100 Years
NORTH SYDNEY BOYS HIGH SCHOOL
1912 - 2012

MATHEMATICS

Preliminary Course Assessment Task 1

March 8, 2013

General instructions

- Working time – 50 minutes.
- Write using blue or black pen. Where diagrams are to be sketched, these may be done in pencil.
- Board approved calculators may be used.
- Attempt **all** questions.
- At the conclusion of the examination, bundle the writing paper used in the correct order within this paper and hand to examination supervisors.
- Commence each new question on a new page. Write on both sides of the paper.
- All necessary working should be shown in every question. Marks may be deducted for illegible or incomplete working.

NAME: ..... **# SHEETS USED**: .....

Class (please ✓)

◯ 11M2A – Mr Lin

Marker's use only.

QUESTION(S)	1	2	3	4	5	6	**Total**	%
MARKS	/7	/20	/15	/7	/8	/13	/70	

Question 1 (Commence a new page)

a) (i) Evaluate $\sqrt[3]{23.6}$ correct to one decimal place. **1**

(ii) Express 3×10^{-5} as a fraction. **1**

b) Express 346.705529 correct to

(i) 3 decimal places. **1**

(ii) 3 significant figures. **1**

c) Voyager Spaceship has travelled 75 960 000km. **1**
Express this distance in scientific notation.

d) Express the following as common fractions in their simplest from.
Show all necessary working.

(i) $0.\dot{6}$ **1**

(ii) $0.58\dot{3}$ **1**

Question 2 (Commence a new page)

a) Expand and simplify

(i) $4(2t-1)+t(3t+2)-t(3t^2-2)$ **2**

(ii) $(7r+2)(7r-2)$ **1**

(iii) $(3x+4)^2-(2x-5)^2$ **2**

b) Factorise completely

(i) $4a + 4b - ax - bx$ **2**

(ii) $72 - 2x^2$ **2**

(iii) $5k^3 + 40$ **1**

(iv) $2x^2 + 11x + 12$ **2**

c) Simplify

(i) $\frac{a}{a-b} + \frac{b}{b-a}$ **2**

(ii) $\frac{x^3 - 1}{x^2 - 1} \div \frac{3x^2 + 3x + 3}{x^2 - 4x - 5}$ **3**

d) Simplify $\frac{1}{x^2 - 4} + \frac{1}{x+2} - \frac{5}{3x-6}$ **3**

Question 3 (Commence a new page)

a) Simplify:

(i) $\sqrt{18}-\sqrt{50}-\sqrt{72}$ **2**

(ii) $\left(\sqrt{3}-2\right)\left(4\sqrt{3}-6\right)$ **2**

(iii) $9\sqrt{6}\times 7\sqrt{6}$ **1**

(v) $\left(\sqrt{5}-3\sqrt{2}\right)^2$ **2**

b) Express as a surd with a rational denominator.

(i) $\dfrac{\sqrt{5}-2}{3\sqrt{5}}$ **2**

(ii) $\dfrac{2\sqrt{5}-\sqrt{2}}{3\sqrt{5}+2\sqrt{2}}$ **3**

c) Given $x=\sqrt{5}+2$, find b if $x+\dfrac{1}{x}=2\sqrt{b}$ **3**

Question 4 (Commence a new page)

a) Solve:

(i) $\frac{x+6}{5}=3$ **1**

(ii) $\frac{x+5}{2}-\frac{x-1}{3}=1$ **2**

(iii) $2(3x+7)=6-(x-1)$ **2**

b) The Fahrenheit temperature Suzie need to cook at is 383° F. **2**
However she has an oven with Celsius range only.

Using the formula $F=\frac{9C}{5}+32$ (where F = degrees Fahrenheit and C = degrees Celsius), Suzie can convert to Celsius degrees.

What temperature in Celsius will she cook at?

Question 5 (Commence a new page)

a) Solve the following for x

(i) $|x-3|=5$ **2**

(ii) $|2x+6|=3x-1$ **3**

b) Solve the following equations simultaneously: **3**

$2x + 3y + 1 = 0$ and $x + 2y = 4$

Question 6 (Commence a new page)

a) Solve

(i) $x^2 - 5x - 6 = 0$ **1**

(ii) $3x^2 - 14x + 8 = 0$ **2**

(iii) $3x^2 - 4x - 1 = 0$ (leave answers in exact surd form) **2**

b) Eight more than twice a number is five less than the number itself.

