

UNIT 2 (HIGHER TIER)

Applications Unit 2 Higher Tier June 2014		Mark	Comment				
1. <table border="1"><tr><td>1 Pyramid Cubit</td><td>25.027 inches, 3dp.</td></tr><tr><td>1 Pyramid Inch</td><td>2.543 cm, 4 sig. fig.</td></tr></table>		1 Pyramid Cubit	25.027 inches, 3dp.	1 Pyramid Inch	2.543 cm, 4 sig. fig.	B2 B2 4	B1 for sight of 25.0(2711688) rounded or truncated B1 for sight of 2.5(42755075008) rounded or truncated <i>If no marks SC1 for evidence of $25 \times 1.001(08...)$ AND $2.54 \times 1.001(08...)$</i>
1 Pyramid Cubit	25.027 inches, 3dp.						
1 Pyramid Inch	2.543 cm, 4 sig. fig.						
2(a)(i) (=) B2 + C2 or sum(B2:C2) or sum(B2,C2)		B1	Or equivalent through percentage				
(ii) (=) $100 \times B3/D3$ or $100 \times B3/(B3+C3)$ or equivalent correct alternatives		B2	B1 for sight of B3/D3 or through MR $100 \times C3/D3$ Accept $\times$ for *, and $\div$ for /				
(b) (Total carbohydrate in 360g pack is) $64.5 \times 360 \div 100$		M1					
(Number of bars found by) $\div 15.48$		M1	Method may be shown in either order				
(Number of bars) 15 (bars)		A1					
Look for: • Calculations linked to text • Units given as appropriate, g or ‘bars’ • Spelling • Final statement			<i>Alternative method:</i> <i>(Weight of one bar is)</i> $15.48 \times 100 \div 64.5 (=24g)$ M1 <i>(Number of bars)</i> $360 \div 24$ M1 FT ‘their 24’ <i>(Number of bars)</i> 15 (bars) A1				
QWC2: Candidates will be expected to • present work clearly, with words explaining process or steps		QWC 2	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.				
AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer			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.				
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			QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.				
(c) (Carbohydrate =) $85 \times 64.5(0) \div 100$ 54.8 or 54.82 or 54.83 or 55 (g)		M1 A2 11	A1 for 54.825				
3(a) All 7 points plotted correctly, not joined		B2	B1 for at least 3 correct plots not joined, or all points plotted correctly but joined				
(b) Reasonable straight line of best fit by eye, some points above and below		B1	Do not accept through intersection of the axes				
(c) Positive		B1	<u>Accept appropriate descriptions</u>				
(d)(i) Example of ‘takings’ $\div$ ‘number of visitors’ or decision to compare takings with number of visitors Manager might think ‘takings’ $\div$ ‘number of visitors’ is valid which always gives a result $>£1$, or comparison with conclusion that takings is always greater than number of visitors		B1 E1					
(ii) Explanation, e.g.” ‘takings’ $\div$ ‘number of visitors’ is not valid because some visitors may not even visit the tea shop , (so they spend £0, also some visitors may spend a lot less than £1 and other spending much more than £1)”		E1	Or states that ‘takings’ $\div$ ‘number of visitors’ is not valid Accept ‘some visitors may not spend anything in the tea shop’, also accept a reason based on some people spending $<£1$ and some $>£1$.				
		7					

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4(a)(i) 87 AND Subidas (ii) <table><tr><td></td><td>Median in £</td><td>Range in £</td><td>Mode in £</td></tr><tr><td>Subidas</td><td>56</td><td>46</td><td>42</td></tr><tr><td>Dinkey</td><td>66</td><td>40</td><td>54</td></tr></table> (iii) Dinkey with a valid reason, e.g. refers to the skew of the stem-and-leaf diagram, or compares the modes or medians (b)(i) 50×1.40 (=70) or 2.5×1.40 (=3.5) or $90 \div 1.40$ (=64.2857...) or $4.5 \div 1.40$ (=3.2142...) or equivalent ' <u>Not correct</u> ' stated or implied with correct interpretation of their appropriate calculation (ii) Notices that the pictogram is number of cases not prices/costs		Median in £	Range in £	Mode in £	Subidas	56	46	42	Dinkey	66	40	54	B1 B4 E1 B1 E1 E1
	Median in £	Range in £	Mode in £										
Subidas	56	46	42										
Dinkey	66	40	54										

