

# APPLICATIONS UNIT 1 HIGHER TIER

Applications Unit 1 Higher Tier January 2014	Mark	Comment																								
1.(a) Reason, e.g. ‘outside the juice bar’, ‘mostly younger people use juice bars’	E1	Accept reference to question 2. Accept reference to age bias																								
(b) Any 2 of: ‘No under 15s’, ‘30 appears in two boxes’, ‘may object to giving their age’	E2	E1 for each response. Do not accept: Over 40s in one group, gaps between ages different																								
(c) (i) Explanation, e.g. ‘vague’, ‘no options’, ‘open question’, ‘can’t display answers easily’, ‘can’t answer if answer to Q2 is NO’, ‘many payment methods’, ‘not same pattern as Q1 & Q2’, ‘no boxes to tick’	E1	<i>Mark responses in the sections they appear, do not pick out responses in other sections. In all parts ignore additional information given by the candidate once a correct response has been given credit.</i>																								
(ii) States ‘need to give options’, ‘change question to allow for no drink bought’ OR give some options, e.g. card, cash, vouchers from phone, etc	B1																									
	5																									
2.(a) At least 2 sides of a triangle 6 cm (±2mm) <u>Construction arcs</u> to make at least 1 60° (±2°) angle Accurate triangle (see overlay)	M1 M1 A1	<i>Penalise -1 for incorrect scale in (a), then FT</i>																								
(b) Lines parallel to each side a distance of 2cm (±2mm) away Arc 2cm (±2mm) centred on at least one vertex Correct drain placement (as overlay)	M1  M1 A1 6	<i>Depends on M2 Penalise -1 for incorrect scale in (b), then FT</i>																								
3.(a) Explanation, e.g. ‘no box had less than 200g’, or ‘no underweight boxes of pasta’, ‘ <b>all other</b> boxes must weigh more (than 205g)’, or similar	E1	Do not accept ‘ <b>some</b> of the <b>other</b> boxes weigh more’, or ‘all boxes weigh more’. Do not accept a repeat of the question																								
(b)(i)																										
<table><tr><td>(3)</td><td>(4)</td><td>7</td><td>9</td><td>9</td><td>9</td><td>10</td><td>12</td></tr><tr><td>(30)</td><td>(40)</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td></tr><tr><td>0.1</td><td>0.1</td><td>0.14</td><td>0.15</td><td>0.128..</td><td>0.1125</td><td>0.111..</td><td>0.12</td></tr></table>	(3)	(4)	7	9	9	9	10	12	(30)	(40)	50	60	70	80	90	100	0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12	B1 B1 B2	
(3)	(4)	7	9	9	9	10	12																			
(30)	(40)	50	60	70	80	90	100																			
0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12																			
(ii) Uniform scale on vertical axis Correct plots (allow joined or not joined)	B1 B2	FT from their cumulative totals to last row Accept truncation to 2d.p. Accept percentages B1 for any 6 correct, or all rounded or truncated to 1d.p.  FT from (b)(i) only for r.f.<1, %<100% Need not start at 0. FT to plots if possible B1 for at least 6 correct plots																								
(iii) (0.12)	B1	No FT to (iii) for either mark for r.f.>1 Correct response or strict FT from their last relative frequency, but must be ≤ 1																								
Explanation: e.g. “last point plotted”, “all data used”	E1 10	Do not accept references to most common, all round to 0.12, etc																								
<table><tr><td>(3)</td><td>(4)</td><td>7</td><td>9</td><td>9</td><td>9</td><td>10</td><td>12</td></tr><tr><td>(30)</td><td>(40)</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td><td>100</td></tr><tr><td>0.1</td><td>0.1</td><td>0.14</td><td>0.15</td><td>0.128..</td><td>0.1125</td><td>0.111..</td><td>0.12</td></tr></table>	(3)	(4)	7	9	9	9	10	12	(30)	(40)	50	60	70	80	90	100	0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12		