(i) Write an algebraic expression for this statement. **1**

(ii) What is the number that satisfies this statement? **1**

c) Solve $3 \le 2(6 + x)$ and graph its solution on a number line. **3**

d) Solve $x^2 - x - 30 < 0$ **2**

e) Solve $|4x + 10| > 13$ **2**

End of examination

Question 1

(a) (i) 2.9 — **1**

(ii) $\frac{3}{100000}$ — **1**

(b) (i) 346.706 — **1**

(ii) 347 — **1**

(c) 7.596×10^7 — **1**

(d) (i) $\frac{6}{9}$ — **1**

(ii) $\frac{7}{12}$ — **1**

Question 2

(a) (i) $8t - 4 + 3t^2 + 2t - 3t^3 + 2t$ — **1 (correct expansion)**

$= -3t^3 + 3t^2 + 12t - 4$ — **1 (correct answer)**

(ii) $49r^2 - 4$ — **1**

(iii) $9x^2 + 24x + 16 - 4x^2 + 20x - 25$ — **1 (correct expansion)**

$= 5x^2 + 44x - 9$ — **1 (correct answer)**

(b) (i) $4(a + b) - x(a + b)$ — **1 (attempt at using 'grouping in pairs' method)**

$= (a + b)(4 - x)$ — **1**

(ii) $2(36 - x^2)$ — **1**

$2(6 + x)(6 - x)$ — **1**

(iii) $5(k + 2)(k^2 - 2k + 4)$ — **1**

(iv) $(2x + 3)(x + 4)$ — **1**

(c) (i) $\frac{a-b}{a-b}$ — **1**

$= 1$ — **1**

(ii) $\frac{(x-1)(x^2+x+1)}{(x+1)(x-1)} \times \frac{(x-5)(x+1)}{3(x^2+x+1)}$ — **2 (-1 for each mistake)**

$= \frac{x-5}{3}$ — **1 (correct answer)**

(d) $\frac{3+3(x-2)-5(x+1)}{3(x+2)(x-2)}$ — **1**

$\frac{3+3x-6-5x-5}{3(x+2)(x-2)}$ — **1**

$\frac{-2x-8}{3(x+2)(x-2)}$ — **1**

Question 3

(a) (i) $3\sqrt{2} - 5\sqrt{2} - 6\sqrt{2}$ **1**

$= -8\sqrt{2}$ **1**

(ii) $12 - 6\sqrt{3} - 8\sqrt{3} + 12$ **1**

$= 24 - 14\sqrt{3}$ **1**

(iii) 378 **1**

(iv) $5 - 6\sqrt{10} + 18$ **1**

$= 23 - 6\sqrt{10}$ **1**

(b) (i) $\frac{5-2\sqrt{5}}{15}$ **2**

(-1 if not simplified)

(ii) $\frac{30-4\sqrt{10}-3\sqrt{10}+4}{45-8}$ **2 (-1 for each mistake)**

$= \frac{34-7\sqrt{10}}{37}$ **1**

(c) $\frac{5+4\sqrt{5}+4+1}{\sqrt{5}+2}$ **1**

$= \frac{10+4\sqrt{5}}{\sqrt{5}+2} \times \frac{\sqrt{5}-2}{\sqrt{5}-2}$ **1**

$= 2\sqrt{5}$

$\therefore b = 5$ **1**

Question 4

(a) (i) $x = 9$ **1**

(ii) $3x + 15 - 2x + 2 = 6$ **1**

$x = -11$ **1**

(iii) $6x + 14 = 6 - x + 1$ **1**

$x = -1$ **1**

(b) $195°C$ **3**

Question 5

(a) (i) $x - 3 = 5$ $\quad -(x - 3) = 5$

$x = 8$ $\quad -x + 3 = 5$

$x = -2$ **2**

(ii) $2x + 6 = 3x - 1$ $\quad -2x - 6 = 3x - 1$

$x = 7$ $\quad 5x = -5$

$x = -1$ **3**

(b) $y = 9, x = -14$ **3**

Question 6

(a) (i) $(x + 1)(x - 6)$ **1**

(ii) $(3x - 2)(x - 4)$ **2**

(iii) $x = \frac{4 \pm \sqrt{28}}{6}$

$x = \frac{2 \pm \sqrt{7}}{3}$ **2**

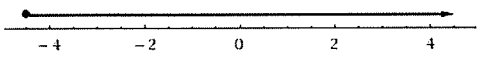
(b) (i) $2x + 8 = x - 5$ **1**

(ii) $x = -13$ **1**

(c) $3 \leq 12 + 2x$ **1**

$-2x \leq 9$ **1**

$x \geq -\frac{9}{2}$ **1**



(d) $(x - 6)(x + 5) < 0$

$-5 < x < 6$ **2**

(e) $4x + 10 > 13$ $\quad -(4x + 10) > 13$

$x > 0.75$ $\quad x < -5.75$ **2**