Assessment Schedule – 2024

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

Evidence

Q	Evidence	Achievement	Merit	Excellence
ONE (a)	$(x+4)^2-5-16$ $(x+4)^2-21$	• Written in correct form.		
(b)	$3x^2-5x+2=0$ $b^2-4ac=(-5)^2-4(3)(2)$ $=1$	• Correct value but beware of RAWW.		
(c)	$\frac{3t+3(t-5)-t}{3t^2}=\frac{3t+3t-15-t}{3t^2}$ $=\frac{5t-15}{3t^2}$	• Obtains a correct expression by putting 2 fractions over the same denominator and simplifying the numerator.	• Full simplification.	
(d)	$(3x-1)(x-4)(x+2)=0$ $(3x-1)(x^2-2x-8)=0$ $3x^3-6x^2-24x-x^2+2x+8=0$ $3x^3-7x^2-22x+8=0$ So, $a=-7, b=-22, c=8$.	• Identifies the 3 correct factors. OR Uses y (*any root*) = 0	• Finds values for a, b, and c. Explicit statement not required.	
(e)	$\frac{x^2-x+x-1}{x^3-x^2-x^2+x}=\frac{x^2-1}{x(x^2-2x+1)}$ $=\frac{(x+1)(x-1)}{x(x-1)(x-1)}$ $=\frac{x+1}{x(x-1)}$	• Correct expansion of either numerator or denominator.	• Factorisation of either numerator or denominator (2nd line of working).	T1 Derives result but with incorrect mathematical statements. T2:Mathematically correct proof.

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

Q	Evidence	Achievement	Merit	Excellence
TWO (a)	$3x^2-14x-5=0$ $(3x+1)(x-5)=0$ $x=-\frac{1}{3}$ or 5	• Both solutions found.		
(b)	$\frac{\sqrt{(3x+5)^2}}{x(5+3x)}=\frac{3x+5}{x(3x+5)}$ $=\frac{1}{x}$	• Factorising the surd.	• Simplified.	
(c)	$\frac{x^2-2x}{4x-1}=\frac{k-1}{k+1}$ $(x^2-2x)(k+1)=(k-1)(4x-1)$ $x^2k+x^2-2kx-2x=4xk-k-4x+1$ $(k+1)x^2+(2-6k)x+(k-1)=0$ Equal and opposite signs so, $2-6k=0$ $k=\frac{1}{3}$ Other valid approaches are also acceptable.	• Expand to remove denominator on both sides giving line 3.	• Expand and simplify to reach line 4. OR Other clearly valid approach with minor numerical error.	• Value of k found.
(d)(i)	Radius $=\frac{x}{4}$ Area $=\pi\left(\frac{x}{4}\right)^2$ $=\frac{\pi x^2}{16}$	• Correct expression (accept line 2).		
(ii)	Green area = area of rectangle – 2 (area of circle) $=\frac{x^2}{2}-\frac{2\pi x^2}{16}$ OR $=8r^2-2\left(\pi r^2\right)$ $=\frac{x^2(4-\pi)}{8}=10$ $8r^2-2\pi r^2=10$ $x^2=\frac{80}{4-\pi}$ $r^2=\frac{10}{8-2\pi}$ $x=\sqrt{93.196}=9.65$ cm $r=\sqrt{5.825}=2.4134$ $\therefore x=9.65$ cm		• Correct expression for green area in terms of either x or r (not both).	Correct value for length of rectangle.

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

Q	Evidence	Achievement	Merit	Excellence
THREE (a)	$x = \log_5 625$ $5^x = 625$ $x = 4$	• Correct answer.		
(b)	$3^{2(2x+3)} = (3^{-3})^x$ $4x + 6 = -3x$ $7x = -6$ $x = -\frac{6}{7}$ OR $2x + 3 = \log_9\left(9^{-1.5x}\right) = -1.5x$ $4x + 6 = 3x$ $7x = -6$ $x = -\frac{6}{7}$	• Rewrites at least one term as a power with base 3. OR Takes logs and movers exponent out of log for at least 1 term.	• Solved correctly.	
(c)	$b^2 = x$ and $(3b)^2 = y$ $y = 9b^2$ $y = 9x$	• Rewrite at least one of the log terms in exponential form.	• Correct answer.	
(d)	$x = \frac{-(-4k) \pm \sqrt{(-4k)^2 - 4(3)(k^2)}}{2(3)}$ $= \frac{4k \pm \sqrt{16k^2 - 12k^2}}{6}$ $= \frac{4k \pm \sqrt{4k^2}}{6}$ $= \frac{4k \pm 2k}{6}$ $x = k$ or $\frac{k}{3}$	• Substitutes into the quadratic formula and evaluates the b^2 term.	• Finds both solutions (simplest form of last line not required).	
(e)	Let P_c = intensity of cooling fan P_h = intensity of heat pump Cooling fan: $38 = 10\log\left(\frac{P_c}{P_0}\right)$ $P_c = 10^{3.8} P_0$ Heat pump: $30 = 10\log\left(\frac{P_h}{P_0}\right)$ $P_h = 10^3 P_0$ $\frac{P_c}{P_h} = 10^{0.8} = 6.31 > 6$ Hence it is more than six times higher.		• Intensity of either cooling fan or heat pump in terms of P_0. Accept expressions for $\frac{P}{P_0}$.	T1: Finds that heat pump is 6.3 times more intense. T2: Explicitly compares 6.31 to the 6 given in the question.

NØ	N1	N2	A3	A4	M5	M6	E7	E8

No response; no relevant evidence.	A valid attempt at one question.	1u	2u	3u	1r	2r	1t	2t

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 07	08 – 13	14 – 19	20 – 24