Assessment Schedule – 2025

Mathematics and Statistics: Demonstrate mathematical reasoning (91947)

Evidence

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
ONE (a)	Dimensions are: $(2x - 1):(3x + 2):3x$ $= 13:23:21$ Surface area $= 2 \times 13 \times 21 + 2 \times 23 \times 21 + 2 \times 13 \times 23$ $= 546 + 966 + 598 = 2110 \text{ units}^2$	• Correct area. Units not necessary.		
(b)	$3x - y = 2$ $x + 3y = 19$ $9x - 3y = 6$ $x + 3y = 19$ Adding gives: $10x = 25$ $x = 2.5, y = 5.5$ $Q = (2.5, 5.5)$ **Alternative method** $3x - y = 2$ $x + 3y = 19$ $3x - y = 2$ $3x + 9y = 57$ Subtracting gives: $-10y = -55$ $y = 5.5$ $x = 2.5$ $Q = (2.5, 5.5)$ Accept other alternative algebraic methods, e.g. substitution. *Must have evidence of algebraic method.*	• Elimination of one variable from the pair of equations. OR CAO	• Correct coordinates for Q, with evidence of an algebraic method. *Accept if the x and y values of the coordinates are not actually given in coordinate format.*	

(c)	Using triangle ABE and Pythagoras: $BE^2 = 70^2 + 120^2$ $BE^2 = 19300$ $BE = 138.92$ cm Using triangle BCD and trigonometry: $\tan 28 = \dfrac{CD}{70}$ $CD = 70 \times \tan 28$ $CD = 70 \times 0.5317 = 37.22$ cm Also $\cos 28 = \dfrac{BC}{BD}$ $BD = \dfrac{70}{\cos 28}$ $BD = \dfrac{70}{0.8829} = 79.28$ cm Alternative method using Pythagoras: $BD^2 = 70^2 + 37.22^2$ $BD^2 = 6285.3$ $BD = 79.28$ cm Then $ED = 120 - 37.22 = 82.78$ cm Perimeter $= 82.78 + 79.28 + 138.92$ $= 300.98$ cm *Allow alternative solution using metres.*	• Evidence of use of Pythagoras. OR Trigonometry to find the lengths: BE or CD or BD. OR CAO.	• Correct value for the perimeter, with clear working. *Units not necessary.*	
(d)(i)	$y = 3^{x+1} + 2$ Or equivalent: $y = 3 \times 3^x + 2$ Shows some justification, e.g. indicates differences.	• Equation formed as exponential, with base 3. OR Identifies a multiplier of 3.	• Exponential equation, with base 3. AND One other correct component.	t_2 / E8 Correct equation. AND At least two non-trivial features. t_1 / E7 Correct equation. AND One non-trivial feature.
(ii)	Possible non-trivial features are: • exponential graph • crosses y-axis at (0,5) • never crosses x-axis OR horizontal asymptote of $y = 2$ • no symmetry OR no maximum point OR no minimum point • graph becomes steeper as $x \to \infty$ OR graph becomes flatter as $x \to -\infty$. Allow equivalent wording for asymptotes or gradients.	• One non-trivial feature. OR Two non-trivial features, with consistency, from incorrect exponential equation (d)(i).	• Two non-trivial features for the exponential equation.	

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	ONE question attempted towards solution.	1u	2u	3u	1r	2r	t1	t2

