



Nelson R

SOUTH SYDNEY HIGH SCHOOL

PRELIMINARY MATHEMATICS

MATHEMATICS

MARCH ASSESSMENT

2006

Time Allowed—1 Hr and 10 minutes

Directions to Candidates

- Attempt ALL questions
- All necessary working must be shown. Marks may be deducted for careless or badly arranged work.
- Board approved calculators may be used.

2 Unit Assessment 1 Year 11
March 2006

1. Express the following as simplified fractions

a) 0.2 b) 72% c) $\sqrt{\frac{13}{36}}$ (1 mark each)

2. Express $0.\dot{2}9\dot{7}$ as a fraction
(2 marks)

3. Simplify the following

a) $\sqrt{18}$ b) $\sqrt{7}(2\sqrt{7}+3)$ c) $3\sqrt{2}+3\sqrt{8}-\sqrt{50}$
(5 marks total)

4. Expand and Simplify

a) $(2\sqrt{3}-1)(3\sqrt{3}+5)$ b) $(4-3\sqrt{2})^2$ (3 marks each)

5. Rationalise the denominator for

$$\frac{3\sqrt{3}+5}{3\sqrt{3}-5} \quad (3 \text{ marks})$$

6. Find the value for 'p' and 'q' such that

$$\frac{\sqrt{5}}{\sqrt{5}-2} = p + q\sqrt{5} \quad (3 \text{ marks})$$

*-7. The price of a pair of shoes has increased by 7.5% to \$112. Find the price of the shoes before the increase.
(2 marks)

8. Simplify the following

* a) $(-3xy^3)^3$ * b) $-15a^3b^{-2} \div -3a^{-1}b^3$ (2 marks each)

9. Expand the following and simplify if needed.

a) $(3m+2)(4m-5)$ b) $(p+q)^2 - (p-q)^2$ (3 marks each)

10. Factorise the following expressions

a) $c^2 - 12c + 27$ b) $2k^3 - 16k^2 - 3k + 24$

c) $32 - 4x^3$ d) $4m^2 - 16m - 9$ (10 marks total)

11. Simplify the following

a) $\frac{a^2 - 9a + 18}{a^2 - 3a - 18}$ b) $\frac{ac + ad + bc + bd}{a^2 + ab}$

c) $\frac{3x+3}{2x} \times \frac{x^2}{x^2-1}$ d) $\frac{x-5}{3x} - \frac{x-3}{5x}$

e) $\frac{2x^2+x-15}{x^2+3x-28} \div \frac{x^2+6x+9}{x^2-16} \times \frac{x^2-49}{6x^2-15x}$

(14 marks total)

$\frac{1}{2} \div -1\frac{1}{15} \times 5\frac{1}{3} = -2.5$ $\frac{-3}{6} - \frac{-1}{10}$

$\frac{2(4-8)}{15 \times 4}$

12) Solve the following equations

a) $7a - 4 = 2a + 11$

b) $\frac{x}{3} - 2 = \frac{x}{2} - 3$

(3 marks each)

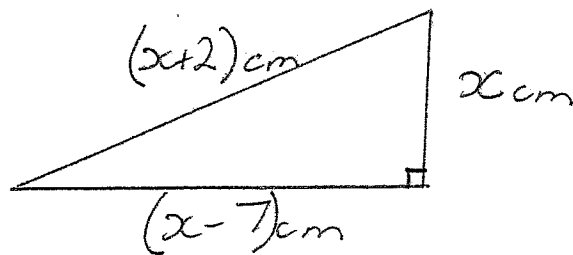
13) Solve the following absolute value and quadratic equations

a) $|x + 4| = |2x - 3|$

b) $6x^2 + 3x - 9 = 0$

(3 marks each)

14) Find the value of x in the following



(4 marks)

SOLUTIONS

2 UNIT

ASSESSMENT 1

Year 11

1. a) $0.2 = \frac{1}{5}$ b) $\frac{72}{100} = \frac{18}{25}$ c) $\sqrt{\frac{49}{36}} = \frac{7}{6}$

2. Let $x = 297297297\dots$

$$1000x = 297297297$$

$$\therefore 999x = 297$$

$$x = \frac{297}{999} = \frac{99}{333} = \frac{11}{37}$$

3. a) $\sqrt{18} = 3\sqrt{2}$

b) $\sqrt{7}(2\sqrt{7}+3)$

$$2 \times 7 + 3\sqrt{7}$$

$$14 + 3\sqrt{7}$$

c) $3\sqrt{2} + 3\sqrt{8} - \sqrt{50}$

$$3\sqrt{2} + 6\sqrt{2} - 5\sqrt{2}$$

$$4\sqrt{2}$$

4. a) $(2\sqrt{3}-1)(3\sqrt{3}+5)$

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

$$18 - 3\sqrt{3} + 10\sqrt{3} - 5$$

$$13 + 7\sqrt{3}$$

b) $(4-3\sqrt{2})^2$

$$16 - 24\sqrt{2} + 18$$

$$34 - 24\sqrt{2}$$

$$2(17 - 12\sqrt{2})$$

5. $\frac{3\sqrt{3}+5}{3\sqrt{3}-5} \times \frac{3\sqrt{3}+5}{3\sqrt{3}+5} = \frac{(3\sqrt{3}+5)^2}{27-25}$

