

**APPLICATIONS UNIT 1
HIGHER TIER**

Applications Unit 1 Higher Tier January 2015	Mark	Comment
1(a) Considering multiples of 12 and 14, e.g. sight of 12, 24, 36, .. AND 14, 28, 42, ..., OR Looking at factors of 12 and 14, e.g. sight of 2×6 AND 2×7 Correct list of multiples of 12 to at least 72, or multiple 72 AND Correct list of multiples of 14 to at least 70, or multiple 70, OR Sight of $2 \times 6 \times 7$ Sight of 84 (as common multiple or number of minutes) Time 11:24 (b) 12/50 or equivalent (ISW)	S1 M1 A1 A1 B2 6	At least 3 correct multiples for both 12, 24, 36, 48, 60, 72, 84 14, 28, 42, 56, 70, 84 OR 1 hour 24 minutes FT time from 10:00 for their number of minutes provided S1 and M1 awarded <i>If no marks SC2 for an answer of 12(:)48, OR SC1 for sight of 2hours 48minutes No marks for sight of 168(minutes) alone.</i> B1 for sight of 12, or 'their attempt to sum number of trains'/50
2(a) Appropriate arc(s) (dashes) shown on both lines, AND intersection arcs shown, using first set of arcs Angle bisector drawn (b)(i) $3 \times 3.75 + 3 \times (4 \times 16.25 + 2 \times 18.5(0))$ (Sian's pay is $11.25 + 195 + 111 = \text{£} 317.25$) (ii) $4 \times 3.75 (= 15)$ $(4 \times) 2y \times 18.5(0) + (4 \times) y \times 16.25$ $P = 15 + 213y$	M1 A1 M2 A1 B1 B2 B1 9	$\pm 2 \text{ mm}$ M0 if no arcs seen $\pm 2 \text{ mm}$ <i>SC1 if steps of process seen but slightly outside tolerance, OR SC1 if no arcs seen on the sides of the triangle but a correct set of arcs for the bisector shown</i> M1 for sight of the terms 3×3.75 and $4 \times 16.25 + 2 \times 18.5(0)$ (11.25) (65+37 = 102) OR M1 for sight of the terms $3 \times 4 \times 16.25$ and $3 \times 2 \times 18.5(0)$ (195) (111) OR M1 for $3.75 + 4 \times 16.25 + 2 \times 18.5(0) (= 105.75)$ FT from M1 May be seen in stages of working Must be as an expression or formula of at least 2 terms which may have been simplified, OR B1 for either term correct in an expression of at least 2 terms CAO. Must be a formula ISW <i>If no marks allow SC1 for $P = 12y (+15)$</i>
2(c) $\pi \times 6^2$ Between 113.04 to 113.1(43m²) inclusive, or 113(m²) (d) (1 revolution measures) $2 \times \pi \times 0.24$ $\times 32$ or $\times 14$ (West field) 48.2 to 48.3(2m), or 48(m) AND (Storage building) 21.(1...m)	M1 A1 M1 m1 A1 5	Ignore incorrect rounding or truncation if a correct response is seen. Accept $36\pi \text{ (m}^2\text{)}$ as the final answer May be embedded in working ($C = 1.507 \dots \text{m}$)

