

UNIT 2 (HIGHER TIER)

Applications Unit 2 Summer 2013 Higher Tier GCSE				Final																	
1(a) (D3 =) C3 – B3 (F3=) D3 * E3 OR (F3=) D3 × E3 or equivalent (b) (i) D2 219 F2 1095 D3 448.8(0) F3 3590.4(0) F4 5000 (ii) (G5 =) F2 + F3 + F4 OR (G5 =) SUM(F2:F4)				B2	<i>Penalise once only for consistent incorrect cell number</i> B1 for 3C – 3B or 1108.8(0) – 660 B0 for B3 – C3 Accept (C3 – B3) * E3 or (C3 – B3) × E3 Do not accept numerical solutions Ignore inclusion of £ sign Accept if formula continued for addition of further F cells																
				B1																	
				B1																	
				B1																	
				5																	
2.				B2	For correct first 2 columns OR B1 for any 4 correct entries in the first 2 columns For correct final column, FT appropriate decision for their lines and rotational responses written in the table																
<table border="1"><tr><td>Design</td><td><i>n</i></td><td><i>r</i></td><td>Satisfies the criteria? Yes or No</td></tr><tr><td>Rings</td><td>3</td><td>3</td><td>Yes</td></tr><tr><td>Petals</td><td>4</td><td>4</td><td>Yes</td></tr><tr><td>Legs</td><td>0</td><td>3</td><td>No</td></tr></table>				Design		<i>n</i>	<i>r</i>	Satisfies the criteria? Yes or No	Rings	3	3	Yes	Petals	4	4	Yes	Legs	0	3	No	B1
Design	<i>n</i>	<i>r</i>	Satisfies the criteria? Yes or No																		
Rings	3	3	Yes																		
Petals	4	4	Yes																		
Legs	0	3	No																		
				3																	
3. Howard (£)10 Betty 2/5 × 10 OR Charlie 2/5 × 6 (£) 4 (£)2.4(0)				B1 M1 A2 4	A1 for each correct answer																
4. (a) Reason e.g. ‘fair comparison’, ‘doing survey the same way’ (b) (i) Name: Shaun Length in range 10.3 to 10.5(cm) (ii) Billy with a reason, e.g. ‘Billy because no correlation’, ‘Billy because leaves are different’, ‘Billy as no connection between length and width’ (iii) Reasonable straight line of best fit (iv) Width in the range 6.6 to 7.5 cm				B1 B1 B1 B1 B1 5	With some points above and some points below following the trend Ignore a ‘tail’ at the lower part of the line OR correct reading from their line of best fit																

5(a) All three stages of the appropriate calculation $560 \times (4.55 \div 37.8) \times 1.48$ (£)99.76 Look for • spelling • clarity • the use of notation (watch for the use of '=', £, being appropriate) 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)(i) $560 / 10.75$ or $560 / 10 \frac{3}{4}$ 52(.093 mph) (ii) C selected or implied with a reason, e.g. 'C because 52mph average means travels fast'	M3 A2 QWC 2 M2 A1 E1 11	M2 for sight of $560 \times 4.55 \div 37.8$, OR M1 for sight of $560 \div 37.8$, $4.55 \div 37.8$, $37.8 \div 4.55$, or 4.55×1.48 <i>Note:</i> $560 \div 37.8$ (= 14.814814... gallons) $\times 4.55$ (= 67.407... litres) Use of 14.8 gives 67.34, use of 15 gives 68.25 Depend s on M3 A1 for (£)99.7629.. or 99.6632 or 101.01 or other amount from premature approximation 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. M1 for $560/10.45$ or $560/675$ or $560/645$ CAO Only FT provided their answer in $70 \geq (b)(i) \geq 50$												
6(a) $0.5 \times 6 \times 8 \times 130$ 3120 (cm³) (b) Greater (by) 120 (cm³)	M2 A1 B1 4	M1 for $0.5 \times 6 \times 8 \times 1.3(0)$ or for $\frac{1}{2} \times 6 \times 8 \times$ 'digits 13 with incorrect place value' Do not accept $0.5 \times 6 \times 8 \times 10$ as area cross section CAO FT difference between 'their 3120' and 3000 correctly evaluated with appropriate statement of greater or less												
7(a) <table><tr><td></td><td>Median</td><td>Range</td><td>Mode</td></tr><tr><td>Internet</td><td>4</td><td>39</td><td>2</td></tr><tr><td>Town</td><td>16</td><td>20</td><td>14</td></tr></table> (b) Statement, e.g 'not typical', 'the town centre shops are actually in need of more help rather than the internet businesses', 'mode for businesses is actually only twice'		Median	Range	Mode	Internet	4	39	2	Town	16	20	14	B3 E1 4	B2 for 4 or 5 correct entries B1 for 2 or 3 correct entries
	Median	Range	Mode											
Internet	4	39	2											
Town	16	20	14											

