SYDNEY BOYS HIGH SCHOOL
MOORE PARK, SURRY HILLS

November 2010
Assessment Task 1
Year 11

Mathematics

General Instructions

- Reading Time – 5 Minutes
- Working time – 90 Minutes

- Write using black or blue pen. Pencil may be used for diagrams.
- Board approved calculators maybe used.
- All necessary working should be shown in every question if full marks are to be awarded.
- All answers to be given in simplified exact form unless otherwise stated.
- Marks may not be awarded for messy or badly arranged work

Total Marks – 80

- Attempt questions 1-5
- Start each new question in a separate answer booklet.
- Hand in your answers in 5 separate bundles:

    Question 1,

    Question 2,

    Question 3,

    Question 4 and

    Question 5

Examiner: *A Ward*

This is an assessment task only and does not necessarily reflect the content or format of the Higher School Certificate

Start a new booklet.

Question 2 (16 Marks).   **Marks**

a) A factory produces components of which 0.6% are defective. The   2
    components are packed in boxes of 10. A box is selected at random. Find the
    probability that the box contains exactly 2 defective components.

b) Differentiate the following with respect to x: 6

   (i) $x^5 - 4x^4 + 2x^2 - 7$

   (ii) $(3x + 2)^7$

   (iii) $x(2x^3 - 13)$

   (iv) $\dfrac{8x^2 + 6}{x - 1}; x \neq 1$

c) Find the equation of the tangent to the curve $y = x^2 + 2x$, that is parallel to   3
    the line $y = 4x + 1$.

d) A parabola has vertex (-2,-3) and directrix $y = -1$. Find the: 5

   (i) focal length

   (ii) focus

   (iii) axis of symmetry

   (iv) equation of the parabola

End of Question 2

Start a new booklet.

Question 4 (16 marks).

<div align="right">Marks</div>

a) Solve: $9 \times 3^{x-1} = \dfrac{1}{27}$

<div align="right">2</div>

b) Find the exact solution to the equations:

(i) $\ln(3x - 7) = 5$

(ii) $3^x e^{7x+2} = 15$

<div align="right">4</div>

c) The functions f and g are defined by:

$$f(x) = e^{2x} + 3$$

$$g(x) = \ln(x - 1)$$

Find $f[g(x)]$ and state its range.

<div align="right">3</div>

d) Bag A contains 2 black and 5 white balls. Bag B contains 4 black and 6 white balls. One bag is selected at random and 2 balls taken from it, without replacement. What is the probability that one ball is black and one ball is white?

<div align="right">3</div>

e)   (i) Show that the locus of the point P, which moves so that its distance from A(1,2) is always three times its distance from B(5,6), is a circle.

         (ii) State its centre and radius.

<div align="right">4</div>

End of Question 4