GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

SUMMER 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2014 examination in GCSE APPLICATIONS OF MATHEMTICS (LINKED PAIR PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

UNIT 1 (FOUNDATION TIER)

Applications Unit 1 Foundation Tier June 2014	Mark	Comment
1. (a) 37	B1	
(b) 85˚ drawn	B1	±2˚
130˚ drawn	B1	±2˚
Line of 6cm AND 4.5cm drawn	B2	±2mm B1 for line of 6cm OR 4.5cm drawn or indicated. Within tolerances allowed
(c)(i) Church (2, 5)	B1	Reverse coordinates B0 throughout (c)
Castle (-4, -3)	B1	
(ii) Skating park (S) plotted at (3, 0)	B1	Accept any indication of (3, 0)
(d) (i) 45 (minutes)	B1	
(ii) ¾ (hours) + 20 (mins) + 1.5 (hours)	M1	For adding the 3 times given. FT 'their 45 minutes'
Changing all to hours OR all to mins correctly	B1	Either 45 + 20 + 90 OR ¾ + $^1/_3$ + 1.5 or equivalent
155 mins or 2 hrs 35 mins or 2.58(3....)hours ISW	A1	Do not accept 0.3 for 1/3 for A1 but allow for B1 If units used they must be correct. Do not accept 2.35 but allow 2:35
	12	
2. (a) Working towards 13 & 12 boxes or Engaging with buy 1 get 1 half price	S1	
13 × (£)27.6(0) or 12 × (£)13.8(0)	M1	
(£)358.8(0)	A1	
(£)165.6(0)	A1	
(£)524.4(0)	A1	FT 'their (£)358.8(0)' + 'their (£)165.6(0)'
		If M0 awarded allow SC1 for sight of (£)13.8(0). Possible S1 can still be awarded.
		Alternative method: *Cost of 2 boxes = 1.5 × £27.60 B1* *∴ cost of 24 boxes* *= 12 × 1.5 × £27.60 = 496.80 M1A1* *Total cost including 25th Box* *= 27.60 + 524.40 M1 A1*
(b) A, B & D circled	B2	Award B1 for any 2 correct nets circled and C not circled
	7	
3. (a) Mean, total of numbers = 154	M1	Attempt to add all given values
÷ 7	m1	FT 'their 154'
= 22	A1	CAO
Put in order 17, 19, 19, 20, 24, 25, 30	M1	
Median = 20	A1	
Mode = 19	B1	
Range = 13	B1	
(b)17 + 19 OR 30 - 19	M1	FT 'their 19'. Accept embedded answers.
36 OR 11	A1	
	9	

Applications Unit 1 Foundation Tier June 2014	Mark	Comment
4. (a) (cost of room) (5 × 24 =) (£)120 (total cost of meals) 27 × 154 (£)4158 (total money spent) 120 + 4158 + 356 + 165 (£)4799 (total money collected from tickets) 154 × 35 (£)5390 (Money given to charity) (£)591	B1 M1 A1 M1 A1 M1 A1 B1	FT 'their 120' **and** 'their 4158' but not 24 and 27. FT 'their correct total collected' – 'their total money spent' Unsupported correct answer implies all previous marks. <u>*Alternative method*</u> *(cost of room) (5 × 24 =) (£)120 B1* *(Difference in meal and ticket price) 35 – 27 M1* *= (£)8 A1* *(Total money from this difference) 8 × 154 M1* *= (£)1232 A1* *(total money spent) 120 + 356 + 165 M1* *(£)641 A1* *(Money given to charity) (£)591 B1*
Look for • Spelling • Clarity of text explanation • the use of notation, watch for the use of '=', '£' being appropriate For QWC2 labels, appropriate use of '=' and units (£) must be evident. 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 in their 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 in their answer	QWC 2 10	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.
4. (b) 6.5 × 3.5 = 22.75 Metres^2 or m^2 or square metres (c) (i) (£)295 + (£)2.8(0) × 20 (£)351 (ii) C = (£)295 + (£)2.8(0)m	M1 A1 U1 M1 A1 B2 7	Independent mark For the intention of multiplying and then adding Accept C = (£)295 + (£)2.8(0) × m Award B1 for (£)295 + (£)2.8(0) × m OR sight of (£)2.8(0) × m or equivalent