8(a) Method to calculate costs, e.g. 14 portions is $2(.19 + 14 \times (0.12$ or equivalent calculation in pence	M1	OR for 1 portion, $2.19 \div 14 + 0.12$ (£0.2764...) or equivalent calculation in pence. Units must be consistent
(Cost of making 14 portions) (£)3.87	A1	Allow B1 (instead of M1, A1) for costs (£)3.27 (considering $9 \times 0.12 + 2.19$)
(Sales from 9 bowls of soup =) 9×2.95 (= £26.55)	M1	Do not accept for ' $(2.95 \pm \dots) \times 9$ ' unless used appropriately in further working
(Profit) (£)22.68	B1	CAO
(% profit =) $\frac{22.68}{\text{'their costs'}}$ $\times 100$ 586(.046%)	M1	FT provided M1 awarded and profit is (£)22.68
	A1	CAO
(b) $(x - 1) \times 1.6 + 13.4 = 35.8$ OR $x = \frac{35.8 - 13.4}{1.6} + 1$	M2	M1 for $1.6 \times x + 13.4 = 35.8$, or $x = (35.8 - 13.4) / 1.6$, OR M1 for equation would be correct apart from missing brackets, OR M1 for correct equation expressed in words
		Accept missing brackets if implied by a correct response
15 (cartons)	A1	If no marks allow SC1 for 15 (cartons)
(c) $2c + 4.5s = 3(.69$ and $5c + 7.5s = 6(.90$	B2	Accept 'carrots' and 'swede' written in full within an equation B1 for either equation, or inconsistent place value for money
Method to solve, e.g. equal coefficients	M1	FT provided at least 1 equation is correct and equivalent level of difficulty Allow 1 slip in non equated variable
Correct first value	A1	FT from their first value
Method to find the second variable	m1	Carrots 45(p) per kg, Swede 62(p) per kg
Correct second value	A1	Accept 0.45 and 0.62. If units are given they need to be correct for A1
		Do not accept unsupported answers or use of trial & improvement methods. No marks
	15	
9. Any 2 correct separate reason based on risk: Reason: Females (pay less) longer life expectation Reason: 'Smokers life expectation shorter than non smokers (of same age)' Reason: 'Premiums increase with age as risk increases' Reason: 'Older people pay more as shorter time to make payments'	E2	E1 for one correct reason Do not accept a statement without giving reason, Do not accept e.g. 'premiums increase with age', or 'smokers pay more' within statement of why.
	2	
10(a) Idea to divide by 2 or a power of 2 $2.3 \times 10^{30} / 2^5$ or equivalent 7.2×10^{28} (b) $r = 0.75^t \times x$	M1 m1 A2 B3	Dividing their 2.3×10^{30} by 2^5 or equivalent A1 for 7.1875×10^{28} B2 for correct expression $0.75^t \times x$ B1 for $0.75x$, $x - 1/4 x$, $0.75^2 x$, ... SC2 for $r = 0.25^t \times x$ or SC1 for $0.25^t \times x$ or equivalent
	7	

