QUESTION ONE *(9 Marks)* Marks

(a) Evaluate $\frac{6.84+ 3.9^3}{\sqrt{15- 7+4}}$, correct to 4 significant figures. **2**

(b)

(i) Write 645.83×10^{-3} as a decimal number **1**

(ii) Write 3270 000 in scientific notation **1**

(iii) Evaluate $\frac{5.4 \times 10^{-7}}{6 \times 10^{-4}}$. Answer in scientific notation **1**

(c) Evaluate $\frac{(x^2)^4}{xy^3}$ when $x = 6$ *and* $y = \frac{1}{2}$ **2**

(d) Use algebraic techniques to express $0.\dot{2}\dot{8}$ as a fraction in simplest terms. **2**

QUESTION TWO *(22 Marks)* **Start a new page**

(a) Expand and simplify the following:

(i) $6 - 2(a + 4) - 3a$ **2**

(ii) $\left(s + \frac{1}{s}\right)^2$ **2**

(iii) $(10 + x)(4 - 2x)$ **1**

(iv) $(3x + 7)(3x - 7)$ **1**

(v) $(2x + 3)^3$ **2**

(vi) $(x + y)(x^2 + 6xy + 10)$ **2**

(b) Factorise:

(i) $6ab - 4a^2b^2$ **1**

(ii) $a(a + 1) - (a + 1)^2$ **1**

(iii) $5y - 15 + 10xy - 30x$ **2**

(iv) $x^2 - 5x - 24$ **1**

(v) $4a^2 - 9$ **1**

(vi) $3t^3 - 27t$ **2**

(vii) $8x^2 + 18x - 5$ **1**

(viii) $a^3 + 64$ **1**

(ix) $x^6 - 1$ **2**

QUESTION THREE *(14 Marks)* **Start a new page**

(a) Simplify:

(i) $\frac{x^{\frac{1}{2}} \times x^{\frac{1}{2}}}{x}$ **2**

(ii) $\left(\frac{2f}{f^6 g}\right)^3$ **2**

(iii) $3abc^2 \times 4b \times -2c$ **2**

(iv) $\frac{10(pq)^2 \times 20p^{20}q^{14}}{(2p^6q^3)^2 \times 5p^5q}$ **3**

(v) $\left(\frac{2x-y}{y+x}\right)^0$ **1**

(b) Write without fractional or negative indices.

(i) b^{-2} **1**

(ii) $(8y + 2z)^{\frac{1}{2}}$ **1**

(c) Change to index form.

(iii) $x\sqrt{x}$ **1**

(iv) $\frac{3}{4\,(x-y)^7}$ **1**

Question 4 on next page.

QUESTION FOUR *(10 Marks)* **Start a new page**

(a) Simplify the following.