Applications Unit 1 Foundation Tier June 2014	Mark	Comment
5. (a) Strategy knowing that **all** sides are equal in length 27 × 7 189 (mm) 18.9 (cm) (b) Sight of 60(˚) 360 – 90 – 90 – 60 120(˚)	S1 M1 A1 B1 B1 M1 A1 7	May see 27 or 2.7 on all sides. Sight of 27 × 9 (=243) implies S1 Or equivalent FT 'their 189(mm)' *Alternative method for changing to cm 1st* *Award S1 as above* *Sight of 2.7 (cm) B1* *2.7 × 7 M1* *18.9 (cm) A1*
6. (a) 24 (seconds) (b) (i) 3.6 (miles) (ii) 69 (mins) (iii) Before, steeper graph	B2 B1 B1 E1 5	Award B1 for other multiples of 24 eg 48 (seconds) **OR** for listing multiples of 8 **AND** multiples of 6. Accept "Before as more vertical" or Before, because he travelled 3.6 miles in 30 mins and afterwards, 2.2 miles in 30 mins"
7. (a) Reason, e.g. outside the bookshop (b) Two boxes if you are 30 (c) Suitable question with at least 3 boxes, no overlaps or gaps and prices from a low value upwards (to maybe £20) considered or a number of boxes given but concentrated at lower prices	E1 E1 B2 4	Accept reference to people not buying, but checking out ready for downloading, 'showcasing', or that 'older people are more likely these days to buy from shops than younger people' Do not accept reference to groups under 20 and over 40. Or refers to widths groups for younger or older people, or unequal groups. Allow 'overlap(s)'. Ignore incorrect response if correct response is given. Do not accept 'doesn't give options for under 20s or over 40s', or '2 options for 20 year olds' B1 Suitable question with at least 3 boxes, with either consistent overlaps or gaps OR a suitable range of prices is not considered, OR B1 for suitable choice of groups with no gaps or overlaps but without a suitable question being asked *Examples of consistent overlaps or gaps:* *'£0 - £5, £5 - £10, £10 - …'* *'under £5, £6 - £10, £11 - £15, £16 - …'* *'over £5, over £10, over £20'** **however possible B2 if asked to tick only one box*
8. (a) 7cm (± 0.2cm) × 8 (÷ 100) 0.56 (m) (b) Measuring 2 appropriate angles (±2°) to check allied, or appropriate corresponding or alternate angles Conclusion based on the angles measured and accurate knowledge of parallel line angle facts.	M1 A1 B1 E1 4	Award M1 only for answers 56cm or 56m or 56 or similar from ±0.2cm tolerance The size of angles may not actually be recorded, e.g. on diagram equal angles marked *x* and *y*. Accept references to the angles which are equal or sum to 180° *(Angle at D & E appropriately 110°±2° or 70°±2°, Angle at A & B appropriately 108°±2° or 72°±2°)* Do not accept 'travelling in the same direction so won't meet'

Applications Unit 1 Foundation Tier June 2014	Mark	Comment
9. (a) (Number of necklaces is) 918 ÷ 34 = 27 (necklaces)	M1 A1	 *Note: Sight of 270 (yellow) or 162 (black) implies M1, A1*
(Number of yellow beads is 27×10 =) 270 (Number of black beads is 27×6 =) 162	B1 B1	FT their consistent 'derived 27' × 10 correctly evaluated FT their consistent 'derived 27' × 6 correctly evaluated
(b) Deciding to make two bracelets 8 bags of purple beads 3 bags of green beads	B1 B1 B1	OR sight of needing 48 purple or 18 green Reversed answer: '3 purple bags and 8 green bags' following correct working award B1, SC1. Note intention to match 72s is incorrect working. *If no marks, allow SC2 for 4 bracelets with 16 bags of purple beads and 6 bags of green beads, OR* *SC1 for other possible number of bracelets with the number of whole bags of purple and green correctly evaluated in the correct ratio*
	7	
10. (a) 5(7x + 3) (b) -16a -11b (c) 9d – 6e – d + e = 8d – 5e (d) One correct evaluation, $3 \le x \le 4$ 2 correct evaluations, $3.55 \le x \le 3.75$, one either side of 0 2 correct evaluations, $3.55 \le x \le 3.65$, one either side of 0 OR correct evaluation for x = 3.65 if previous B1 awarded 3.6 *No calculations shown: accept "too high",">", etc.*	B1 B1 B1 B1 B1 B1 M1 A1	 Allow -16a (+) -11b FT until 2nd error x $x^3 - 2x - 40$ 3 -19 3.1 -16.409 3.2 -13.632 3.3 -10.663 3.4 -7.496 3.5 -4.125 **3.55 -2.361125** 3.6 -0.544 **3.65 1.327125** 3.7 3.253 **3.75** 5.234375 3.8 7.272 3.9 11.519 4 16
	8	*Award SC1 for an unsupported answer of 3.6*