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3(a) 1 share seen or implied $2380 \div 10$ or 238 (Connelly Boats pay) $2380 \times 2 \div 10$ OR (Water Watch pay) $2380 \times 5 \div 10$ (Connelly Boats pay £) 476 (Water Watch pay £) 1190 (The 7 friends altogether have to pay £) 714 (Each of the seven friends has to pay $714 \div 7$) (= £) 102 QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps. AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to • present work clearly, with words explaining process or steps. OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer (b) Sight of 7×4.40 (= £ 30.80) OR clear description e.g. “They have rounded the length to 7m and charged them for that” Suggestion how the charges could be displayed more clearly, e.g. ‘sign should include ‘to the nearest metre’ or ‘boats between 6.5 and 7.5 charged ...	B1 M1 A1 A1 B1 B1 QWC 2 B1 E1 10	B1 implied if both appropriate calculations seen If these answers are unlabelled they must be in the correct order FT 2380 minus the sum of their Connelly Boats and Water Watch payments, i.e. $2380 - \text{‘their 476’} - \text{‘their 1190’}$ correctly evaluated CAO depends on the award of all previous marks QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar. <i>Allow $30.80 \div 7 = 4.4(0)$ or $30.80 \div 4.4(0) = 7$ Do not allow they were charged $4.4(0)$ per metre</i> <i>Need to show appreciation of the rounding for E1 e.g. “Give the total costs on the display so £30.80 for a 7m boat” is insufficient Accept 6-5 – 7.5(m) charged £4.40 per (whole) m or equivalent. Accept only suggestions that keep the cost for 7.1m as £30.80 e.g. ‘boats between 6 and 8 m long are charged £4.40 per m’ Do not allow suggestions that lead to changes in the costs displayed for example: ‘boats 7 to 8 (m) are charged...’ is E0 Ignore suggestions that do not relate to the costs for 7.1m</i>		
3(c) (i) 110° drawn from harbour 320° drawn from the position of buoy 1 055° drawn from the position of buoy 2 Line 10cm OR 6cm OR 2.5cm for the appropriate stage Accurate chart with lengths and angles correct (ii) 290° (iii) Distance (± 2 mm) from the position of buoy 3 to the harbour Bearing ($\pm 2^\circ$) from the position of buoy 3 to the harbour (d) Lines following the shape of coast line at 5km An arc of radius 20km from Funchal Perpendicular bisector (Ribeira Brava and Santa Cruz) Appropriate region indicated	 B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 12	Accept ‘their North’ provided $\pm 2^\circ$ from the North given. Penalise ‘their North’ outside of this tolerance once only $\pm 2^\circ$ $\pm 2^\circ$ $\pm 2^\circ$ ± 2 mm Within tolerances allowed $\pm 2^\circ$. FT from their diagram $\pm 2^\circ$ FT from their diagram (Actual is approximately $8 \times 60 = 480$ m) FT from their diagram (Actual is approximately 250°) 1cm $\pm$ 2 mm 4cm $\pm$ 2mm $\pm 2^\circ$ FT for region provided at least B2 previously awarded with an attempt at all three conditions		
3(e)(i) $33 \times 12 + 4$ (=400 inches) $\div 0.3937$ (or $\times 2.54$) 1016(.002....cm) or 1020(cm) (ii) <table border="1"><tr><td>10160</td><td>$1(.016...) \times 10^4$</td></tr></table>	10160	$1(.016...) \times 10^4$	M1 m1 A1 B1 B1 5	<i>Allow M1 if 33×12 and an additional 4 seen in the working Do not accept $\times 2.5$</i> Left entry, 10160(.02) or 10200 or FT $10 \times$ ‘their (e)(i)’ Right entry, $1(.016...) \times 10^4$. FT from use of ‘their 10160’
10160	$1(.016...) \times 10^4$			

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4(a)(i) Implies or states ‘no’ with a valid reason, e.g. ‘No as 810 minutes is less than 15 hours’	B1	(For information 810mins = 13.5 hrs, 900mins = 15hrs) Any calculations shown must be correct					
(ii) Mid-points 45, 135, 225, 360, 630 45×10 + 135×38 + 225×20 + 360×8 + 630×4 (450 + 5130 + 4500 + 2880 + 2520 = 15480) ÷80 193.5	B1 M1 m1 A1	FT their mid-points including bounds. Allow 1 slip in their mid-points outside boundaries if otherwise correct method FT their $\Sigma f_x/80$ Accept 193 or 194 if correct working is seen					
(iii) <table border="1"><tr><td>10</td><td>48</td><td>68</td><td>76</td><td>80</td></tr></table>	10	48	68	76	80	B1	
10	48	68	76	80			
(iv) Correct cumulative frequency diagram, points plotted at upper bounds and joined by a curve or straight line	B2	FT from cumulative (iii). Must show initial plot at the origin. B1 for points correct but not joined, OR B1 correct apart from 0.5 translation, OR B1 if one error in plotting but joined correctly					
(v) Median 160 Intention to subtract readings from horizontal axis for vertical 60 & 20 Interquartile range from diagram	B1 M1 A1 11	FT from their cumulative diagram. <u>Not cumulative no FT</u> FT from their cumulative diagram.					
4(b)(i) Range ends 50 and 800 correctly indicated with ‘whiskers’ Within a box: Median line correctly indicated LQ correctly indicated UQ correctly indicated	B1 B1 B1 B1	There must be a box drawn for these three marks, not vertical lines only.					
(ii) Suitable comparison statement for medians Suitable comparison statement for IQR Conclusion, e.g. ‘Don’t agree because....’	M1 M1 A1	FT their (a)(v) median IQR Thursday is 360, and FT their (a)(v) IQR Depends on first M1 Accept ‘Don’t agree’ OR ‘No’ ‘because on average Thursday is higher’ Ignore extra comment based on the IQR providing it does not contradict their conclusion based on the median. If no marks awarded SC1 for ‘Cannot decide as we do not know if these are a typical Thursday and a typical Wednesday’.					
(c)(i) Reason that implies ‘like with like’ comparison, i.e. always includes the full set of days or because a 7 point moving average will provide an average for the week	E1	Do not accept ‘because there are 7 days in a week’ or ‘using the whole week’s data’ without further explanation <i>Accept statements such as “the results then show the viewing figures for a week”</i>					
(ii) 4.27, 4.30, 4.34, 4.40, 4.33 (million)	B4 <						