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0.1	0.1	0.14	0.15	0.128..	0.1125	0.111..	0.12																			
4. (4, -3) (-3, -5)	B2  2	B1 for either or for marking both correct points on the grid. SC1 for (-2.5, 6.5) or (-7, 9)																								

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<p>5.(a)(i) <math>[18 + 12 \times 2 + 30 \times 0.25] \times 1.2</math>  <math>(=49.5(0) \times 1.2)</math>  <math>(£)59.4(0)</math>  (ii)(£)35.1(0)  (b) Sight of <math>12 \times h</math> OR <math>(0).25 \times m, m/4</math>  <math>18 + 12 \times h + (0).25 \times m</math> OR  the product of 1.2 by the sum of at least 2 correct terms  <math>F = 1.2(18 + 12 h + 0.25m)</math> or equivalent</p> <p>(c) Explanation, e.g. '60×25p is more than the cost per hour', or '£15 paying for an hour charged by the minute, but £12 for the hour', '50×25p (=£12.50) is more than the cost per hour', or 'between 48 and 60 minutes cost more than an hour', or similar</p>	<p>M1 A1 B1 B1 B1  B2  E1  8</p>	<p>Intention <math>\times 1.2</math> however brackets may be missing</p> <p>Or equivalent in pence throughout</p> <p>Accept <math>F = (18 + 12 \times h + (0).25 \times m) \times 1.2</math>  B1 for <math>(F =) 18 + 12 \times h + (0).25 \times m \times 1.2</math>,  i.e. missing brackets or partially in brackets  OR <math>(18 + 12 \times h + (0).25 \times m) \times 1.2</math> with any  2 of the 3 terms within the brackets correct  <i>Ignore if F is written as T</i></p>
<p>6.(Area 1 slab <math>\Rightarrow 30 \times 40 + \frac{1}{2} \times 30 \times 40</math> (cm<sup>2</sup>) (=1800cm<sup>2</sup>)  (Area 25 slabs =1800) <math>\times 25</math> (=45000cm<sup>2</sup>)  <math>(45000 \div 10000 =) 4.5</math> (m<sup>2</sup>)</p> <p>(Number of tins of sealant = ) 6</p> <p>(Paving slabs) <math>25 \times £8.25</math> (£206.25)  + (+)  (6 tins of sealant) <math>6 \times £14.49</math> (£86.94)</p> <p>((Total cost = £)293.19</p> <p>Look for</p> <ul style="list-style-type: none"> <li>• use of units, e.g. £, cm<sup>2</sup>, m<sup>2</sup></li> <li>• notation, e.g. '=<math>\Rightarrow</math>'</li> <li>• labels for calculations</li> </ul> <p>QWC2: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps.</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer</li> </ul> <p>QWC1: Candidates will be expected to</p> <ul style="list-style-type: none"> <li>• present work clearly, with words explaining process or steps.</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>• make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer</li> </ul>	<p>M1 m1 B1  B1  M1  A1  QWC 2   8</p>	<p>OR <math>\frac{1}{2} \times 40 \times (60 + 30)</math> (cm<sup>2</sup>)  OR <math>25 \times 0.18</math>, intention their area <math>\times 25</math>  Conversion to m<sup>2</sup> or correct use of measures in m with area calculation. 'Their 45000' <math>\div 10000</math> correctly evaluated. This may be done early as each length <math>\div 100</math>, or area single slab <math>\div 10000</math></p> <p>FT 'their area' <math>\div 0.8</math> evaluated and rounded up  Allow for 'their area' of 1 slab, mark is for the intention to divide by 0.8 and round up the answer. Only award for calculations involving rounding up</p> <p>Their full calculation, FT their <b>whole</b> number of tins of sealant. Must be whole number of tins</p> <p>CAO</p> <p>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.</p> <p>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.</p> <p>QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.</p>

