3]**

End of Assessment Task