Year 11 Mathematics
Assessment Task 1
Term 1 Week 5, 2013

Name: _____

Teacher: _____

Friday 1st March, 2013

- Answer all questions on the lined paper provided.
- Start each question on a new page.
- Board approved calculators (except graphics calculators) are permitted in this task.
- Marks may be deducted for insufficient or illegible work.
- Total possible mark: **40**
- Time allowed**: 45 minutes**

Question 1 /10	Question 2 /10	Question 3 /10	Question 4 /10	Total /40

Question 1 (10 marks) **Marks**

(a) Simplify

(i) $\frac{1}{4}mn \times 8n \times (-5p)$ **1**

(ii) $16a^2b \div 28ab^2$ **1**

(iii) $\frac{1}{x+2} + \frac{1}{x-3}$ **2**

(b) Subtract $4x^2 + 7x - 9$ from $5x^2 + 3x - 4$ **2**

(c) Factorise:

(i) $64x^2y^2 - 121$. **1**

(ii) $27x^3 - 125$ **1**

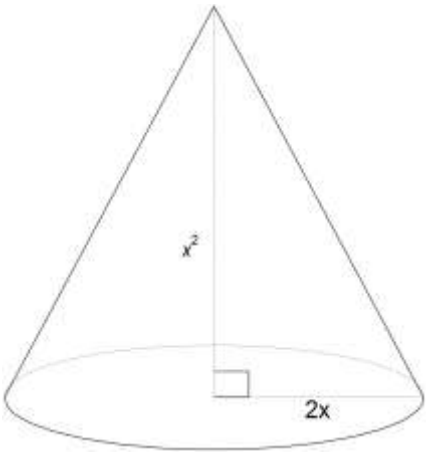
(iii) $3xy + 6x - 5y - 10$ **2**

Question 2 (10 marks)

(a) Make a the subject of the formula $v^2 = u^2 + 2as$. **1**

(b) Find the value of b in the formula $a = 6\sqrt{\frac{b}{c}}$ if $a = 42$ and $c = 2$. **2**

(c) Find an expression, in terms of x, for the volume of this cone. **2**



(d) (i) Factorise $2x^2 + 5x - 52$ **1**

(ii) Hence or otherwise, solve $2x^2 + 5x - 52 = 0$ **1**

(e) Solve $5a^2 + 4a - 12 = 0$ by using the quadratic formula. **3**

Question 3 (10 marks)

(a) Simplify $\left(3x^{-1}\right)^{-2}$, giving the answer without negative indices. **2**

(b) Solve $2 - \frac{x}{8} \leq 6$ **2**

(c) Expand and simplify $\left(\sqrt{11} - 3\sqrt{2}\right)^2$ **2**

(d) Rewrite $\frac{2}{3 - \sqrt{7}}$ with a rational denominator in its simplest form. **2**

(e) Find the value of x if $\sqrt{54} + \sqrt{24} = \sqrt{x}$ **2**

Question 4 (10 marks)

(a) Write $0.000\ 000\ 000\ 192$ in scientific notation. **1**

(b) Evaluate $\dfrac{\sqrt{7}}{580(1.02)^{11}}$ correct to three significant figures. **1**

(c) Write $x^{\frac{3}{4}}$ in the form $\left(\sqrt[n]{a}\right)^m$ **1**

(d) Solve $16^x = 512$ **2**

(e) Write $0.4\dot{3}\dot{7}$ as a fraction in simplest form. Show working. **2**

(f) Solve simultaneously: **3**

$$2x - y + 3z = 3$$

$$3x + 4y - z = -1$$

$$4x - 3y - 2z = 16$$

End of Assessment

Solutions Yr 11 2U Maths Task 1 2013

(a)

(i) $\frac{1}{1} mn \times \frac{2}{1} n \times (-5p) = -10mn^2p$ (1)

(ii) $16a^2b \div 28ab^2 = \frac{16a^2b}{28ab^2}$

$= \frac{4a}{7b}$ (1)

(iii) $\frac{1}{x+2} + \frac{1}{x-3} = \frac{x-3}{(x+2)(x-3)} + \frac{x+2}{(x-3)(x+2)}$ (1)

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

$\left(\frac{2x-1}{x^2-x-6} \right) = \frac{2x-1}{(x+2)(x-3)}$ (1)

acceptable

(b) $5x^2 + 3x - 4 - (4x^2 + 7x - 9)$ (1)

$= 5x^2 + 3x - 4 - 4x^2 - 7x + 9$

$= x^2 - 4x + 5$ (1)

(c)

(i) $64x^2y^2 - 121 = (8xy + 11)(8xy - 11)$ (1)

(ii) $27x^3 - 125 = (3x - 5)(9x^2 + 15x + 25)$ (1)

(iii) $3xy + 6x - 5y - 10 = (3xy + 6x) - (5y + 10)$

$= 3x(y + 2) - 5(y + 2)$ (1)

$= (3x - 5)(y + 2)$ (1)

2.