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<p>7. Any common multiple of any 2 of 40, 24 and 16 OR <math>40 = 2 \times 2 \times 2 \times 5</math> OR <math>24 = 2 \times 2 \times 2 \times 3</math> Working towards a common multiple of 40, 24 and 16, looking at multiples, allowing 1 error in 1 sequence of multiples OR <math>40 = 2 \times 2 \times 2 \times 5</math> and <math>24 = 2 \times 2 \times 2 \times 3</math> and <math>16 = 2 \times 2 \times 2 \times 2</math>  <math>2 \times 2 \times 2 \times 2 \times 3 \times 5</math> (= 240) or any multiple of 240 Table completed correctly, or sight of correct number of boxes in working, e.g.</p> <table border="1"><tr><td>Springs</td><td>6 boxes</td></tr><tr><td>Washers</td><td>10 boxes</td></tr><tr><td>Rods</td><td>15 boxes</td></tr></table> <p>Or answers 6n, 10n, 15n when n is an integer and n&gt;0</p>	Springs	6 boxes	Washers	10 boxes	Rods	15 boxes	<p>M1  M1  A1 A1  4</p>	<p>Numbers do not need to be prime, accept e.g. <math>40 = 8 \times 5</math> OR <math>24 = 8 \times 3</math>  Accept <math>40 = 8 \times 5</math> and <math>24 = 8 \times 3</math> and <math>16 = 8 \times 2</math></p>
Springs	6 boxes							
Washers	10 boxes							
Rods	15 boxes							
<p>8.(a) Journey 800 km seen or implied Length on map measured, answers in the range 9cm to 10.5cm inclusive <math>800 \div \dots</math> Sentence completed or implied by correct evaluation</p> <p>(b) Both bearings correct <math>273^\circ \pm 2^\circ</math> and <math>030^\circ \pm 2^\circ</math></p> <p>(c) <math>2.5 \times 10^{-1}</math></p> <p>(d) <math>(T =) d/s + b</math> or <math>(T =) \frac{d + bs}{s}</math> or equivalent</p>	<p>B1 B1  M1 A1  B2  B2  B2 10</p>	<p>FT <math>800 \div</math> ‘their measurement in cm’  B1 for either bearing correct <math>\pm 2^\circ</math>, or both correct <math>\pm 3^\circ</math>, or for <math>270 \pm 3^\circ</math> with <math>30 \pm 2^\circ</math> B1 for 0.25(km), or for ‘their answer’ in km correctly expressed in standard form, provided ‘their answer’ &lt;1 or ‘their answer’ &gt;10 SC1 for <math>2.5 \times 10^4</math> (25000 in standard form) B1 for <math>(T =) t + b</math> with sight of d/s elsewhere</p>						

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9.(a)(i) Mid points 2.5, 5.5, 8.5, 11.5 $2.5 \times 32 + 5.5 \times 26 + 8.5 \times 14 + 11.5 \times 2 = 365$ $\div 74$  (£)4.93(2...)  (ii) (£)11.99 (b)(i) 60, 61, 63, 69  (ii) Correct plots at mid interval points  Solid trend line shown (iii) Any 2 suitable comments about number of visitors (not the lines) one comment on time series and one comment on the trend line	B1 M1 m1 A1  B1 B3  P2  L1  E1 E1 13	FT their mid-points (within & including bounds) Their $\Sigma fx \div 74$ . Accept reasonable rounding from correct working Allow (£)12 B2 for any two correct entries, B1 for correct method seen, or 1 correct entry FT for their values from (b)(i) P1 for any 2 correct plots or a consistent translation for all correct values to labelled season (bounds) FT from P1. Allow a dotted line FT from (b)(i) and their trend line Do not accept descriptions of the lines Accept 'summer more popular' Do not accept 'steeper' (refers to the line not visitors)																								
10. <table border="1"><tr><td><math>1000^{2/3}</math></td><td><math>10^2</math></td><td><math>1 \times 10^2</math></td></tr><tr><td><math>1000^4</math></td><td><math>10^{12}</math></td><td><math>1 \times 10^{12}</math></td></tr><tr><td><math>1000^{-1/3}</math></td><td><math>10^{-1}</math></td><td><math>1 \times 10^{-1}</math></td></tr><tr><td><math>1000^{-8}</math></td><td><math>10^{-24}</math></td><td><math>1 \times 10^{-24}</math></td></tr></table>	$1000^{2/3}$	$10^2$	$1 \times 10^2$	$1000^4$	$10^{12}$	$1 \times 10^{12}$	$1000^{-1/3}$	$10^{-1}$	$1 \times 10^{-1}$	$1000^{-8}$	$10^{-24}$	$1 \times 10^{-24}$	B4  B2  6	B1 for each of $10^2$ , $1000^4$ , $10^{-1}$ and $1000^{-8}$ in the correct cell For standard form entries, FT from their penultimate column written in standard form, OR B1 for at least one standard form correct or FT												
