



Student Number: _____

St. Catherine's School
Waverley

2009
ASSESSMENT TASK 1
(15%)

Mathematics

Year 11

General Instructions

- Working time – 55 minutes
- Start each question on a new page in your answer booklet.
- If any additional booklet is used, please label it clearly and attach it to the appropriate booklet.
- Write using black or blue pen only.
- Board-approved calculators may be used.
- All necessary working must be shown.
- Marks may be deducted for careless or badly arranged work.

Q1	/14
Q2	/10
Q3	/19
Q4	/15
TOT	/58

QUESTION 1 START A NEW PAGE MARKS

a) Simplify the following:

(i) $2a \times 5b - 2b \times 3a$ 1

(ii) $(3a^2b)^3$ 1

b) Express in simplest terms:

(i) $\frac{2x}{5} - \frac{x+3}{6}$ 2

(ii) $\frac{15x^2y}{3xy^3} + \frac{12xy^3}{x^4y^2}$ 2

c) Factorise fully:

(i) $x^2 - 25$ 1

(ii) $t^3 - 8s^6$ 2

(iii) $y^2 + 5y - 24$ 2

d) Evaluate $2.3^{0.5} + 3^{-2}$ correct to two decimal places 1

e) The population of New Zealand is approximately 4,173,460.

(i) Write the number correct to two significant figures. 1

(ii) Write this number in scientific notation, correct to three significant figures. 1

QUESTION 2

START A NEW PAGE

MARKS

a) Express in simplest terms:

i) $2\sqrt{5} \times 3\sqrt{15}$ 2

ii) $2\sqrt{6} + \sqrt{54}$ 2

b) Express with a rational denominator:

$$\frac{5}{3 - \sqrt{3}}$$
 3

c) Use your calculator to evaluate $\sqrt[5]{29}$ to 2 decimal places 1d) If $(3\sqrt{2} + \sqrt{6})^2 = a + b\sqrt{3}$, find the values of a and b 2

QUESTION 3

START A NEW PAGE

MARKS

a) Expand and simplify:

(i) $2 + 9(k - 3) - 20$ 2

(ii) $(h - 3j)^2$ 2

b) Simplify the following:

$$\frac{x^2 + x - 20}{2x^2 - 8x}$$
 3

c) Express the recurring decimal $2.11\dot{2}$ as a fraction in its lowest terms 3d) Solve for x in the following equations:

(i) $5x - (x - 3) = x + 9$ 3

(ii) $\frac{x + 5}{3} = \frac{2x - 4}{5}$ 3

e) Solve for t , leaving your answers to 2 significant figures:

$$t(3t - 2) = 4(t + 7)$$
 3

QUESTION 4**START A NEW PAGE****MARKS**

a) Solve the following equations:

(i) $6n^2 + n - 15 = 0$ 2

(ii) $(y+1)^2 - 2(y+1) = 80$ 3

b) Solve the pair of simultaneous equations:

$2x - y = 8$

$x - 2y = 1$ 2

c) Solve simultaneously for p and m :

$p^2 + 5m = 66$

$p + m = 14$ 4

d) By simplifying the left side of the expression, show that

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

and hence solve

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

Qn	Solutions	Marks	Comments+Criteria
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Year 11 20 Assessment Task 1 March 2009

Question 1.

- a) i) $10ab - 6ab = 4ab$ 1
 ii) $(3a^2b)^3 = 27a^6b^3$ 1
- b) $\frac{2x}{5} - \frac{x+3}{6} = \frac{12x}{30} - \frac{5x+15}{30}$ 2
 $= \frac{7x-15}{30}$
- c) i) $\frac{15x^2y}{3xy^3} \times \frac{x^4y^2}{12xy^3} = \frac{5x^6y^3}{12x^2y^6} = \frac{5x^4}{12y^3}$
 ii) $x^2 - 25 = (x-5)(x+5)$ 1
 iii) $t^3 - 8s^6 = (t-2s^2)(t^2 + 2ts^2 + 4s^4)$ 2
 iv) $y^2 + 5y - 24 = (y+8)(y-3)$ 2
- d) 1.63 (2dp) 1
- e) i) 4 200 000 1
 ii) 4.17×10^6 1

1/14

Qn	Solutions	Marks	Comments+Criteria
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Question 2

