Assessment Schedule – 2013

Mathematics with Statistics: Apply algebraic methods in solving problems (91261)

Evidence Statement

ONE	Expected Coverage	Achievement	Merit	Excellence
(a)(i)	$(2x-5)(3x+2)$ $6(x+\frac{2}{3})(x-\frac{5}{2})$	Correctly factorised. Correct decimal / rounding.		
(a)(ii)	$x=-\frac{2}{3}\ (-0.67)$ or $x=\frac{5}{2}\ (2.5)$	Complete correct solutions found. Any rounding / truncation. Consistency with a(i) but not trivial (coefficients of x > 1)		
(b)	$b^2-4ac=0$ $16m=64$ $m=4$ Perfect square. $4(x-1)(x-1)=0$ or equivalent $x=1$ $m=4$	Recognising the discriminant must = 0. OR CRO.	Calculating the value of m.	
(c)	$\frac{2(x+2)(x-2)}{(x+2)(x-4)}$ $=\frac{2(x-2)}{(x-4)}$ accept $\frac{(2x-4)}{(x-4)}$	Factorised. OR Factorised and simplified with one error in factorising.	Correctly simplified.	
(d)	$a^2-3a-4=0$ $(a-4)(a+1)=0$ $a=4$ or $a=-1$ $\sqrt{(x+2)}=4$ or $\sqrt{(x+2)}=-1$ (not a solution) $x=14$ $((x+2)-4)^2$ $=(3\sqrt{(x+2)})^2$ $x^2-4x+4=9(x+2)$ $x^2-13x-14=0$ $(x+1)(x-14)=0$ $x=-1$ and $x=14$	Equation rearranged and factorised OR Solved using either method. (RANW= n)	Solved for x. $x=14$ and -1 but not disregarding $x=0$.	Recognition that $x=-1$ is not a solution.
(e)(i) (ii)	$x^2-mx+nx-mn=2(x^2-nx+mx-mn)$ $x^2+3mx-3nx-mn=0$ $x^2+(3m-3n)x-mn=0$ $x=\frac{-3(m-n)\pm\sqrt{9(m-n)^2+4mn}}{2}$ $=\frac{-3(m-n)\pm\sqrt{9m^2-14mn+9n^2}}{2}$ Hence $9m^2-14mn+9n^2>0$ OR $9(m-n)^2+4mn>0$	Cross multiplication and collection of like terms. Mei for one incorrect simplification step.	Correct substitution into the quadratic formula, not necessarily simplified. OR No roots given but correct inequality in (ii).	Roots and inequality found.

NØ no response; no relevant evidence
N1 attempt at one question
N2 1 of u
A3 2 of u
A4 3 of u
M5 1 of r
M6 2 of r
E7 1 of t
E8 2 of t

TWO	Expected Coverage	Achievement	Merit	Excellence
(a)	$64a^6/64a^{10}$ $= 1/a^4$ (or a^{-4})	Correct simplification.		
(b)(i)	$2x^{0.5}$ (or $2\sqrt{x}, 2x^{\frac{1}{2}}$	Correct simplification.		
(ii)	$2x^{0.5} \times 3x^{1.5} = 6x^2$	Correct simplification. Consistent with (b) (i).		
(c)	$6x^2 + 12x - 48 = 0$ $x^2 + 2x - 8 = 0$ $(x + 4)(x - 2) = 0$ $x = -4$ and $x = 2$	Correct equation = 0 OR CAO or guess and check. OR If answer correct & $x = -4$ is eliminated.	Equation solved showing equation.	
(d)	$x \log a = (x-1)\log 5$ $= x\log 5 - \log 5$ $x(\log a - \log 5) = -\log 5$ $x = \dfrac{-\log 5}{\log a - \log 5}$		Expression written in log form and expanded.	Expression for x correct. OR equivalent.
(e)	$(3x + n)(x - 2) = 0$ $3x^2 + (n - 6)x - 2n = 0$ $n - 6 = 4$ $n = 10$ $(3x + n) = 0$ root is $-n / 3 = -10 / 3$ $k = 2n = 20$	Establishing the relationship. OR CRO of k and other root.	One value for n or k or the other root found with algebraic working.	Solutions found for k and the other root with algebraic working.

NØ no response; no relevant evidence

N1 attempt at one question

N2 1 of u

A3 2 of u

A4 3 of u

M5 1 of r

M6 2 of r

E7 1 of t

E8 2 of t

THREE	Expected Coverage	Achievement	Merit	Excellence
(a)(i)	$x^3 = 64$ $x = 4$	Correctly solved.		
(ii)	$\frac{2^{x+1}}{2^{3x}} = 32$ $= 2^5$ $2^{x+1-3x} = 2^5$ $1-2x=5$ $x=-2$	CRO OR Whole equation in powers of two. OR Use of log, with exponents eliminated. eg: $(x + 1)\log 2$ $= \log 32 + x \log 8$	Correctly solved.	
(b)(i)	1800×0.6^n	Expression correct.		
(ii)	$100 > 1800 \times 0.6^n$ $0.6^n < \frac{1}{18}$ $n \log 0.6 < \log \frac{1}{18}$ $n > 5.658$ 6 years OR equivalent.	In/Equation rearranged in index form. OR CRO. OR Solved by guess and check. OR 5.7 years with working. OR Consistent use of 0.4^n give $n = 3.15$	Number of years found as a whole number ($n = 6$) Consistent use of 0.4^n using logs give $n = 4$ years (whole number).	
(c)	$9x^2 + 6x + 8 = 0$ $b^2 - 4ac = -252$ therefore no real roots. Graph of the parabola does not cut the x-axis. A squared term can never be negative hence there is no solution therefore the graphs do not intersect each other.	Quadratic expression rearranged=0 OR Explanation of no x intercepts because the discriminant is less than zero, without –252. OR A squared term can never be negative hence there is no solution.	Discriminant found and therefore no real roots but no x axis analysis. OR Quadratic expression rearranged = 0. AND Explanation of no x intercepts because the discriminant is less than zero, without –252.	Discriminant calculated and explanation of no x intercepts given. OR Full explanation of the two graphs not intersecting.
(d)	$x = (mx)^2$ $x(m^2x - 1) = 0$ therefore either $m^2 x = 1$ $x = \frac{1}{m^2}$ if $x \neq 0$. OR $x = 0$ But log 0 is undefined Therefore $x = \frac{1}{m^2}$	Equation given in index form.	One solution found. $x = \frac{1}{m^2}$ OR Both solutions and $x = 0$ not disregarded.	Correctly solved with $x = 0$ disregarded. OR Use of log properties to solve completely. $X = 0$ still needs to be disregarded.

NØ no response; no relevant evidence
N1 attempt at one question
N2 1 of u
A3 2 of u
A4 3 of u
M5 1 of r
M6 2 of r
E7 1 of t
E8 2 of t

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 6	7 – 13	14 – 18	19 – 24