$1000^{2/3}$	$10^2$	$1 \times 10^2$																								
$1000^4$	$10^{12}$	$1 \times 10^{12}$																								
$1000^{-1/3}$	$10^{-1}$	$1 \times 10^{-1}$																								
$1000^{-8}$	$10^{-24}$	$1 \times 10^{-24}$																								
11. Strategy: use of ratio and $\pi r^2$  Use of A : B is 2 : 3 or sight of 2/5 Area circle = $\pi \times 1.5^2$ Area A = $(2/5) \times \pi \times 1.5^2$ $= 2.8(27.. \text{ cm}^2)$	S1  B1 B1 M1 A1 5	May included use of a three stage ratio, e.g. 2 parts of 7  Mark final answer																								
12.(a) 5 (athletes) (b) 15 (athletes) (c) $45 - 25$ $= 20$ (seconds) (d) <table border="1"><tr><td>t</td><td>0 to 10</td><td>10 to 15</td><td>15 to 20</td><td>20 to 25</td><td>25 to 30</td><td>30 to 40</td><td>40 to 50</td></tr><tr><td>f</td><td>0</td><td>5</td><td>0</td><td>5</td><td>5</td><td>5</td><td>20</td></tr><tr><td>f.d.</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0.5</td><td>2</td></tr></table>  Axes labelled 'frequency density' and 'time' with appropriate scales, with at least 1 correct bar  Correct histogram (as acetate)	t	0 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 40	40 to 50	f	0	5	0	5	5	5	20	f.d.	0	1	0	1	1	0.5	2	B1 B1 M1 A1  B1  B1  B1  M1 A1 9	Indication of groups Allow 20 to 30 taken as one group  Correct frequency. FT for their groups, provided there are at least 4 groups  Frequency density, FT from a total of 1 or 2 errors in groups and/or frequencies  FT from their frequency densities, but not from raw data (frequency) and not cumulative data (cumulative frequency) If M0, A0, allow SC1 for correct histogram with correct groups, but axes not labelled
t	0 to 10	10 to 15	15 to 20	20 to 25	25 to 30	30 to 40	40 to 50																			
f	0	5	0	5	5	5	20																			
f.d.	0	1	0	1	1	0.5	2																			

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13.(a) (10) $\times 60 \times 60$ $\div 1000$ 36 (km/h)	M1 M1 A1													
(b) Tangent at t = 30 Use of difference in v / difference in t Acceleration ..... (reasonable for their tangent) m/s <sup>2</sup> or ms <sup>-2</sup>	M1 M1 A1 U1	Accept with or without sight of a tangent Must be evaluated from their tangent Independent												
(c) Use of area under the curve from 0 to 30 seconds Correct method, including $\frac{1}{2} \times 4 \times 30$ or $\frac{1}{2} \times 5 \times 30$  Correct answer to calculation, e.g. 60(m) to 75(m)	S1 M1  A1	<i>Treat area 0 to 50 seconds as MR-1 then FT</i> Accept any suitable calculation for 1 or more blocks of area If units are given they must be correct <i>Trapezium rule (approximate values)</i> $10 \times [0 + 4.4 + 2(1.75 + 3.4)] / 2 = 73.5(m)$												
(d) Attempt to find at least one point, i.e. value of v for a value of t between 10 and 50 At least 2 correct plots or 2 appropriate values of v Suitable curve between 30 and 40 or 3 values of v evaluated in the interval $30 \leq t \leq 40$ (t is) 35 or 36 seconds (to the nearest second)	S1  P1 C1  B1  14	<table border="1"><tr><td>t</td><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td></tr><tr><td>v</td><td>0.4</td><td>1.6</td><td>3.6</td><td>6.4</td><td>10</td></tr></table> CAO <i>Allow B4 for a correct answer resulting from a substitution or trial method</i>	t	10	20	30	40	50	v	0.4	1.6	3.6	6.4	10
t	10	20	30	40	50									
v	0.4	1.6	3.6	6.4	10									