11. Idea of ratio or length scale factor, e.g. sight of 0.8 or 1.25 Area scale factor used correctly $\div 0.8^2$ or $\times 1.25^2$ or equivalent 1 cartridge to make 38281(.25) smaller bubbles $15\,000\,000 \div 38281(.25)$ 391.8... or 392 cartridges needed Cost (£)9800	M1 M1 A1 M1 A1 A1 6	Evidence of this implies also the first M1 FT their linear scale factor squared used correctly for all further marks FT 'their 38281.25' number of smaller bubbles provided both M1 awarded CAO. FT for the cost of a whole number of cartridges rounded up. (Note 9795.92 is A0) <i>Allow M1 and SC1 for linear calculation with answer (£)12 250</i>
12(a) 3.24×0.8 OR 3.24×0.60 2.59(%) AND 1.94(%) (b)(i) Oak AND a reason showing understand of AER (ii) Oak (Total amount after 2 years = £)25000 $\times 1.023^4$ (Total amount £)27380.57(37...) OR (Interest £)2380.57(3696...) Sycamore (Total amount after 2 years = £)25000 $\times 1.046^2$ (Total amount £)27352.9(0) OR (Interest £)2352.9(0) (Difference in interest is £) 27.67	M1 A3 E1 M2 A1 M1 A1 B1 11	Or other complete method A2 for 2.59(2) AND 1.94(4) A1 for either 2.59(2) OR 1.94(4) <i>If no marks SC1 for sight of digits 2592 and 1944 (incorrect place value), OR for 0.65 and 1.3(0)</i> Reason must say about comparing annually Accept 'Oak, because they give more interest (annually)' Or for alternative complete method compounding 4 times, or M1 for $2.3\% \times 25000$ (= £575) Do not accept other rounding or truncation Or alternative complete method Do not accept other rounding or truncation FT provided M mark(s) for Oak or Sycamore awarded, with all this answer to nearest penny
13. Density = $\frac{21.4 \times 10.13}{19.3}$ = 11.2(322...troy ounces/cubic inch)	M1 A1 2	
14(a) $R + P < 45$ $40R + 65P > 1560$ (b) Line $R + P = 45$ shown Line $40R + 65P = 1560$ shown Region between the lines indicated (c) Using their graph to show Iwan's statement outside the region with 'No' in the table AND shown on the graph Using their graph to show Sid's statement inside the region with 'Yes' in the table AND shown on the graph	B1 B1 B1 B1 B1 B1 7	<i>If no marks, SC1 for $R+P \dots 45$ and $40R + 65P \dots 1560$, with the gaps here both being inequalities</i> FT their inequalities if possible from a slip Accept FT from either line correct but for a similar region MUST be a FT from their graph in (c) provided at least 1 line is correct. Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly

15. Sight of 3.45, 3.55, 4.75 and 4.85 $\tan x = 3.55/4.75$ and $\tan x = 3.45/4.85$ Greatest $x = 36.77(3..^\circ)$ or $36.8(^\circ)$ or $37(^\circ)$ Least $x = 35.4(25...^\circ)$ or $35.43(^\circ)$ or $35(^\circ)$	B1 M1 A1 A1 4	FT their least and greatest provided $>$ $<$ or $>$ then values given in the question for M1 only From correct working From correct working
16. Volume hemisphere = $\frac{1}{2} \times \frac{4}{3} \times \pi \times 0.9^3$ = $1.5(268... \text{ cm}^3)$ Volume cylinder = 8.6 – volume hemisphere correctly evaluated (7.1 cm^3) $7.1 = \pi \times 0.9^2 \times h$ $h = 7.1 / (\pi \times 0.9^2)$ Answers in the range 2.77 to 2.8 (cm) Overall height = 3.7 (cm) Rod length = $3.7/\sin 68^\circ$ Answers in the range 3.96 to 4 (cm)	M1 A1 B1 M1 M1 A1 B1 M2 A1 10	Accept rounded or truncated 1.53 or 1.52 FT their volume hemisphere CAO CAO FT provided all M marks awarded FT their 3.7 provided >0.9 M1 for $\sin 68^\circ = 3.7/\text{rod}$ CAO