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6(a)(... the) <u>cost</u> of a sandwich in <u>pence</u> AND (... the) <u>cost</u> of a drink in <u>pence</u>	B2	Do not accept 'sandwiches' and 'drinks' need 'cost'('price') and unit 'pence' B1 if correct (cost) but 'in pence' omitted, or for either statement correct, or for 'sandwiches in pence and drinks in pence' B0 for 'sandwiches' and 'drinks'
(b) Method, e.g. equal coefficients Correct first variable Method to find 2 nd variable, e.g. substitution Correct second variable	M1 A1 m1 A1	Allow 1 slip in non-equalised variable $x = 180$ or $y = 90$
(c) Idea that £1.68 is 112% Start of a correct method $1(.)68/1(.)12 (\times 100 \times 10)$ 1 box costs (£)15	B1 M1 A1 9	For the division of correct digits, not place value An answer of (£)1.5(0) implies B1, M1, A0
7(a)(i) (diagonal base ² =) $230^2 + 230^2$ diagonal base ² = 105800 or diagonal base = $\sqrt{105800}$ $\text{path}^2 = (\frac{1}{2} \text{ diagonal base})^2 + 146^2$ $\text{path}^2 = 47766$ or $\text{path} = \sqrt{47766}$ Path 218.6 or 218.5(543...) (m)	M1 A1 M1 A1 A1	diagonal base = 325.269..., $\frac{1}{2}$ diagonal base = 162.63... or $115\sqrt{2}$ FT $\frac{1}{2}$ their diagonal base, but not 230 or 115 Must be for correct $\frac{1}{2}$ diagonal base used Accept 218 or 219 from correct working <i>Alternative for the 1st 3 marks:</i> $\text{path}^2 = 115^2 + 115^2 + 146^2$ M3 OR $115^2 + 115^2$ OR $115^2 + 146^2$ M1 $= 26450$ OR $= 34541$ A1 $\text{path}^2 = 26450 + 146^2$ OR $\text{path}^2 = 34541 + 115^2$ M1
(ii) $\tan e = 146 / \frac{1}{2} \text{diagonal}$ or $\sin e = 146 / \text{path}$ or $\cos e = \frac{1}{2} \text{diagonal} / \text{path}$ $e = 41(9...^\circ)$ or $42(^\circ)$	M1 A2	FT throughout for their ' $\frac{1}{2}$ diagonal' and their 'path' for M1 only CAO. A1 for $e = \tan^{-1} 0.8977...$ or $\sin^{-1} 0.668...$, or $\cos^{-1} 0.744...$
(b) $7/15.4 = x/17.6$ or $x = 17.6 \div 2.2$ or equivalent (side on smaller triangle $x =$) 8 (cm) $y = 2.2 \times 11$ or $y/11 = 15.4/7$ or equivalent (side on larger triangle $y =$) 24(2 cm)	M1 A1 M1 A1 12	For a correct first step For a correct first step
8(a) Line $d+p = 25$ drawn correctly Line $3d+2p = 60$ drawn correctly The correct region indicated	B1 B1 B1	FT their inequalities for similar region provided at least 1 line is correct
(b) Any correct point from the correct region, using whole numbers only	B1 4	FT from 2 lines with at least one line drawn correctly and similar region Do not accept $p(\text{lates}) = 0$
9. Considering (1 dollar =) $1 \div 1.29 (= 0.7751938 \text{ euros})$ Considering (1 dollar =) $1 \div 1.61 (= £0.62111801...)$ Realising (£) $1 \div 1.61 = 1 \div 1.29$ (euros) (£) $1 = 1.61 \times 1 \div 1.29 = 1.24(8 \text{ euros})$ OR 1.25(euros)	B1 B1 M1 A1 4	Award B1, B1, M1 for sight of $1.61 \div 1.29$
10. $\Pi \times 1.8^2 \times 142/360$ OR $\Pi \times 3.6^2 \times 142/360$ $\Pi \times 3.6^2 \times 142/360 - \Pi \times 1.8^2 \times 142/360$ Answer $12(\text{cm}^2)$ or answers in the range 12.03 to 12.05 (cm^2)	B1 M1 A1 3	Seen in working Or equivalent

