



MLC SCHOOL BURWOOD

YEAR 12

2 UNIT / EXTENSION I MATHEMATICS

ASSESSMENT TASK 1

FRIDAY 1st DECEMBER 2000

TIME ALLOWED : 40 MINUTES

TOTAL : 34 MARKS

**Question 1 (START A NEW BOOKLET) ( 8 Marks )**

a) In an arithmetic sequence the fourth term is 13 and the fourteenth term is 93

- (i) Find the first term and the common difference
- (ii) Calculate the sum of the first 80 terms of the sequence

b) Given the series

$$4 + 12 + 36 + 108 + \dots$$

which term in the series is the first one with a value greater than 8000 ?

i.e Find the smallest value of  $n$  such that

$$T_n > 8000$$

**Question 2 (START A NEW BOOKLET) ( 6 Marks )**

- a) Given A is (3,2) and B is (0,7) show that the locus of point P(x,y) that moves so that the distance PA to the distance PB is in the ratio 2 : 3 is given by the equation

$$5x^2 - 54x + 5y^2 + 20y - 79 = 0$$

- b) Find the radius and the centre of the circle with equation

$$x^2 - 10x + y^2 + 8y - 8 = 0$$

**Question 3 (START A NEW BOOKLET) ( 7 Marks )**

Consider the curve given by

$$y = x^3 + 3x^2 - 5$$

- a) Find the stationary points and determine their nature
- b) Find any points of inflection
- c) Sketch the curve for the domain  $-3 \leq x \leq 1$
- d) Determine the set of values of  $x$  for which the curve is decreasing

**Question 4 (START A NEW BOOKLET) ( 9 Marks )**

- a) Find all the real numbers  $x$  which satisfy the equation

$$4x^4 = 4x^2 + 3$$

- b) Consider the straight line  $y = mx - 2$  and the parabola  $y = x^2 + 2$

- (i) For what value(s) of  $m$  will the line  $y = mx - 2$  have only one point of intersection with the parabola  $y = x^2 + 2$
- (ii) Using your value(s) of  $m$ , draw a neat sketch (one third of a page) to show the case(s) where  $y = mx - 2$  and  $y = x^2 + 2$  have only one point of intersection.
- (iii) For what value(s) of  $m$  will there be no point of intersection between the line and the parabola ?