NEWINGTON COLLEGE

2014
Assessment 1

Year 11 Mathematics (2unit)

General Instructions:
- Date of task – Wednesday 9th April (Wk 11A)
- Reading time – 5 mins
- Working time – 120 mins
- Weighting - 35%
- Board-approved calculators may be used.
- Attempt all questions.
- Show all relevant mathematical reasoning and/or calculations.

Total marks – 85

Section I (10 marks)
- Answer questions 1 to 10 on the multiple choice answer sheet provided at the end of this paper.
- Allow about 15 minutes for this section.

Section II (75 marks)
- Answer questions 11 to 17 in the writing booklets provided.
- **Start each question on a new booklet.**
- Each booklet must show the candidate's computer number.

Outcomes to be assessed:

P1 & P3   Performs routine arithmetic and algebraic manipulation involving surds, simple rational expressions, trigonometric identities.

P5   Understands the concept of a function and the relationship between a function and its graph.

Section I

10 marks

Use the multiple-choice answer sheet for Questions 1 – 10

Remove the Multiple Choice Answer Sheet from the back of the paper.

QUESTION 1

Evaluate $\sqrt{\dfrac{3.8\times10^{11}}{2.03\times10^{7}}}$, in scientific notation to 2 significant figures is:

A.   136.82

B. 1.36×10^{2}

C. 1.4×10^{2}

D. 1.4×10^{7}

QUESTION 2

Evaluate $|a-b|$ if $a=-5$ and $b=7$

A.   2

B.   12

C. -2

D. -12

QUESTION 3

Expressed with a rational denominator, $\dfrac{3}{2\sqrt{6}}$ would be written:

A. $\dfrac{3\sqrt{6}}{2}$

B. $\dfrac{18}{12\sqrt{6}}$

C. $\dfrac{\sqrt{6}}{2}$

D. $\dfrac{\sqrt{6}}{4}$

QUESTION 4

Expand and simplify $(3x-4y)^{2}$

A. $9x^{2}-24xy+16y^{2}$

B. $9x^{2}+24xy+16y^{2}$

C. $9x^{2}-12xy+16y^{2}$

D. $9x^{2}+16y^{2}$

QUESTION 5

Evaluate $\left(1\frac{1}{2}\right)^{-3}$, giving your answer as a fraction.

A. $\dfrac{6}{9}$

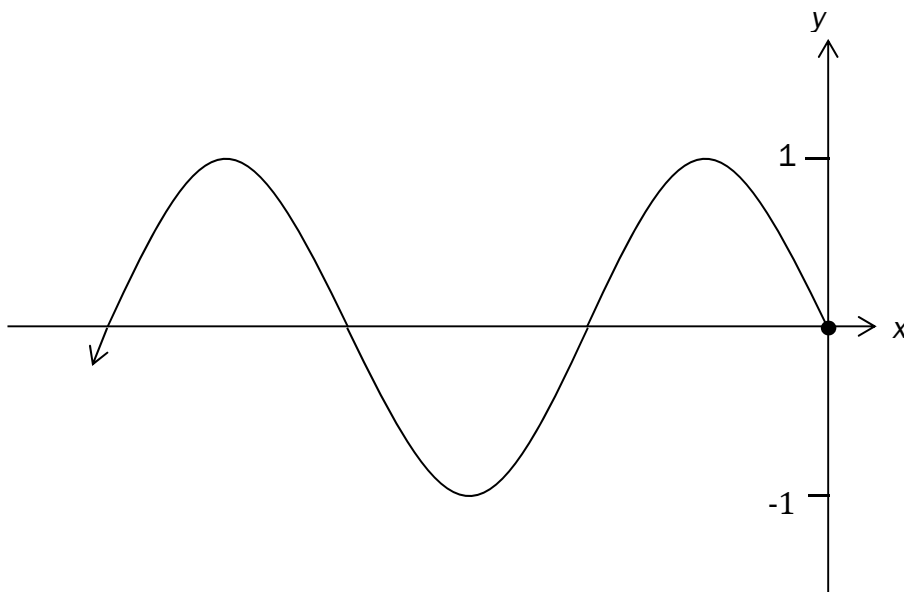B. $\dfrac{8}{27}$

C. $\dfrac{-8}{27}$

D. $\dfrac{27}{3}$

QUESTION 6

Factorise $t^3 + 8$

A. $(t+8)(t^2 + 8t + 64)$

B. $(t+8)(t^2 - 8t + 64)$

C. $(t+2)(t^2 - 4t + 4)$

D. $(t+2)(t^2 - 2t + 4)$

QUESTION 7

Find the domain (D) and the range (R) of the function below.