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5(a) Strategy, e.g. to draw a tangent at 7.5 seconds Use of difference v / difference t $= 0.4$ to 0.6 m/s^2 or m per s^2	S1 M1 A1 U1	Must be differences, not readings from axes. Ignore signs Reasonable from their graph. <i>Allow a fraction for example 4/7</i> Does not depend on previous marks Maybe shown on their graph
(b) Identifying the required area Splitting area into areas that can be approximated Complete calculation for the area required Accurately calculated area	S1 M1 M1 A1 8	Must include at least 1 calculation for an appropriate area, or correct statement of the trapezium rule OR correct substitution into the trapezium rule, allow 1 slip (Possible answers around 195 to 215 metres)

t	0	1	2	3	4	5	6	6.4	7	8	9	10
H	0	4.9	19.6	44.1	78.4	122.5	176.4	200	240.1	313.6	396.9	490

t	0	10	20	30	40	50	60
H	0	490	1960	4410	7840	12250	17640

6(a) Suitable uniform scales on labelled axes	B2	Scale for H does not extend beyond 400(m) B1 on labelled scale for H extends beyond 400(m) Award B1 for correct scales and one label missing.				
At least 6 correct values calculated (or plotted) which could produce an appropriate curve.	B2	For example including values of H for t = 3, 4, 5, 6, (7) OR values of t for H = 175 and 200 B1 for 2, 3, 4 or 5 correct values calculated				
At least 6 correct values plotted AND joined with a curve that includes H = 200	C1	No incorrect values plotted				
(b) Check reading for their graph:		MUST FT their graph, not for calculation (Calculated values are 30.625 and 132.496) FT only from derived points or values.				
<table border="1"><tr><td>from graph ≈ 28 to 33</td><td>e.g 3×10^{-2}, 3.1×10^{-2}</td></tr><tr><td>from graph ≈ 130 to 135</td><td>e.g 1.32×10^{-1}, 1.33×10^{-1}</td></tr></table>	from graph ≈ 28 to 33	e.g 3×10^{-2} , 3.1×10^{-2}	from graph ≈ 130 to 135	e.g 1.32×10^{-1} , 1.33×10^{-1}	B1 B1	For both readings correct for their graph FT expressed in km in standard form <i>If no marks, SC1 for one correct reading from their graph, as km and correctly given in standard form</i>
from graph ≈ 28 to 33	e.g 3×10^{-2} , 3.1×10^{-2}					
from graph ≈ 130 to 135	e.g 1.32×10^{-1} , 1.33×10^{-1}					
(c) Suggests error due to river level changing or other suitable reason, or that the time taken was not accurately measured, or not drop from consistent level on the bridge, or rivers were not all horizontal, or different river levels, or windy, or air resistance neglected, or...	E1	Allow comparison that implies the stones are different				
(d) $496 = \frac{1}{2} \times 9.8 \times t^2$ $t^2 = 101.2244898...$ $t = 10(.06...seconds)$	M1 A1 A1 11	Accept (t between) 10 and 10.1 from use of trial and improvement CAO				