(i) $\dfrac{5x+10y}{8x^2+16xy}$ **2**

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

(iii) $\dfrac{9a^2-3a-2}{2a^2+9a-5} \div \dfrac{3a^2-17a+10}{2a^2-11a+5}$ **3**

(iv) $\dfrac{x^2}{4x^2+7x+3} + \dfrac{3x}{4x+3}$ **3**

END OF PAPER

Year 11 Mathematics Assessment 1 2012

Question 1

a) $\frac{6.84+3.9^3}{\sqrt{15-7+4}} \doteq 19.09845823$

$= 19.10$ to 4 sig. fig

b) i) $645.83\times10^{-3} = 0.64583$

ii) $3270000 = 3.27\times10^{6}$

iii) $\frac{5.4\times10^{-7}}{6\times10^{-4}} = 0.9\times10^{-3}$

$= 9\times10^{-4}$

c) $\frac{(x^2)^4}{xy^3} = \frac{x^8}{xy^3}$

$= \frac{x^7}{y^3}$

$= \frac{6^7}{(\frac{1}{2})^3}$

$= 2239488$

d) Let $x = 0.\dot{2}\dot{8}$

$x = 0.282828\ldots$ — ①

$100x = 28.2828\ldots$ — ②

② − ① $99x = 28$

$x = \frac{28}{99}$

$\therefore 0.\dot{2}\dot{8} = \frac{28}{99}$

Question 2

a) i) $6-2(a+4)-3a = 6-2a-8-3a$

$= 2-5a$

ii) $(a+\frac{1}{a})^2 = (a+\frac{1}{a})(a+\frac{1}{a})$

$= a^2+2+\frac{1}{a^2}$

iii) $(10+x)(4-2x) = 40-20x+4x-2x^2$

$= 40-16x-2x^2$

iv) $(3x+7)(3x-7) = (3x)^2-7^2$

$= 9x^2-49$

v) $(2x+3)^3$

$= (2x+3)(2x+3)(2x+3)$

$= (2x+3)(4x^2+12x+9)$

$= 2x(4x^2+12x+9)+3(4x^2+12x+9)$

$= 8x^3+24x^2+18x+12x^2+36x+27$

$= 8x^3+36x^2+54x+27$

vi) $(x+y)(x^2+6xy+10)$

$= x(x^2+6xy+10)+y(x^2+6xy+10)$

$= x^3+6x^2y+10x+x^2y+6xy^2+10y$

$= x^3+7x^2y+6xy^2+10x+10y$

b) i) $6ab - 4a^2b^2 = 2ab(3-2ab)$

ii) $a(a+1)-(a+1)^2 = (a+1)[a-(a+1)]$

$= (a+1)(a-a-1)$

$= -1(a+1)$

iii) $5y-15+10xy-30x$

$= 5[y-3+2xy-6x]$

$= 5[(y-3)+2x(y-3)]$

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

iv) $x^2-5x-24 = (x-8)(x+3)$

$P = -24$

$S = -5$

$F = -8, 3$

v) $4a^2-9 = (2a)^2-3^2$

$= (2a-3)(2a+3)$

vi) $3t^3-27t = 3t(t^2-9)$

$= 3t(t-3)(t+3)$

vii) $P = 8x-5$

$= -40x^2$

$S = 18x$

$F = 20x, -2x$

$8x^2+18x-5 = 8x^2+20x-2x-5$

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

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

viii) $a^3+64 = a^3+4^3$

$= (a+4)(a^2-4a+16)$

ix) x^6-1

$= (x^3)^2-1^2$

$= (x^3-1)(x^3+1)$

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

Question 3

a) i) $\frac{x^{\frac{1}{3}} \times x^{\frac{1}{2}}}{x} = \frac{x^{\frac{1}{3}+\frac{1}{2}}}{x}$

$= \frac{x^{\frac{5}{6}}}{x}$

$= 1$

ii) $\left(\frac{2f}{f^6g}\right)^3 = \left(\frac{2}{f^5g}\right)^3$

$= \frac{2^3}{f^{15}g^3}$

$= \frac{8}{f^{15}g^3}$

iii) $3abc^2 \times 4b \times -2c = 12ab^2c^2 \times -2c$

$= -24ab^2c^3$

iv) $\frac{10(pq)^2 \times 20p^{20}q^{14}}{(2p^6q^3)^2 \times 5p^5q}$

$= \frac{10p^2q^2 \times 20p^{20}q^{14}}{4p^{12}q^6 \times 5p^5q}$

$= \frac{200p^{22}q^{16}}{20p^{17}q^7}$

$= 10p^5q^9$

v) $\left(\frac{2x-y}{y+x}\right)^0 = 1$

b) (i) $b^{-2} = \frac{1}{b^2}$

(ii) $(8y+2z)^{\frac{1}{2}} = \sqrt{(8y+2z)}$

c) (i) $x\sqrt{x} = x \times \sqrt{x}$

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

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

$= x^{\frac{3}{2}}$

(ii) $\frac{3}{4(x-y)^7} = \frac{3}{4} \frac{1}{(x-y)^7}$

$= \frac{3}{4} (x-y)^{-7}$

Question 4

i) $\frac{5x+10y}{8x^2+16xy} = \frac{5(x+2y)}{8x(x+2y)}$

$= \frac{5}{8x}$

ii) $\frac{5a}{3} - \frac{(a^2+2)}{a} = \frac{5a^2-3(a^2+2)}{3a}$

$= \frac{5a^2-3a^2-6}{3a}$

$= \frac{2a^2-6}{3a}$

$= \frac{2(a^2-3)}{3a}$

iii) $\frac{9a^2-3a-2}{2a^2+9a-5} \div \frac{3a^2-17a+10}{2a^2-11a+5}$

$= \frac{(3a-2)(3a+1)}{(2a-1)(a+5)} \div \frac{(3a-2)(a-5)}{(2a-1)(a-5)}$

$= \frac{(3a-2)(3a+1)}{(2a-1)(a+5)} \times \frac{(2a-1)(a-5)}{(3a-2)(a-5)}$

$= \frac{(3a+1)}{(a+5)}$

iv) $\frac{x^2}{4x^2+7x+3} + \frac{3x}{4x+3}$

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

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

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

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

$= \frac{x(4x+3)}{(4x+3)(x+1)}$

$= \frac{x}{(x+1)}$