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11(a) $5.2/100 \times 450$ or 0.052×450 or $23.4(0)$ $(1 + 0.052)^4 \times 450$	B1 M1	May be embedded in further calculation Method of adding on different amounts, 4 year period, following attempts to calculate 5.2% Example of working without truncation or rounding: ($450 + 23.4(0) = 473.4(0)$ $473.4(0) + 24.6168 = 498.0168, 498.01$ or 498.02 $498.0168 + 25.8968736 = 523.9136736$ $523.9136736 + 27.24351.. = 551.15718..$) <i>Accept 551.15(7....)</i> <i>B1 and SC1 for depreciation 363.45(099..), but no FT for a conclusion</i> <i>Simple interest answer of 543.6(0) is awarded only the B1</i>
(£) 551.16	A1	
Conclusion, e.g. 'Yes as more than £550'	E1	FT from their compounded amount provided M1, and FT from simple interest from an answer of 543.6(0) being < 550
(b)(i) 0.068	B1	CAO
(ii) Greater AND a reason, e.g. 'interest is accumulated through the year (each three months)'	E1	
(iii) Use of $n = 4$ $(1 + 0.068/4)^4 - 1$ AER 6.98(%)	B1 M1 A2	Correct substitution in the formula given A1 for 0.06975373... rounded or truncated, or incorrect rounding or truncation of the AER percentage. Mark final answer (box takes priority)
(iv) Explanation, based on need for fair comparison of interest rates	E1 11	Allow 'percentage of interest paid annually', must mention 'year' or 'annual'
12(a)(i) All 5 plots accurate (taking into account accuracy difficulty of plotting) AND joined with a curve	B3	B2 for plots generally accurate for the first 2 seconds with an attempt at the others, but not joined by a curve (or joined by straight lines), OR B1 for (2500,) 1875, 1406.25, 1054.6(875), 791.0(15625) or (2500,) 1875, 1406, 1055 (or 1054), 791 (or 790) <i>SC1 for (2500) 625, 156.25, 39.0625, 9.76.. plotted AND joined with a curve</i>
(ii) From their graph (b) $f = m \times 3^5/4^5$ or $f = 243m/1024$ or $f = m \times 0.75^5$ or $f = m \times 0.237304687$	B1 B3 7	B2 for an expression, or $f = m/4^5$, $f = m/1024$, $f = m \times 0.25^5$, or $f = m \times 0.0009765625$, or equivalent OR B1 for evidence of m repeatedly being multiplied by: $\frac{3}{4}$, divided by 4 or multiplied by 0.75 or 0.25 i.e. more than once, OR sight of or $243/1024$ or 0.237304687 or 1024 or 0.0009765625

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13(a)(i) $3000 \div 60$ = 50 l/min. or 50 litres per minute	M1 A1	Units must be given for A1 Accept 50 bottles/min
(ii) 3000×12 or 36000 3.6×10^4	M1 A1	If no marks SC1 for 7.2×10^4
(b)(i) Use of: Cylinder + hemisphere = $\pi r^2 h + \frac{2}{3}\pi r^3$ Use of 1 litre = 1000ml or 1litre = 1000cm ³ Realising $1000 = \pi \times 4^2 \times h + \frac{2}{3}\pi \times 4^3$	B1 B1 S1	Accept use of 1 instead of 1000, and 8 instead of 4. Mark for the idea of how h can be found, but may have errors in substitution.
$h = \frac{1000 - \frac{2}{3}\pi \times 4^3}{\pi \times 4^2}$	M1	<u>For the isolation of h.</u> Accept FT for equivalent level of difficulty, e.g. with 1 instead of 1000, 8 instead of 4. Not for accuracy, for isolation, which may be seen in parts.
Height of cylinder, 17.2 (cm) Answers in the range 17.2 to 17.24(cm)	A1	CAO. Accept 17.3 as rounding up is appropriate Only accept 17(cm) from correct working
Overall inside height 21.2(cm) or 21(cm)	B1	FT 'their 17.2' + 4 correctly evaluated provided at least B1, S1 and M1 awarded in (i)
(ii) Reason, e.g. 'may not be able to fill to the top', 'measurements may be at lower bounds', 'need an air gap at the top of the bottle'	E1 11	