A. $D: y \le 0, R: -1 \le x \le 1$
B. $D: x \le 0, R: -1 \le y \le 1$
C. $D: y \ge 0, R: -1 \le x \le 1$
D. $D: x \ge 0, R: -1 \le y \le 1$

QUESTION 8

Evaluate $ab^{\frac{1}{2}}c^{-2}$ if $a=\dfrac{2}{3}$, $b=9$ and $c=0.5$

A.   8

B. $\dfrac{1}{2}$

C.   12

D. $\dfrac{1}{4}$

QUESTION 9

A television costs \$1850. Due to inflation it increased in cost by 4% this year. What was its value last year?

A.   \$1924.00

B.   \$1778.85

C.   \$1867.80

D.   \$1776.00

QUESTION 10

Write $\dfrac{1}{5\sqrt[3]{(t+8)^7}}$ in index form

A. $5(t+8)^{\frac{-7}{3}}$

B. $3(t+8)^{\frac{7}{5}}$

C. $\dfrac{1}{5}(t+8)^{\frac{-7}{3}}$

D. $\dfrac{1}{3}(t+8)^{\frac{-7}{5}}$

End of Section I

Section II
75 marks

Start each question in a separate booklet for Questions 11 – 17

QUESTION 11   (9 Marks)   **(Start a new booklet)**   **Marks**

(a)   Use algebraic techniques to express $0.7\overset{..}{1}$ as a fraction in   **2**
       simplest terms.

(b)   Simplify

    (i) $\sqrt{45}$ **1**

    (ii) $2\sqrt{48} - 3\sqrt{27}$ **2**

(c)   Expand and simplify $\left(3\sqrt{6} - 4\right)\left(2\sqrt{3} + \sqrt{2}\right)$ **2**

(d)   Express $\dfrac{\sqrt{5} - \sqrt{2}}{\sqrt{5} + \sqrt{2}}$ with a rational denominator.   **2**

QUESTION 12   (10 Marks)   **(Start a new booklet)**   **Marks**

Factorise fully

    (i) $x^2 - 6x - 55$ **1**

    (ii) $5m^2 - 20$ **2**

    (iii) $t^3 + 2t^2 - 4t - 8$ **2**

    (iv) $8x^2 - 14x + 3$ **2**

    (v) $a^6 - 1$ **3**

QUESTION 13   (11 Marks)   **(Start a new booklet)**   **Marks**

(a)   Simplify

     (i) $\dfrac{x^2 - 2x + 1}{x^2 - x}$ **2**

     (ii) $\dfrac{\left(-2p^3 q^2\right)^2}{4\left(mn\right)^2} \times \dfrac{mn}{p^6 q^4}$ **2**

     (iii) $\dfrac{3ab - 6a}{a^2 - 4} \div \dfrac{2b - 4}{\left(a + 2\right)^2}$ **2**

(b)   Express as a single fraction in simplest terms

     (i) $\dfrac{2x}{3} - \dfrac{x - 1}{2}$ **2**

     (ii) $\dfrac{7}{9 - x^2} + \dfrac{2}{6 + 2x}$ **3**

QUESTION 14   (16 Marks)   **(Start a new booklet)**   **Marks**

Solve for *x:*

     (a) $|x + 3| = 5 - 3x$ **3**

     (b) $9 - 2x \le 5$ **2**

     (c) $\dfrac{6}{x} \le \dfrac{3}{4}$ **2**

     (d) $|3x - 9| \le 15$ **3**

     (e) $\dfrac{x + 1}{2} - \dfrac{x - 2}{3} + \dfrac{2x}{4} = 2$ **3**

   (f) $9^{2x} = 27^{x+3}$ **3**

QUESTION 15   (10 Marks)   **(Start a new booklet)**   **Marks**

(a)   Solve for x giving exact solutions:

   (i) $x^2 - 7x + 10 = 0$ **2**

   (ii) $3x^3 + 9x^2 = 0$ **2**

(b)   Solve for x, $2x^2 - 2x - 5 = 0$ giving your answer in simplified   **2**
surd form.