(a) (i) $v^2 = u^2 + 2as$

$v^2 - u^2 = 2as$

$a = \dfrac{v^2 - u^2}{2s}$ ①

(b) $42 = 6\sqrt{\dfrac{b}{2}}$ ① for substituting the given values into the formula

$7 = \sqrt{\dfrac{b}{2}}$

$49 = \dfrac{b}{2}$

$b = 98$ ①

(c) $V = \dfrac{1}{3}\pi r^2 h$

$= \dfrac{1}{3}\pi (2x)^2 x^2$ ① for correct substitution

$= \dfrac{1}{3}\pi \times 4x^2 \times x^2$

$= \dfrac{4}{3}\pi x^4$ ①

(d) (i) $2x^2 + 5x - 52$

P : -104
S : 5
F : $13, -8$

$= 2x^2 - 8x + 13x - 52$

$= (2x^2 - 8x) + (13x - 52)$

$= 2x(x - 4) + 13(x - 4)$

$= (x - 4)(2x + 13)$ ①

(ii) $(x - 4)(2x + 13) = 0$

$x = 4, \dfrac{-13}{2}$ or $-6\frac{1}{2}$ ① for both solutions

2.

(e) $5x^2 + 4x - 12 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4 \pm \sqrt{4^2 - (4 \times 5 \times -12)}}{2 \times 5}$$

① for correct substitution

$$= \frac{-4 \pm \sqrt{16 - (-240)}}{10}$$

$$= \frac{-4 \pm \sqrt{256}}{10}$$

$$= \frac{-4 \pm 16}{10}$$

$$= \frac{12}{10}, \frac{-20}{10}$$

$$= \frac{6}{5}, -2$$

① for both solutions

3.

(a) $(3x^{-1})^{-2} = (3)^{-2}(x^{-1})^{-2}$ ①

$= \frac{1}{9} \times x^2$

$= \frac{x^2}{9}$ ①

or $\frac{1}{3^2(x^{-1})^2}$

$= \frac{1}{9x^{-2}}$

$= \frac{1}{9 \times \frac{1}{x^2}}$

$= \frac{1}{\frac{9}{x^2}}$

$= \frac{x^2}{9}$

(b) $2 - \frac{x}{8} \leq 6$

$-\frac{x}{8} \leq 4$ ① or $2 \leq 6 + \frac{x}{8}$ ① for moving $\frac{x}{8}$ on RHS

$-x \leq 32$ $-4 \leq \frac{x}{8}$

$x \geq -32$ ① $-32 \leq x$

$x \geq -32$ ①

(c) $(\sqrt{11} - 3\sqrt{2})^2 = (\sqrt{11} - 3\sqrt{2})(\sqrt{11} - 3\sqrt{2})$

$= 11 - 3\sqrt{22} - 3\sqrt{22} + 18$ ①

$= 29 - 6\sqrt{22}$ ①

3.

(d) $\dfrac{2}{3-\sqrt{7}} \times \dfrac{(3+\sqrt{7})}{(3+\sqrt{7})}$ ① for multiplying numerator and denominator by the conjugate of $3-\sqrt{7}$

$= \dfrac{6+2\sqrt{7}}{9-7}$

$= \dfrac{\overset{3}{\cancel{6}}+\overset{1}{\cancel{2}}\sqrt{7}}{\cancel{2}_1}$

$= 3+\sqrt{7}$ ①

(e) $\sqrt{54} + \sqrt{24} = \sqrt{x}$

$\sqrt{9\times6} + \sqrt{4\times6} = \sqrt{x}$

$3\sqrt{6} + 2\sqrt{6} = \sqrt{x}$ ①

$5\sqrt{6} = \sqrt{x}$

$\sqrt{25\times6} = \sqrt{x}$

$\sqrt{150} = \sqrt{x}$

$\therefore x = 150$ ①

4.

(a) 1.92×10^{-10} ①

(b) 0.00367 (or 3.67×10^{-3}). ①

(c) $x^{\frac{3}{4}} = \left(\sqrt[4]{x}\right)^3$ ①

(d) $16^x = 512$

$2^{4x} = 2^9$ ①

$4x = 9$

$x = \frac{9}{4}$ or $2\frac{1}{4}$ ①

(e) Let $x = 0.4\dot{3}7\dot{}$

$10x = 4.\boxed{3\dot{7}\dot{}}$

$100x = 43.\dot{7}\dot{}$

$1000x = 437.\boxed{3\dot{7}\dot{}}$

$1000x - 10x = 437.3\dot{7}\dot{} - 4.3\dot{7}\dot{}$ ①

$990x = 433$

$x = \frac{433}{990}$ ①

$\therefore 0.4\dot{3}\dot{7}\dot{} = \frac{433}{990}$

4.

(f) ① $2x - y + 3z = 3$

② $3x + 4y - z = -1$

③ $4x - 3y - 2z = 16$

$2 \times$ ② $\quad 6x + 8y - 2z = -2$

$2 \times$ ② $-$ ③ $\quad 2x + 11y = -18$ ④ Elim z

$3 \times$ ② $\quad 9x + 12y - 3z = -3$

① for eliminating the 1st pronumeral

① $+ 3 \times$ ② $\quad 11x + 11y = 0$

$x + y = 0$ ⑤

Elim z

① for getting a second equation with the same pronumeral eliminated

$2 \times$ ⑤ $\quad 2x + 2y = 0$

④ $- 2 \times$ ⑤ $\quad 9y = -18$

$y = \frac{-18}{9}$

$= -2$

Subst into ⑤ $\quad x - 2 = 0$

$x = 2$

Subst into ② $\quad 3(2) + 4(-2) - z = -1$

$6 - 8 - z = -1$

$-2 - z = -1$

$-1 = z$

$x = 2$

$y = -2$

$z = -1$

} ① for getting all 3 pronumerals correct