Assessment Schedule – 2017

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

Evidence Statement

Q	Expected Coverage	Achievement (u)	Merit (r)	Excellence (t)
ONE (a)(i)	$3(4x)^{-2} = \frac{3}{16x^2}$	Correct answer.		
(a)(ii)	$\left(\frac{16x^4}{x^6}\right)^{\frac{3}{2}} = \left(16x^{-2}\right)^{\frac{3}{2}}$ $= \left(16^{\frac{3}{2}}x^{-3}\right)$ $= \frac{64}{x^3}$	Correct power of x or number.	Correct answer.	
(b)	$\frac{2x^2-50}{9x^2-39x-30} = \frac{2(x+5)(x-5)}{3(3x+2)(x-5)}$ $= \frac{2(x+5)}{3(3x+2)}$	Either numerator or denominator correctly factorised.	Correctly simplified.	
(c)	$(2n+6)^2-(n-2)^2 = 200$ $4n^2+24n+36-n^2+4n-4 = 200$ $3n^2+28n-168 = 0$ $n = 4.1525 \text{ OR } -13.49$ Width is $\frac{1}{2}(2n+6-n+2) = \frac{n}{2}+4$ $= 6.1$ cm (6.07625)	Sets up a quadratic OR finds expression for width in terms of n.	Both solutions of quadratic found.	Correct answer.
(d)	Let x be the number of people who went on the trip. $\frac{560}{x} - \frac{560}{x+3} = 1.5$ $1.5x^2+4.5x-1680 = 0$ $x = 32 \text{ or } -35$ So 32 students went on the trip.	Sets up equation.	Quadratic equation formed.	Correct solution with positive answer.

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)	$2^{10} = x$ $x = 1024$	Correct answer.		
(b)	$x^2 = 49$ $x = 7$ or -7 As base cannot be negative, $x = 7$	Written in index form.	Correct answer with justification.	
(c)	$x = \log_{\sqrt{5}} \frac{1}{125}$ $\left(\sqrt{5}\right)^x = \frac{1}{125}$ $\left(5^{\frac{1}{2}}\right)^x = 5^{-3}$ $\frac{x}{2} = {}^-3$ $x = {}^-6$	Written in index form.	Problem solved.	
(d)	Initially the computer is \$4699 so $A = 4699$ $1500 = 4699r^{4.25}$ $r^{4.25} = \frac{1500}{4699} = 0.3192$ $r = \sqrt[4.25]{0.3192}$ $r = 0.764$ Value after 6 years = 4699×0.764^6 or \$937.26 or consistent with rounding.	Sets up equation with correct value for A.	Value of r found.	Problem solved.
(e)	$\left(\frac{px}{q} - 3\right)\log 81 = \log 243$ $\frac{px}{q} - 3 = \frac{\log 243}{\log 81} = \frac{5}{4}$ $px = \frac{17q}{4}$ $p = \frac{17q}{4x}$ or $\frac{4.25q}{x}$	Converts equation to exponent form.	Simplifies logs on right hand side.	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)	$4\left(x+\frac{1}{2}\right)\left(x-\frac{5}{2}\right)=0$ $(2x+1)(2x-5)=0$ $4x^2-8x-5=0$ $b=-8$	Finds *b*.		
(b)	$6x^2 - mx + 3 = 0$ One unique real root means $\Delta = 0$ $(-m)^2 - 4 \times 6 \times 3 = 0$ $m^2 = 72$ $m = \pm 8.485$	Correct substitution into discriminant and set to 0.	Correct values for *m*.	
(c)	There are no real roots so: $\Delta < 0$ $(12)^2 - 4k(5k) < 0$ $144 - 20k^2 < 0$ $k^2 > \frac{144}{20}$ Either $k > 2.68$ or $k < -2.68$ Graph is always above the *x*-axis so $k > 0$ and it follows $k > 2.68$	Recognising graph is above *x*-axis with discriminant $\Delta = b^2 - 4ac < 0$	Finds –2.68 and 2.68	Correct range of values for *k*.
(d)	$\frac{9}{(x-3)(x+3)} + \frac{3}{2(x+3)}$ $= \frac{18+3(x-3)}{2(x-3)(x+3)} = \frac{3x+9}{2(x-3)(x+3)}$ $= \frac{3(x+3)}{2(x-3)(x+3)}$ $= \frac{3}{2(x-3)}$ $x \neq 3$ or -3	Lowest common denominator found.	Correct answer. Restriction on values of *x* need not be given.	
(e)	$2^{mx-3} = 8^{x^2} = \left(2^3\right)^{x^2} = 2^{3x^2}$ $mx - 3 = 3x^2$ $3x^2 - mx + 3 = 0$ has exactly one root. $\Delta = 0$ $m^2 - 4 \times 3 \times 3 = 0$ $m^2 = 36$ $m = 6$ or -6	Changes bases to 2.	Substitutes and makes discriminant equal to 0.	Correctly 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

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 14	15 – 20	21 – 24