UNIT 1 (HIGHER TIER)

Applications Unit 1 **Higher Tier June 2014**	**Mark**	**Comment**
1(a) Reason, e.g. outside the bookshop	E1	Accept reference to people not buying, but checking out ready for downloading, 'showcasing', or that 'older people are more likely these days to buy from shops than younger people' Do not accept reference to groups under 20 and over 40.
(b) Two boxes if you are 30	E1	Or refers to widths groups for younger or older people, or unequal groups. Allow 'overlap(s)'. Ignore incorrect response if correct response is given. Do not accept 'doesn't give options for under 20s or over 40s', or '2 options for 20 year olds'
(c) Suitable question with at least 3 boxes, no overlaps or gaps and prices from a low value upwards (to maybe £20) considered or a number of boxes given but concentrated at lower prices	B2 4	B1 Suitable question with at least 3 boxes, with either consistent overlaps or gaps OR a suitable range of prices is not considered, OR B1 for suitable choice of groups with no gaps or overlaps but without a suitable question being asked *Examples of consistent overlaps or gaps:* *'£0 - £5, £5 - £10, £10 - …'* *'under £5, £6 - £10, £11 - £15, £16 - …'* *'over £5, over £10, over £20'** **however possible B2 if asked to tick only one box*
2(a)(i) 180 + 73 or 360 - 107 $= 253^{(o)}$ (ii) 360 – 42 $= 318^{(o)}$	M1 A1 M1 A1	*SC1 for answers of 073(°) and 138(°) in (i) and (ii)*
(b) 60° with construction arcs (30° by) bisecting 'their angle', with arcs shown Correct 30° from appropriate construction with line shown at the right hand end of the line	M1 M1 A1 7	Accept anywhere on the line *Allow sight of construction arcs for 60°* Line (road) may not be shown Depends on both M marks
3(a) 7cm (± 0.2cm) × 8 (÷ 100) 0.56 (m)	M1 A1	Award M1 only for answers 56cm or 56m or 56 or similar from ±0.2cm tolerance
(b) Measuring 2 appropriate angles (±2°) to check allied, or appropriate corresponding or alternate angles Conclusion based on the angles measured and accurate knowledge of parallel line angle facts.	B1 E1 4	The size of angles may not actually be recorded, e.g. on diagram equal angles marked *x* and *y*. Accept references to the angles which are equal or sum to 180° *(Angle at D & E appropriately 110°±2° or 70°±2°, Angle at A & B appropriately 108°±2° or 72°±2°)* Do not accept 'travelling in the same direction so won't meet'

Applications Unit 1 Higher Tier June 2014	Mark	Comment
4(a) (Number of necklaces is) 918 ÷ 34 = 27 (necklaces)	M1 A1	
		Note: Sight of 270 (yellow) or 162 (black) implies M1, A1
(Number of yellow beads is 27×10 =) 270	B1	FT their consistent 'derived 27' × 10 correctly evaluated
(Number of black beads is 27×6 =) 162	B1	FT their consistent 'derived 27' × 6 correctly evaluated
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	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.
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		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.
(b) Deciding to make two bracelets 8 bags of purple beads 3 bags of green beads	B1 B1 B1	OR sight of needing 48 purple or 18 green Reversed answer: '3 purple bags and 8 green bags' following correct working award B1, SC1. Note intention to match 72s is incorrect working. *If no marks, allow SC2 for 4 bracelets with 16 bags of purple beads and 6 bags of green beads, OR* *SC1 for other possible number of bracelets with the number of whole bags of purple and green correctly evaluated in the correct ratio*
	9	
5(a) 5(7x + 3) (b) -16a -11b (c) 9d – 6e – d + e = 8d – 5e (d) One correct evaluation, $3 \le x \le 4$ 2 correct evaluations, $3.55 \le x \le 3.75$, one either side of 0 2 correct evaluations, $3.55 \le x \le 3.65$, one either side of 0 OR correct evaluation for x = 3.65 if previous B1 awarded 3.6 *No calculations shown: accept "too high",">", etc.*	B1 B1 B1 B1 B1 B1 M1 A1	Allow -16a (+) -11b FT until 2nd error x $x^3 - 2x - 40$ 3 -19 3.1 -16.409 3.2 -13.632 3.3 -10.663 3.4 -7.496 3.5 -4.125 **3.55 -2.361125** 3.6 -0.544 **3.65 1.327125** 3.7 3.253 **3.75** 5.234375 3.8 7.272 3.9 11.519 4 16
	8	*Award SC1 for an unsupported answer of 3.6*

