Assessment Schedule – 2018

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

Evidence Statement

Q	Expected coverage	Achievement	Merit	Excellence
ONE (a)(i)	∠HAG = 51° (corr ∠s, // lines =) ∠JHK = 51° (corr ∠s, // lines =) OR: start with ∠GHJ = 51° using alternate angles instead.	Correct angle. OR 1 step shown.	Correct angle found with at least one valid reason.	
(ii)	∠CBD = 180° – 90° – y = 90° – y (∠s in Δ add to 180°) $\angle z$ = 180° – (90° – y) = 90° + y (∠s on a straight line = 180°) OR $\angle z$ = 90° + y (ext ∠ of a Δ = sum of opp. int. ∠s)	1 step shown. OR An unsimplified equivalent expression for z.	Correct angle found (simplified) with at least one valid reason.	
(b)	$\angle UTX : \tan\theta = \frac{2.5}{3}$ $\theta = 39.8°$ This passes council regulations. $\text{height} : \tan 39.8° = \frac{h}{8}$ YW = 6.67 m This fails council regulations. OR (using similar triangles) $k = 2\frac{2}{3}$ $h = 2.5 \times 2\frac{2}{3} = 6.67$ m	Angle found correctly. OR Equivalent (such as maximum compliant angle has UX greater than that stated). OR Equivalent (such as maximum compliant angle has UX greater than that stated). Accept 0.694 rads or 44.2 grads. OR Height found correctly or consistently.	Both angle and height found correctly. OR One of the aspects is found correctly and a correct conclusion is drawn in context for **that aspect.**	Clear working shown, AND an overall conclusive statement is made as to whether **the slide** passes both of the council regulations.
(c)	N = North, X = seesaw, G = swing, F = slide, O = sandpit ∠NOG = 10° ∠NOF = 130° ∠NOX = 75° ∠GOX = 65° ∠OXG = 57.5° (base ∠s isos Δ =) ∠XOF = 155° (∠s at pt = 360°) ∠OXF = 12.5° (base ∠s isos Δ =) ∴ Turning angle = 57.5 + 12.5 = 70°	Any TWO relevant angles correctly recognised. *(They could be shown on the diagram.)*	Any FOUR relevant angles correctly recognised with at least one relevant reason stated.	Correct turning angle stated with clear working and at least TWO relevant reasons stated.

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

Two	Expected coverage	Achievement	Merit	Excellence
(a)(i)	∠LDA = 33° (base ∠s isos Δ =) $\angle x = 180 - (2 \times 33) = 114°$ (∠s in Δ add to 180°)	Correct angle. OR 1 step shown.	Correct angle found with at least one valid reason.	
(ii)	∠ADB = 33° (base ∠s isos Δ =) ∠DBA = 90° (∠ in semicircle = 90°) $\therefore \angle y + 33° = 180° - 90° - 33°$ $\angle y = 24°$ (∠s in Δ add to 180°)	Correct angle. OR 1 step shown, but not the same step as for (ai) above	Correct angle found with at least one valid reason.	
(b)	**Solution assumes that the line AOB is a straight line.** This is reasonable as part (a) of the question specified that context. OB = OD = OC = OA = radii ΔODB = equilateral triangle (1) ∠AOC = 60° (corr ∠s, // lines =) ∠OAC = ∠ACO = 60° (base ∠s isos Δ =) so ΔOCA = equilateral triangle (2) ∠DOC = 60° (∠s on a straight line = 180°) ∠ODC = ∠OCD = 60° (base ∠s isos Δ =) so ΔOCD = equilateral triangle since ∠BOD = ∠DOC = ∠COA = 60° (∠s in Δ add to 180°) With ΔODB, ΔOCA, and ΔOCD all equilateral, then OD = AC.	Identifies one equilateral triangle (could be marked on the diagram) with support. OR Identifies a pair of equal sides, one in each of the two triangles, AND a pair of equal angles, one in each of the triangles (1) and (2), with support.	Forms two equilateral triangles with valid justification. OR Establishes the "SAS" situation with support: Two pairs of equal sides, one of each pair in each of the triangles (1) and (2) AND a pair of equal angles one in each of the triangles (1) and (2) located between these lines in each triangle.	Establishes that ΔBOD and ΔOCA are congruent (all their sides are the same length SSS or SAS) and **concludes in particular, that** **OD = AC**
(c)	∠FLK = 108° (∠s in a polygon) ∠FLO = 54° x = distance from L to inner pentagon vertex. $\sin 54° = \frac{2}{x}$ = 3.072 m $x = 2.472$ m Find y – distance halfway between F and L. $\cos 54° = \frac{y}{3.072}$ $y = 1.806$ m Double this distance 2 × 1.806 = 3.61 m	Calculates the angle 54° or 36° in a relevant rt ∠ Δ. Relevant rt ∠ Δs are: Small rt∠ Δ (in small 5-gon) Big rt∠Δ (between the 2 5-gons Overlapping rt∠Δ	Uses the angle to calculate an appropriate length in any relevant rt ∠ Δ: e.g. 0.35 m 0.485 m 1.45 m 1.805 m 2.47 m 3.07 m	States correct length with relevant working and / or geometric reasoning.

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

Three	Expected coverage	Achieved	Merit	Excellence
(a)(i)	$\sin w = \frac{1.8}{2.3}$ $w = 51.5°$	Angle w found. Accept 0.899 rads and 57.2 grads		
(ii)	$\sqrt{2.3^2 - 1.8^2} = 1.43$ $\therefore v = 1.43 - 0.5 = 0.9$ m v = 0.93 m accept 0.9 m	Complete height of 1.43 m found.	0.5 removed to give 0.9 m.	
(b)	**Solution assumes that the line ABD is straight and is a tangent to the circle.** ∠AOD = 108° (∠s in Δ add to 180°) ∠EOF = 108° (vert opp ∠s =) ∠OEF = 36° (base ∠s isos Δ =) ∠BOD = 68° (∠s in Δ add to 180°) ∠JOE = 68° (vert opp ∠s =) $\therefore \angle z$ = 76° (∠s in Δ add to 180°)	Finds one relevant angle with at least one reason towards answer.	Finds two relevant angles with at least two reasons towards answer.	Answer completed, well explained and justified, with at least two reasons.
(c)	Let XB be vertical height below. $\sin 85° = \frac{XB}{2.5}$ XB = 2.49 m $XE = \sqrt{3^2 - 2.49^2} = 1.67$ Let P = halfway between C and E $\sin 60° = \frac{EP}{1.67}$ EP = 1.45 m $\therefore CE = 2 \times 1.45 = 2.9$ m	One correct height or length found from: XB = 2.49 m EX = 1.67 m EP = 1.45 m CE = 2.9 m AX = 0.22 m	Two correct heights or lengths found from: XB = 2.49 m EX = 1.67 m EP = 1.45 m CE = 2.9 m	Final answer stated with working.

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No response; no relevant evidence.	One point made incompletely.	1 of u	2 of u	3 of u	2 of r	3 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