Assessment Schedule – 2015

Mathematics and Statistics: Apply geometric reasoning in solving problems (91031)

Evidence Statement

One	Expected coverage	Achievement	Merit	Excellence
(a)(i)	ACL = DCL (symmetry) (ACK = 90 – 24 (angles on a line)) BCF = 90 – 24 = 66°	1 angle statement with reason. OR correct angle calculated.	Answer correct with reason.	
(ii)	CDG = CGD (isosceles triangle) 2CGD = 180 – 66 (sum of angles of triangles) CGD = 114/2 = 57°	1 angle statement with reason. OR CGD calculated.	Answer correct with reason.	
(iii)	CL = 1.2 m KL = 1.2 tan 24° = 0.53 m	Correct expression to lead to solution of 0.53 m.		
(iv)	$CK = \sqrt{1.2^2 + 0.53^2}$ $= 1.31$ m	Correct solution.		
(v)	If CH is $\frac{2}{3}$ CK Then $HI = \frac{2}{3}KM$ $\frac{2}{3}KM = 1.06 \times \frac{2}{3}$ $HI = 0.707$ OR $CH = \frac{2}{3} \times 1.1 = 0.873$ $HI = 2 \times \sin 24 \times 0.873$ $= 0.71$ m	Recognition of relationship between HI and KM. OR Calculation of ½ of HI.	Recognition of relationship between HI and KM with reason. OR Correct solution found with incomplete statements	Correct solution with correct Geometric Reasoning OR Correct solution with correct trig statements
(b)	Area of MNP = $0.5NP \times h$ = 0.5 NP . MT Area of MQS = $0.5\ QS \times h$ = $0.5\ QS \times MR$ $\frac{MNP}{MQS} = \frac{0.5NP \times MT}{0.5QS \times MR}$ But $\frac{NP}{QS} = \frac{MT}{MR} = \frac{a}{a+b}$ Therefore $\frac{MNP}{MQS} = \frac{a^2}{(a+b)^2}$	Equation of area of triangle. OR Correct ratio for lengths of sides.	Establishment of comparison of areas of triangles.	Proof correct. OR gives correct scale factor and squares it.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response or no relevant evidence	One point made incompletely	1u	2u	3u	2r	3r	t	2t

Two	Expected coverage	Achievement	Merit	Excellence
(a)(i)	$x = \frac{360}{5} = 72°$ Sum of exterior angles of any polygon (or pentagon) = 360°. Regular shape – the angles are equal.	Correct answer and reason.		
(ii)	Angle at a point $= \frac{360}{5} = 72°$ $y = \frac{180 - 72}{2} = 54°$ (base angles isosceles triangle) The distance from centre to vertex is always the same in a regular polygon (pentagon). OR Interior angles of a regular polygon / pentagon = 108°. OD would bisect the angle in a regular pentagon $y = 54°$	y value correct.	y value correct with justification.	
(b)(i)	50° The tangent meets the radius at 90°.	Correct angle and reason.		
(ii)	AOB = 100° angle at the circumference = half the angle at the centre OAB = 40° OR BAC = 90° (angle in a semi circle) OAB = 40° (angle sum of triangle)	1 angle statement with reason.	Answer correct with reason.	

(iii)	LNM = $\frac{a}{2}$ (angle at circumference) NLM = 90° (angle in a semi-circle) NM = 2 × radius Therefore can use trigonometry to express NL in terms of x and a $\cos\frac{a}{2} = \frac{\text{NL}}{2x}$ NL = $2x\cos\frac{a}{2}$ OR NML = $\frac{180-a}{2}$ (base angles isosceles triangle) NL = $2x\sin\frac{180-a}{2}$	One step in calculation with reason.	Progress towards solution or correct solution with incomplete reasoning.	Correct solution with reasons.
(c)	OSR = OYR = 90° (angles between tangents and radii) OX = OS = OY (radii of circle) OXS = OSX (isosceles triangle) RSZ = 90 – x (angles on a line) SZR = 90 – x (angle sum of triangle XYZ) Therefore RSZ is Isosceles RS = RZ OR SRZ = 2x (angle sum of triangle) YRS = 180 – 2x YOS = 2x Therefore OSRY is a kite. YR = SR = RZ SR bisects YZ	At least 2 steps towards answer completed – may be one relationship and one reason.	At least 4 steps in relationship found.	Relationship proved.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response or no relevant evidence	One point made incompletely	1u	2u	3u	2r	3r	t	2t

Three	Evidence	Achieved	Merit	Excellence
(a)(i)	$\sin^{-1} = \frac{2.9}{3} = 75.2°$ Yes the ladder is long enough.	Calculation correct.	Conclusion made.	
(ii)	Distance from base $= \sqrt{3^2 - 2.9^2} = 0.77$ m	Distance Found		
(iii)	$\sin 80 = \frac{2.9}{x}$ $x = 2.94$ $3 - 2.94 = 0.06$ m above the tank	Setting up of equation.	Solving for x and calculating difference.	
(b)(i)	BCD = 108° (corresponding angles)	Correct angle and reason.		
(ii)	If TUR = x UTS = 180° – x (co-interior angles) And if URS = y RST = 180° –y (co-interior angles) But $x + 180 - y = 180$ (opposite angles of a cyclic quadrilateral) Therefore $x = y$ Therefore the trapezium is symmetrical. Therefore RS = TU And RSTU is an isosceles trapezium, which is true for all trapeziums inscribed in a circle.	Two correct statements or one statement with a reason other than that used in part (i).	Recognition with reason the trapezium is isosceles.	Generalisation.
(c)	Calculating the northern components of the first two flight paths: 40cos50 + 45 = 25.71 + 45 = 70.71 Northerly component for third path of flight = 135 – 70.71 = 64.29 km Westerly component = 40 sin 50 = 30.64 Length of third flight path $= \sqrt{64.29^2 + 30.64^2}$ = 71.2 km Angle = $\tan^{-1} \frac{64.29}{30.64}$ = 64.5° Therefore bearing = 90 – 64.5 OR 026 or 025 71.2 km on a bearing of 025 or 026	Calculation of the northerly or westerly component of the first section of the flight.	Correct calculation of the bearing or the distance for the third section of the flight.	Distance and bearing calculated for the third section of the flight.

NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response or no relevant evidence	One point made incompletely	1u	2u	3u	2r	3r	1t	2t

Cut Scores

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