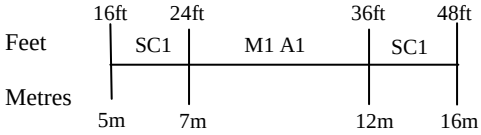
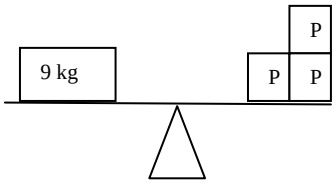
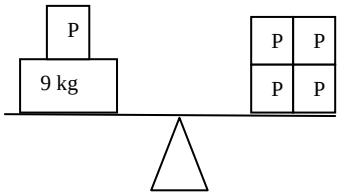
Applications Unit 1 Higher Tier June 2014	Mark	Comment
6(a)(i) Total number of rotten apples considered 9 Total number of apples considered 100 9/100 or equivalent	B1 B1 B1	 Allow 3/20+0/20+1/20+4/20+1/20 leading to 9/100 as poor notation *Allow B2 for an answer of 1.8/20*
(ii) 8×9 or equivalent 72 (rotten apples)	M1 A1	FT their (i) × 8 *M1 only for an answer of 72/..., e.g. 72/800*
(b) 2/24 ISW (=1/12 = 0.08333…)	B2 7	B1 for appropriate sight of '2 apples' considered as a response or answers of 3/24 (= 1/8 = 0.125) or 4/24 (= 1/6 = 0.1666…)
7(a) 240, 300, 345, 440	B3	OR B2 for any two correct entries, OR B1 for a correct method seen, or one correct entry
(b)Plots correct for their data at the mid interval with trend line drawn	B2	B1 for correct plots at mid interval, or consistent translated plots with trend line drawn
(c) Explanation, e.g. 'months not equal number of days', 'months about the same number of days'	E1	Accept 'yes' or 'no' depending on a reasonable explanation Allow 'NO, it makes it easier to plot with equal spaces', or 'NO, it still displays the data correctly' Do not accept 'YES, it gives inaccurate display', without an explanation of why
(d) 'NO', stated or implied with a suitable reason, e.g. 'will go down again as it gets to winter (autumn)', 'only rising as it now includes summer months', 'No in the long term as autumn and winter approach', 'no way of knowing'	E1 7	Accept YES with an appropriate reason, e.g. 'Yes in the short term as August has yet to be included'
8. Straight lines parallel to all verticals and horizontals, with lines of radius distance away from the steps (±2mm)	B2	B1 for straight lines, or series of points (>6), parallel to 2 verticals/horizontals, radius distance away (±2mm), OR straight **lines** parallel to all 6 verticals and horizontals but not radius distance away *Do not accept curves with free hand sketches*
All inner steps, locus turn at 90° vertex	B1	
All outer steps, arcs with wheel radius (±2mm)	B2 5	B1 for arcs with wheel radius (±2mm) at 2 outer steps, OR intention of arcs at all outer steps but not necessarily at wheel radius If B5 penalise extra lines drawn -1
9.(a)(i) (800 – 300)/ 50 = 10	M1 A1	Or equivalent
(ii) Explanation, e.g. 'extra cost per person', '£10 per person', '£100 extra for every 10 people'	E1	Do not accept 'more people the more paid' FT from their gradient if reasonable
(iii) Explanation, e.g. 'fixed charge'	E1	Accept 'conference cost starts at £300', or 'hire cost'
(b) (£)200	B1 5	CAO

