Assessment Schedule – 2012

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

Evidence Statement

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)
ONE (a)(i)	8	Complete correct solution found.		
(ii)	$x = 5^2$ $= 25$	Complete correct solution found.		
(b) (i)	Log equivalent formed $2250/2000 = 1.035^t$ $t = \log 1.125/\log 1.035$ $= 3.42$ years	Establishing log equation. Problem solved using substitution (at least 2 iterations).	Accept 3.42 or 4 (years) or any other rounding. CRO of 3.42 allowed. Do not accept 3 unless accompanied by algebraic working.	
(ii)	$2000(1.035)^{21} - 2000(1.035)^{18}$ $= 4118.863 - 3714.978$ $= 403.8846$ $= \$403.88$	Value after 18 or 21 years found.	Correct solution. CRO	
(iii)	The additional amount in the account between Tara's m^{th} and $(m + n)^{th}$ birthday. OR The difference in the amount from the m^{th} year to the $(m + n)^{th}$.			Correct statement.
(c)	$x^2 - 6x - 27 = 0$ $(x + 3)(x - 9) = 0$ $x = -3$ or $x = 9$ $3^n = -3$ no solution Only solution is $3^n = 9$ $\Rightarrow n = 2$	Quadratic equation in x formed and solved.	Expression given for 3^n.	Value of n found with algebraic evidence.

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

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)
TWO (a)(i)	$(5x + 1)(x – 2)$ OR $5(x – 2)(x + 0.2)$	Factorise the expression.		
(ii)	$x = -\frac{1}{5}$ or 2 or equivalent.	Equation solved giving TWO solutions. Accept in fractional form. Consistent with 2a(i) but not trivial.		
(b)	$x^2 + 5x + 2 = 3x + 6$ $x^2 + 2x – 4 = 0$ $x = 1.236, –3.236$	Expanded and simplified to a quadratic equation = 0. CRO Truncate / rounding ok – min 1dp.	Equation solved giving TWO correct solutions. Truncate / rounding ok – min 1dp.	
(c)	$\frac{(x-3)(x-2)}{(x+3)(x-2)} = 4$ $\frac{(x-3)}{(x+3)} = 4$ $3x = -15$ $x = -5$	Two solutions $x = –5$, $x = 2$, with comments about incorrect factorisation (or the correct factorisation). OR An answer to the question with both values substituted showing these solutions do not =4.	Correct solution of x=-5 only with one of the two aspects of the incorrect solution discussed.	Correct solution and i) A comment about incorrect factorisation. ii) $x = 2$ gives an invalid solution as it results in dividing by 0 or back substitution shows $x = 2$ does not satisfy the equation. BOTH required.
(d)	$\frac{(x+3)(x-2)}{6x^2+4x+c} = \frac{x+3}{2(3x+8)}$ Multiply numerator and denominator of RHS by $(x – 2)$ ⇨ $2(x – 2)(3x + 8)$ $= 6x^2 + 4x – 32$ Therefore $c = –32$	Factorising, and recognising the need to multiply by $(x – 2)$ to equate denominators. Or cross multiplication and expanding and simplifying correctly.	Solving.	
(e)	Equation $d = a(x+ 8)(x – 8)$ $d = a(x^2 – 64)$ $d = 0 \quad 64a = 16$ $a = ¼$ $d = ¼ (x + 8)(x – 8)$ Width of 12, $x = ±6$ $¼ \times 14 \times 2 = 7$ m	General equation formed in any correct format.	a calculated and equation formed. Depth = –7m	Problem solved.

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

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)
THREE (a)(i)	$8x^{13}$	Correct.		
(ii)	$4x^{\frac{1}{3}}$	Correct (accept 0.3 as power).		
(iii)	$\sqrt{\frac{\left(4x^{\frac{1}{3}}\right)}{x^{-\frac{1}{2}}}}$ $= 2x^{\frac{5}{12}}$	Consistent with 3a(ii) .	Correct. Or equivalent.	
(b)(i)	$2x^2 - 3x + 8x - 12 = 13$ $2x^2 + 5x - 25 = 0$ $a = 2$, $b = 5$ and c = –25 $x = 2.5$ or $x = -5$	Expanding and simplifying to = 0. Incorrect simplification, then correct use of quadratic formula giving two solutions. CRO.	Solution including values for a, b, c.	
(ii)	$2x^2 + 5x - 12 - k = 0$ For one solution $b^2 - 4ac = 0$ $25 + 8(12+k) = 0$ $k = -15.125$	Knowledge of statement $b^2 - 4ac = 0$. Incorrect substitution into $b^2 - 4ac$.	Correct substitution into $b^2 - 4ac$.	Value of k calculated.
(c)	$x^2 + 5x - 1 - dx^2 - d = 0$ $x^2(1 - d) + 5x - (1 + d) = 0$ To have solutions $25 + 4(1 - d)(1 + d) > 0$ $25 + 4 - 4d^2 > 0$ $4d^2 < 29$ $-2.69 < d < 2.69$	Expansion and simplified equation –collecting coefficients (line 2) .	Correct substitution into the discriminant of $b^2 - 4ac > 0$. Including $>$ or $\geq$.	Range for d calculated. Do not penalise for using ≥ 0.

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

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 13	14 – 18	19 – 24