(c)   Use completing the square method to solve, $x^2 - 4x = 10$, giving   **2**
your solutions to 2 decimal places.

(d)   Solve for m, $m^2 - 3m - 18 \leq 0$ **2**

QUESTION 16   (9 Marks)   **(Start a new booklet)**   **Marks**

(a)   Redraw this function into your answer booklet. Add to the   **1**
diagram the necessary part of the function so it becomes an
odd function.
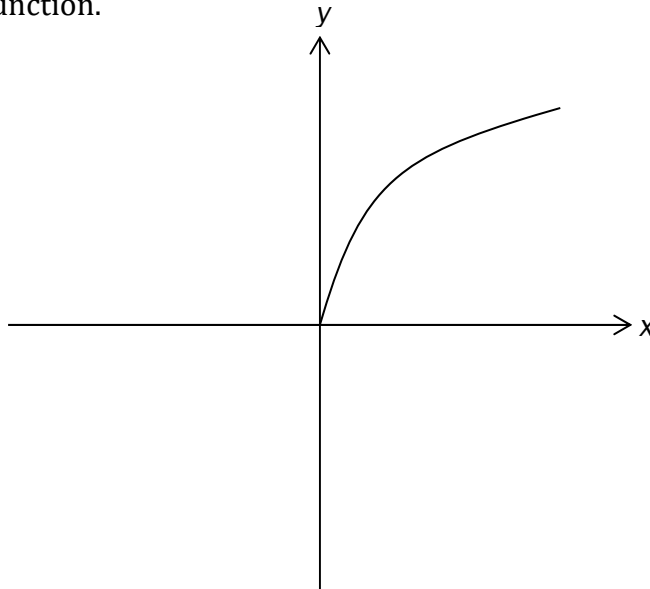
Question 16 continues on the next page

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(b)   A function is defined by $f(x) = x^2 - 5x - 14$.

     Find   (i)   the x-intercepts   **2**

               (ii)   the y-intercept   **1**

               (iii)   the equation of the axis of symmetry   **1**

               (iv)   the co-ordinates of the vertex   **1**

               (v)   Sketch the function showing all these details.   **2**

               (vi)   State the range of this function.   **1**

QUESTION 17   (10 Marks)   **(Start a new booklet)**   **Marks**

(a)   A function is defined by :
$$f(x) = \begin{cases} x^2, & for \ \ x \le 2 \\ 2x+1, & for \ \ x > 2 \end{cases}$$

     Evaluate $f(-1) + 2f(2) - f(3)$ **2**

(b)   A function is defined as $f(x) = x^3 - 2x$

          (i)   Show this function is either even, odd or neither.   **2**

          (ii)   What is the geometrical significance of this?   **1**

(c)   Solve simultaneously:

          (i) $4a + 3b = 11$ **2**

                   $3a + b = 2$

          (ii) $y = 3x$ **3**

                   $xy = 12$

END OF EXAM

10 Marks
Attempt Question 1 – 10.
Allow approximately 15 minutes for this section.

Use the multiple choice answer sheet below to record your answers to Question 1 – 10.
Select the alternative: A, B, C or D that best answers the question.
Colour in the response oval completely.

Sample:

2 + 4 = ?   (A)   2   (B)   6   (C)   8   (D)   9

A   ⬭   B   ⬤   C   ⬭   D   ⬭

If you think you have made a mistake, draw a cross through the incorrect answer and colour in the new answer

ie   A   ⬤   B   ✖   C   ⬭   D   ⬭

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word "*correct*" and draw an arrow as follows:

correct

A   ⬤   B   ✖   C   ⬭   D   ⬭

....
....

Year 11 Extension 1 Mathematics

Multiple Choice Answer Sheet

Student number:

Completely colour in the response oval representing the most correct answer.

1	A	⬭	B	⬭	C	⬭	D	⬭
2	A	⬭	B	⬭	C	⬭	D	⬭
3	A	⬭	B	⬭	C	⬭	D	⬭
4	A	⬭	B	⬭	C	⬭	D	⬭
5	A	⬭	B	⬭	C	⬭	D	⬭
6	A	⬭	B	⬭	C	⬭	D	⬭
7	A	⬭	B	⬭	C	⬭	D	⬭
8	A	⬭	B	⬭	C	⬭	D	⬭
9	A	⬭	B	⬭	C	⬭	D	⬭
10	A	⬭	B	⬭	C	⬭	D	⬭

Mark: /10