Applications Unit 1 Higher Tier June 2014	Mark	Comment
10(a) 44, 76, 80	B1	
(b) Correct cumulative frequency diagram, points plotted at upper bounds and joined by a curve or straight line	B2	Accuracy: nearer the intersection of correct lines than any others FT only if cumulative in (a) 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
(c)		FT from their **cumulative** entries. Not cumulative means no FT. Accuracy of readings ±0.5
Median ≈ 58 reading from graph	B1	
Low quartile ≈ 55.5 reading from graph	B1	
Upper quartile ≈ 61 reading from graph	B1	
Interquartile range ≈ 5.5	B1	FT their UQ – their LQ correctly evaluated. Independent FT
(d) Range ends correctly indicated (50(cm) and 68(cm))	B1	In (d) FT consistent previous misread of scale Whiskers should be shown
Median line correctly indicated (approx. 58)	B1	If incorrect then FT their median
UQ and LQ correctly indicated (approx. 61 & 55.5)	B1 10	If incorrect then FT their UQ and LQ readings
11(a) Sight of $8(10+x) - x^2$ or $8\times10 + x(8-x)$	M1	OR sight of appropriate areas, e.g 8×10, $8\times x$ and $x\times x$
Convincing $80 + 8x - x^2$	A1	Must follow from correct working
(b) Finding at least two correct values for the area, either in working or plotted	M1	In (b) ignore any points x>5 x: 0, 1, 2, 3, 4, 5 Area: 80, 87, 92, 95, 96, 95
At least 4 correct plots	P1	
All 6 points plotted accurately and joined with a curve	C1	
(c) Either appropriate use of the graph or sight of $83.75 = 80 + 8x - x^2$	M1	
$x = 0.5$	A1 7	FT from their graph. Allow inclusion of 7.5 with the answer 0.5. *An answer of 7.5 only implies M1, A0*
12.		
$(8^{⅓} + 4^{-½})$ = 2.5	B1	Allow 2.50
$2.3\times10^{-1} + 9^0$ = 1.2	B1	B0 for 0.23 + 1 = 1.23, or 1.20
$\sqrt[3]{125^2 + 12\times160000^{-¼}}$ = 26	B1 3	B0 for 25 + 0.6 = 25.6, or 26.0 However if final 2 B marks are not awarded then SC1 for answers 1.23 **and** 25.6 respectively, or 1.20 **and 26.0**
13(a) Method of finding 1 correct area	M1	
2 correct areas AND intention to add all areas	M1	Areas are $4\times25 + 6\times25 + 7\times25 + 2\times50$ $= 100 + 150 + 175 + 100$
525	A1	CAO. Answer of 600 by considering full area, is award M1, SC1
(b) $1\times75 + 4\times25$ (=175)	M1	
$\times 200$	m1	
(£) 3.5×10^4	A2	A1 for 35000 If no marks, then SC1 for 'their 175'×200 correctly evaluated and expressed in standard form
(c) No, stated or implied with a reason, e.g. 'skew to offices greater than $80m^2$', 'the median (300^{th} value) lies within the 100–125 interval', 'No, the majority are greater than $80m^2$ (or $100m^2$)'	E2 9	E1 for an answer that implies no with a statement implying that the median is greater than $80m^2$ but without giving a reason why, OR E1 for NO with an incorrect median stated in the range 100<median<125 without further statement *Do not accept reference to mode*

Applications Unit 1 Higher Tier June 2014	Mark	Comment
14(a) Approximate period: 24 to 29 (minutes) (b) Tangent drawn at t = 35 Method, difference y / difference x Evaluated answer from their reasonable tangent cm/min (c) $562 = \pi \times r^2$ $r = \sqrt{(562/\pi)}$ (r = 13.37…) $C = 2 \times \pi \times$ their r 80 (cm)	B1 B1 M1 A1 U1 M1 m1 M1 A2 10	Accept 25 to 30 (minutes) or 23 to 28 (minutes) Not necessarily from a tangent *(May be approximately 0.2)* Accept 'cm per min(ute)' FT their derived r A1 for 84.0…
15.(a) Finding the y values: (0,) 8, 7(, 0) Use of trapezium rule or splitting into the 3 areas required and attempt to sum Complete correct calculation for the area required 30 (m) (b) 'Under estimate' with reason suggesting that trapezium is beneath the curve	B1 M1 A1 A1 E1 5	May be shown on their graph FT their values for y (8 + 15 + 7) CAO Treat splitting area into 6 parts as MR-1, then follow the stages of the mark scheme

UNIT 2 (FOUNDATION TIER)

