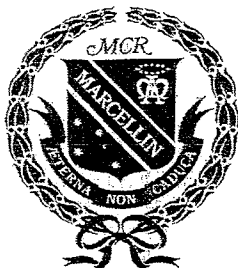


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Year 11  
Mathematics  
Preliminary Course  
Assessment Task #1  
2007

Weighting : 10% of Preliminary Mark

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STUDENT'S NAME : \_\_\_\_\_

MARK : \_\_\_\_\_ /40

**OUTCOMES:**

- P1 – Demonstrates confidence in using Mathematics to obtain realistic solutions to problems.
- P2 – Provides reasoning to support conclusions which are appropriate to the context.
- P3 – Performs routine arithmetic and algebraic manipulation involving surds, simple rational expressions.
- P4 – Chooses and applies appropriate arithmetic and algebraic, techniques.

**Time Allowed :** 40 minutes

**Directions :** Answer all questions  
Show all necessary working  
Marks may be deducted for poorly arranged or careless work  
Begin each new question on a new page.

**Structure :** 2 questions each worth 20 marks

### Question One: (20 marks)

- a) Calculate the following to 3 significant figures:

$$\sqrt{\frac{6 \cdot 35^2}{26.7 - 14.3}} \quad 1$$

- b) Simplify:  $\sqrt{75} + \sqrt{32} - \sqrt{27}$  2

- c) Express in simplest form with a rational denominator:

$$\frac{3}{\sqrt{2} + 1} - \frac{2}{\sqrt{5} - 2} \quad 3$$

- d) Expand where necessary and simplify:

$$(2a + 1)(4a - 1) - 3a^2 - 2a + 1 \quad 2$$

- e) Factorise:

i)  $100 - 4p^2$  1

ii)  $a^3 + 1$  1

ii)  $3p^2 + 10p - 25$  2

- f) Simplify the following fractions;

i)  $\frac{(a-b)^2}{10} \times \frac{5}{(a^2 - b^2)}$  3

ii)  $\frac{6}{x+3} - \frac{3}{x^2 + 5x + 6}$  3

- g) Express in simplest form without the use of negative indices:

$$(8x^6)^{\frac{1}{3}} x^{-3} \quad 2$$

**Question Two: (20 marks)**

a) Solve for the unknown(s):

i)  $30 - 8y = 70$  2

ii)  $\frac{9}{2x} = 4 - \frac{3}{x}$  2

iii)  $(2x - 1)^2 = 36$  2

iii)  $x^2 - 7x + 12 = 0$  2

b) Show that  $\frac{3 + \sqrt{29}}{10}$  is a solution of the equation  $5x^2 - 3x - 1 = 0$  3

c) Solve and graph on a number line:

$$5(x - 3) \geq 2(x + 7)$$
 3

d) Solve:

$$|4 - 2x| = x - 2$$
 3

e) The number of diagonals in a figure with  $n$  sides is given by

$$d = \frac{1}{2}n(n - 3).$$

How many sides has a figure with 20 diagonals.

3

SOLUTIONS Yr 11 Task 1 2007

QUESTION 1

a) 1.80

b)  $5\sqrt{3} + 4\sqrt{2} - 3\sqrt{3} = 2\sqrt{3} + 4\sqrt{2}$

c)  $\frac{3(\sqrt{2}-1)}{(\sqrt{2}+1)(\sqrt{2}-1)} - \frac{2(\sqrt{5}+2)}{(\sqrt{5}-2)(\sqrt{5}+2)}$

$= \frac{3\sqrt{2}-3}{2-1} - \frac{2\sqrt{5}+4}{5-4}$

$= 3\sqrt{2}-3 - (2\sqrt{5}+4)$

$= 3\sqrt{2} - 7 - 2\sqrt{5}$

d)  $8a^2 + 2a - 1 - 3a^2 - 2a + 1$   
 $= 5a^2$

e)  $4(25-p^2)$

$= 4(5+p)(5-p)$

f) (i)  $\frac{(a-b)(a-b)}{10} \times \frac{5}{(a-b)(a+b)}$

$= \frac{5(a-b)}{10(a+b)} = \frac{a-b}{2(a+b)}$

(ii)  $\frac{6}{x+3} - \frac{3}{(x+2)(x+3)}$

$= \frac{6(x+2)}{(x+3)(x+2)} - \frac{3}{(x+2)(x+3)}$

$= \frac{6x+9}{(x+3)(x+2)}$

g)  $8^{\frac{1}{3}} \times (x^6)^{\frac{1}{3}} \times x^{-3}$

$= 2x^2 \cdot x^{-3}$

$= \frac{2}{x}$

QUESTION 2

a) (i)  $30 - 70 = 8y$   
 $-40 = 8y$   
 $-5 = y$

(ii)  $\frac{9 \times 2x}{2x} = 4 \times 2x - \frac{3 \times 2x}{x}$

$\therefore 9 = 8x - 6$

$15 = 8x \rightarrow x = \frac{15}{8}$

(iii)  $2x - 1 = \pm 6$

$\therefore x = \frac{1 \pm 6}{2} \Rightarrow x = 3\frac{1}{2} \text{ or } -2\frac{1}{2}$

(iv)  $(x-3)(x-4) = 0 \Rightarrow x = 3 \text{ or } x = 4$

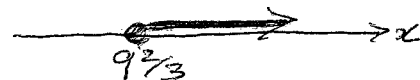
b)  $5x^2 - 3x - 1 = 0 \Rightarrow a = 5, b = -3, c = -1$

$\therefore$  Solutions are  $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(5)(-1)}}{2(5)}$

$= \frac{3 \pm \sqrt{29}}{10}$

c)  $5x - 15 \geq 2x + 14$

$3x \geq 29 \rightarrow x \geq 9\frac{2}{3}$



d)

$4 - 2x = x - 2 \text{ or } 2x - 4 = x - 2$

$6 = 3x$

$x = 2$

$2 = x$

e)  $20 = d$

$\therefore 20 = \frac{1}{2}n(n-3)$

$40 = n^2 - 3n$

$0 = n^2 - 3n - 40$

$0 = (n-8)(n+5)$

$\therefore n = 8 \text{ since } n \neq -5$