$$= \frac{(3\sqrt{3}+5)^2}{2} = \frac{52 + 30\sqrt{3}}{2}$$

$$= \frac{2(26 + 15\sqrt{3})}{2}$$

$$= 26 + 15\sqrt{3}$$

$$\textcircled{6} \frac{\sqrt{5}}{\sqrt{5}-2} \times \frac{\sqrt{5}+2}{\sqrt{5}+2} = \frac{\sqrt{5}(\sqrt{5}+2)}{5-4}$$

$$= \frac{5+2\sqrt{5}}{1}$$

$$\therefore p = \sqrt{5} \quad q = +2$$

$$\textcircled{7} 107.5\% = \$112$$

$$1\% =$$

$$100\% = \$104.19$$

$$\textcircled{8} \textcircled{a} (-3x^2y^3)^3 = -27x^6y^9$$

$$\textcircled{b} -15a^3b^{-2} \div -3a^{-1}b^3$$

$$= 5a^4b^{-5}$$

$$\textcircled{9} \textcircled{a} (3m+2)(4m-5)$$

$$4m(3m+2) - 5(3m+2)$$

$$12m^2 + 8m - 15m - 10$$

$$\underline{12m^2 - 7m - 10}$$

$$\textcircled{b} (p+q)^2 - (p-q)^2$$

$$p^2 + 2pq + q^2 - (p^2 - 2pq + q^2)$$

$$p^2 + 2pq + q^2 - p^2 + 2pq - q^2$$

$$4pq$$

$$\textcircled{10} \textcircled{a} c^2 - 12c + 27 = (c-9)(c-3)$$

$$\textcircled{b} 2k^2 - 16k + 3k + 24$$

$$2k^2(k-8) - 3(k-8)$$

$$(2k^2-3)(k-8)$$

$$\textcircled{c} 32 - 4x^3 = 4(8 - x^3)$$

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

$$\textcircled{d} 4m^2 - 16m - 9 = (2m+1)(2m-9)$$

$$\textcircled{11} \textcircled{a} a^2 - 9a + 18 = \frac{(a-6)(a-3)}{(a+6)(a+3)}$$

$$= \frac{a-3}{a+3}$$

$$\textcircled{b} \frac{ac+ad+bc+bd}{a^2+ab}$$

$$\frac{a(c+d)+b(c+d)}{a(a+b)}$$

$$\frac{(a+b)(c+d)}{a(a+b)}$$

$$= \frac{c+d}{a}$$

$$\textcircled{c} \frac{3x+3}{2x} \times \frac{x^2}{x^2-1} = \frac{3(x+1)}{2x} \times \frac{x}{(x+1)(x-1)}$$

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

$$\textcircled{d} \frac{x-5}{3x} - \frac{x-3}{5x}$$

$$\frac{5(x-5) - 3(x-3)}{15x}$$

$$\frac{5x-15-3x+9}{15x}$$

$$\frac{2x-6}{15x}$$

$$\textcircled{e} \frac{2x^2+x-15}{x^2+3x-28} \div \frac{x^2+6x+9}{x^2-4} \times \frac{x^2-49}{6x^2-15x}$$

$$\frac{(2x-5)(x+3)}{(x+7)(x-4)} \times \frac{(x+4)(x-4)}{(x+3)(x+3)} \times \frac{(x-7)(x+7)}{3x(x-5)}$$

$$\frac{(x+4)(x-7)}{3x(x+3)}$$

$$\textcircled{12} \begin{array}{r} 7a-4 = 2a+11 \\ -2a \quad -2a \\ \hline 5a-4 = 11 \\ +4 \quad +4 \\ \hline 5a = 15 \\ \div 5 \quad \div 5 \\ \hline a = 3 \end{array}$$

$$\begin{array}{r} \frac{x}{3} - 2 = \frac{x}{2} - 3 \\ +2 \quad +2 \\ \hline \frac{x}{3} = \frac{x}{2} - 1 \\ \frac{2x}{6} = \frac{3x-6}{6} \\ \hline 2x = 3x-6 \\ \hline x = 6 \end{array}$$

$$\textcircled{13} \begin{array}{r} x+4 = 2x-3 \text{ or } x+4 = -2x+3 \\ -x \quad -x \quad +2x \quad +2x \\ \hline 4 = x-3 \\ +3 \quad +3 \\ \hline 7 = x \end{array}$$

$$\begin{array}{r} 3x+4 = 3 \\ -4 \quad -4 \\ \hline 3x = -1 \\ \div 3 \quad \div 3 \\ \hline x = -\frac{1}{3} \end{array}$$

$$\textcircled{5} 6x^2 + 3x - 9 = 0$$

$$3(2x^2 + x - 3) = 0$$

$$3(2x+3)(x-1) = 0$$

$$\therefore 2x+3=0 \text{ or } x-1=0$$

$$x = -\frac{3}{2} \text{ or } x=1$$

Check both answer

Correct

∴ Solution $x=7$ or $-\frac{1}{3}$

$$(14) \quad (x+2)^2 = x^2 + (x-7)^2$$

$$x^2 + 4x + 4 = x^2 + x^2 - 14x + 49$$

$$x^2 + 4x + 4 = \begin{array}{r} 2x^2 - 14x + 49 \\ -x^2 \end{array}$$

$$4x + 4 = x^2 - 14x + 49$$

$$0 = x^2 - 18x + 45$$

$$0 = (x-15)(x-3)$$

$$\therefore x = 15 \text{ or } 3$$

But $x=3$ is impossible as $x-7 = 3-7$
 $= -4$

$\therefore x$ can only equal 15