Applications Unit 2 Foundation Tier June 2014	Mark	Comment
1. Cabbage 8, Peas 13, Sprouts 6, Broccoli 3	B2	May be inferred from their bar chart. B1 for any two/three correct frequencies. If frequencies score 0, then give B1 for all 4 correct tallies.
Both axes labelled, e.g. frequency or number of people along one axis and Cabbage, Peas, Sprouts, Broccoli along the other axis (or on the bars), anywhere within the base (inc) of the corres. bar AND uniform scale for the frequency axis starting at 0.	B2	B1 if no scale but allow one square to represent 1 OR B1 if not labelled as 'frequency' or similar. If frequency scale starts with 1 at the top of the first square the starting at 0 will be implied for this axis. **<u>Condone frequency numbers alongside square instead of at the top of the squares.</u>**
Four bars at correct heights (bars must be of equal width). Can be in any order.	B2 6	FT their frequencies throughout. FT their scale. B1 for any 2 or 3 correct bars on FT.
2. (Cost of bracelets) (200 × 6.30) (£)1260 (number of bracelets sold at higher price) 60/100 × 200 120 (sale of 120 bracelets) (120 × (£)9.99 =) (£)1198.8(0) (sale of 80 bracelets) (80 × (£)3.98 =) (£)318.4(0) (sale of all 200 bracelets) (£)1517.2(0) (Profit of) (£)257.2(0)	B1 M1 A1 B1 B1 B1 B1	FT 'their 120' FT 200 –' their 120' but not 120 FT 'their 120 × (£)9.99' + 'their 80 (but not 120) × (£)3.98' FT 'their 1260' AND 'their 1517.2(0)'
Look for • Spelling • Clarity of text explanation • the use of notation, watch for the use of '=', '£', 'pence' being appropriate For QWC2 labels, appropriate use of '=' and units (£) must be evident. 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 in their 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 in their answer	QWC 2 9	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.

Applications Unit 2 Foundation Tier June 2014	Mark	Comment
3. (b) Car 4ft to 6ft OR 1.2m to 2m Car 2.5(cm) house 15(cm) Multiplying factor = 6 OR Multiplying factor if door used = 3.75 (allow 3.7 – 3.8) Height of house = Car's estimate × their SF (4 to 8) OR height of house = Door's estimate × their SF (1.75 to 5.75) *= correct answer for their figures* For B0(or B1), B0, M0, A0 <u>Award SC1 for answers which:</u> • only give car's height as 2.5 cm **and** height of house as 15 cm **OR** • proper attempt at 'dividing' the height of the house into equal parts.	B1 B1 M1 A1 4	 FT if height of door is used to estimate the height of the house instead of height of car. Door 4(cm) house 15(cm) FT their car's estimate AND scale factors 4 to 8 inc Correct units (feet or metres) must be seen at least once to get the final A1 Unsupported answers mark as follows (Candidates may be awarded the first B1 mark too): 
4. H and L F and N G and P B and K Any 2 shapes from A, C, D and I	B1 B1 B1 B1 B1 5	Order of letters not important
5. Two numbers or letters such that Q – P = 9 or Q = 9 + P Two numbers or letters such that Q = 4P P = 3 (kg) Q = 12 (kg)	 B1 B1 B1 B1 4	*Alternative method* For B2 first diagram OR P + P + P = 9  OR for B1 second diagram OR P + 9 = P + P + P + P 
6. (a) Weight of a man 90 kg Length of a rugby pitch 122 m Volume of a bottle of water 75 cl Speed of a sprinter over 100 metres 9 m/s	B1 B1 B1 B1 4	

<table>
<tr><th>Applications Unit 2
Foundation Tier June 2014</th><th>Mark</th><th>Comment</th></tr>
<tr><td>7. (a) Labour AND Conservative
(b) Conservative OR Labour
13 + 4 + 18 OR 6 + 6 + 5 + 13

Conservative 35 (years)
Labour 30 (years)
(c) $^{30}/_{65}$ (ISW)

(d) Explanation relating to number of years not being exact.</td><td>B1

M1

A1
A1
B2

B1

7</td><td>

Answers of 35 for Conservative or 30 for Labour implies M1

FT 65 – ‘their Conservative’ or FT ‘their Labour’. FT ‘their conservative + Labour’ as denominator. There must be a consistent FT for numerator and denominator, e.g. if Labour given as 29 and answer given as 29/65 award B1 only.