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
TWO (a)	$x + 2x + 10 + 3x + 50 = 180$ $6x + 60 = 180$ $6x = 120$ $x = 20$	• Finding the value of x. Allow CAO.		
(b)	In $\triangle$FHS: $\sin 32 = \dfrac{FS}{8}$ $FS = 8 \times \sin 32$ $FS = 8 \times 0.5299 = 4.239$ cm In $\triangle$FHS: $\cos 32 = \dfrac{FH}{8}$ $FH = 8 \times \cos 32$ $FH = 8 \times 0.848 = 6.784$ cm Alternative method In $\triangle$FHS: $FH^2 = 8^2 - 4.239^2$ $FH^2 = 46.03$ $FH = 6.784$ cm In $\triangle$FGH: $\tan 43 = \dfrac{6.784}{FG}$ $FG = \dfrac{6.784}{0.9325} = 7.275$ cm In $\triangle$FGS: $\tan x = \dfrac{4.239}{7.275}$ $\angle SGF = x = \tan^{-1} 0.5827 = 30.23°$	• Evidence of working of Pythagoras or trigonometry in finding either of the lengths FS or FH. OR Finding the length FG, with consistency. OR Finding the angle x, with consistency. OR CAO	• Correct answer with evidence of working of Pythagoras or trigonometry in finding the angle x.	
(c)	$15x^2 + 7x - 2 = 0$ $(5x - 1)(3x + 2) = 0$ Either $5x - 1 = 0$ or $3x + 2 = 0$ $x = \dfrac{1}{5}(0.2)$ or $x = -\dfrac{2}{3}(-0.6667)$	• Correct factorised form. OR CAO. *Answers may be given as fractions or decimals.*	• Both solutions found. AND With evidence of factorised form and working. AND Answers given as fractions.	
(d)	$h^2 = 25^2 - 15^2$ $h^2 = 400$ $h = 20$ metres Volume $= \dfrac{1}{2} \times 30 \times 20 \times 20 + 5 \times 30 \times 20$ $= 6000 + 3000 = 9000$ m^2 Weight $= 9000 \times 800$ kg $= 7\,200\,000$ kg $= 7200$ tonnes Truck journeys $= \dfrac{7200}{45} = 160$ trips	• Correct height found. OR Consistent answer found after error in height. OR CAO	• Correct volume of removed earth found. AND Weight in kg.	t₂ / E8 Correct number of truck journeys found, with clear working. t₁ / E7 Correct number of truck journeys found, with incomplete justification. OR Complete solution with a minor error.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	ONE question attempted towards solution.	1u	2u	3u	1r	2r	t1	t2

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
THREE (a)(i)	$y = -3x + 15$	• Correct equation found. Accept CAO.		
(ii)	$y = k(x + 1)^2 + 6$ $y = -\dfrac{3}{8}(x + 1)^2 + 6$ Alternative method $y = k(x + 5)(x - 3)$ $y = -\dfrac{3}{8}(x + 5)(x - 3)$ OR $y = -\dfrac{3}{8}x^2 - \dfrac{3}{4}x + \dfrac{45}{8}$ OR $y = -0.375x^2 - 0.75x + 5.625$ OR equivalent.	• Equation found with k-value ignored or incorrect. OR CAO.	• Correct equation, with evidence of justification.	
(b)	$FH^2 = p^2 + p^2$ $FH = \sqrt{p^2 + p^2}$ $FH = \sqrt{2p^2} = \sqrt{2}\,p = 1.414p$ $FGH = \dfrac{1}{4} \times 2\pi \times p = \dfrac{\pi}{2}p$ $= 1.57p$ Required length $= \dfrac{\pi}{2}p - \sqrt{2}\,p = 0.1566p$	• Correct expression for FH or FGH. OR CAO.	• Correct required length, with evidence of working.	
(c)	$RS^2 = RT^2 - ST^2$ $RS^2 = \dfrac{41}{8}x^2 - \dfrac{x^2}{16}$ $RS^2 = \dfrac{81}{16}x^2 = 5.0625x^2$ $RS = \sqrt{\dfrac{81}{16}x^2}$ $RS = \dfrac{9}{4}x = 2.25x$ Area $= 72$ $\dfrac{1}{2} \times ST \times RS = 72$ $\dfrac{1}{2} \times \dfrac{x}{4} \times \dfrac{9}{4}x = 72 \quad (1)$ $\dfrac{9}{32}x^2 = 72$ $x^2 = \dfrac{72}{^9\!/_{32}} = \dfrac{72}{0.28125}$ $x^2 = 256$ $x = 16$ cm Units not necessary.	• Finding length RS, with evidence of use of Pythagoras' theorem. OR CAO.	• Evidence of forming equation (1). OR Consistent value for x, following from error, as long as equation is still quadratic.	t_2 / E8 Correct value for x, with evidence of clear working. t_1 / E7 Correct value for x, with incomplete justification. OR Complete solution with a minor error.

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No response; no relevant evidence.	ONE question attempted towards solution.	1u	2u	3u	1r	2r	t1	t2

Cut Scores

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