- a) i) $2\sqrt{5} \times 3\sqrt{15} = 6\sqrt{75}$ 2
 $= 6 \times \sqrt{25} \times \sqrt{3}$
 $= 30\sqrt{3}$
- ii) $2\sqrt{6} + \sqrt{54} = 2\sqrt{6} + \sqrt{9 \times 6}$ 2
 $= 5\sqrt{6}$
- b) $\frac{5}{3-\sqrt{3}} \times \frac{3+\sqrt{3}}{3+\sqrt{3}} = \frac{15+5\sqrt{3}}{9-3}$ 3
 $= \frac{15+5\sqrt{3}}{6}$
- c) $\sqrt[5]{29} = 1.96$ (2dp) 1
- d) $(3\sqrt{2} + \sqrt{6})^2 = 9\sqrt{4} + 6\sqrt{12} + \sqrt{36}$ 2
 $= 18 + 6 \times \sqrt{4} \times \sqrt{3} + 6$
 $= 24 + 12\sqrt{3}$

$\therefore a = 24 \quad b = 12$

1/10

Qn	Solutions	Marks	Comments+Criteria
<u>Question 3</u>			
		2	
a)	$1) 2 + 9(k-3) - 20 = 2 + 9k - 27 - 20$ $= 9k - 45$		
	$ii) (h-3j)^2 = h^2 - 6hj + 9j^2$	2	
b)	$\frac{x^2+x-20}{2x^2-8x} = \frac{(x+5)(x-4)}{2x(x-4)}$ $= \frac{x+5}{2x}$	3	
c)	$10x = 21.12222 \dots$ $x = 2.11222 \dots$ $9x = 19.01$ $x = \frac{19.01}{9} = \frac{1901}{900}$ <p>(or $2 \frac{101}{900}$)</p>	3	
d)	$i) 5x - (x-3) = x+9$ $5x - x + 3 = x+9$ $4x + 3 = x+9$ $3x = 6$ $x = 2$	3	
	$ii) \frac{x+5}{3} = \frac{2x-4}{5}$ $\frac{5(x+5)}{15} = \frac{3(2x-4)}{15}$ $5x+25 = 6x-12$ $x = 37$	3	
e)	$3t^2 - 2t = 4t + 28$ $3t^2 - 6t - 28 = 0$ $t = \frac{6 \pm \sqrt{36 - 4 \times 3 \times -28}}{6} = \frac{6 \pm \sqrt{372}}{6}$ $= 4.2 \text{ or } -2.1 \text{ (2 sig fig)}$		

Qn	Solutions	Marks	Comments+Criteria
<u>Question 4</u>			
a)	$i) 6n^2 + n - 15 = 0$ $(3n+5)(2n-3) = 0$ $\therefore n = -\frac{5}{3}, n = \frac{3}{2}$	2	
	$ii) y^2 + 2y + 1 - 2y - 2 = 80$ $y^2 = 81$ $y = \pm 9$ <p>OR Let $m=y+1$ etc</p>	3	
b)	$2x - y = 8 \rightarrow 2x - y = 8$ $x - 2y = 1 \rightarrow 2x - 4y = 2$ $3y = 6$ $\therefore y = 2, x = 5$	2	
c)	$p^2 + 5m = 66 \quad m = 14 - p$ $p^2 + 5(14 - p) = 66$ $p^2 + 70 - 5p = 66$ $p^2 - 5p + 4 = 0$ $(p-1)(p-4) = 0 \quad \therefore p = 1, p = 4$ $\therefore m = 13 \quad m = 10$	4	
d)	$LHS = \frac{x+5}{x^2-3x+2} + \frac{4}{x-1} - \frac{1}{x-2}$ $= \frac{x+5}{(x-1)(x-2)} + \frac{4(x-2)}{(x-1)(x-2)} - \frac{x-1}{(x-1)(x-2)}$ $= \frac{4x-2}{(x-1)(x-2)} = \frac{2(2x-1)}{(x-1)(x-2)} = RHS$ $\frac{2(2x-1)}{(x-1)(x-2)} = 5$ $4x-2 = 5x^2 - 15x + 10$ $0 = 5x^2 - 19x + 12$ $0 = (5x-4)(x-3)$ $\therefore 5x = 4 \text{ or } x = 3$ $x = \frac{4}{5}$	4	