B1 for denominator of 65 or B1 for numerator of 30 in a fraction less than 1.
Award B1 for 30 out of 65 OR 0.46(1538461)

E.g. ‘One year could be May, another year in December’ OR ‘1945 to 1951 could be anything from 5 to 7 years’ OR ‘could be at different times within a year’.</td></tr>
<tr><td>8. (a) (i) -8(˚C)
(ii) 15(˚C)

(b) (i) 800 × 1.59
($) 1272 (dollars)
(ii) 456 ÷ 1.59
= (£)287</td><td>B1
B1

M1
A1
M1
A2
7</td><td>Do not accept Wednesday
Accept -15(˚C).
Watch for answer to greatest daily range of 9(˚C)

Award A1 for (£)286(.7924528)</td></tr>
<tr><td>9.
<table><tr><th>P son</th><th>Should have flu vaccination? Yes or No</th><th>Reason</th></tr><tr><td>Denise</td><td>Ye</td><td>Is a diabetic</td></tr><tr><td>Jack</td><td>Yes</td><td>Is over 65 and/or has a chest condition</td></tr><tr><td>David</td><td>No</td><td>Does not meet any requirements or equivalent, OR gives at least 2 reasons for not having the flu jab.</td></tr><tr><td>Alys</td><td>Yes</td><td>Is pregnant</td></tr></table></td><td>B4

4</td><td>Award B1 for each correct response and valid reason.

Award SC2 for ALL CORRECT reasons with ALL INCORRECT Yes/No.

If no marks awarded, award SC1 for Yes, Yes, No, Yes</td></tr>
<tr><td>10. (Units used =) 911
(cost of units =) 911 × 24.7 (÷ 100)

(£)225.017 or 22501.7(p)

(Charge for days =) (£)28.52 or 2852(p)
(Total =) (£)253.537 or 25353.7(p)

(Total bill =) (£) 253.54 or 25354(p)</td><td>B1
M1

A1

B1
B1

B1

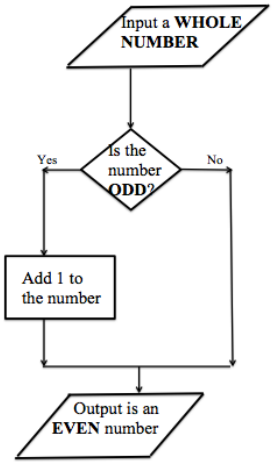
6</td><td>CAO
FT their number of units if subtraction has taken place.
Accept (£)225.02 or 22502(p)

If B0 M0 A0 awarded, award SC1 for correct evaluation of their number of units × 24.7 (÷100)

FT their figures. Accept rounded or truncated but no mix of units
Answer must be rounded correct to the nearest penny. FT any answer that requires rounding and has been rounded correctly and units have not been mixed.
If units are given, they must be correct.
Penalise once only for incorrect use of units.</td></tr>
</table>

Applications Unit 2 Foundation Tier June 2014	Mark	Comment
11. (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	Accept appropriate descriptions
(d)(i) Example of 'takings' ÷ 'number of visitors' or decision to **compare takings with number of visitors**	B1	
Manager might think 'takings' ÷ 'number of visitors' is valid which always gives a result >£1, or comparison with **conclusion that takings is always greater than number of visitors**	E1	
(ii) Explanation, e.g." 'takings' ÷ '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' ÷ '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	
12. (a)(i) 87 AND Subidas	B1	Do not accept indication on the diagram unless 87 seen
(ii)	B4	Median, mode and range correct, OR B3 for 4 or 5 correct entries B2 for 3 correct entries B1 for 1 or 2 correct entries
(iii) **Dinkey** with a valid reason, e.g. refers to the skew of the stem-and-leaf diagram, or compares the modes or medians	E1	Do not accept reason based on range Accept responses where means have been calculated and compared (59.9 & 64.9) Accept comparison of the totals (659 & 714) Do not accept 'On average, Dinkey', as a repeat of the question, however average 'Dinkey because their averages are higher'
(b)(i) 50 × 1.40 (=70) or 2.5 × 1.40 (=3.5) or 90÷1.40 (=64.2857…) or 4.5÷1.40 (=3.2142…) or equivalent	B1	
'Not correct' stated or implied with correct interpretation of their appropriate calculation	E1	Depends on B1 *Alternative:* *Sunday = 90 and Wednesday = 50 leading to either 90/50 or 40/50 B1* *which indicates 80% more sold on Sunday rather than 40% E1* Do not accept 100 × 50/90 = 55.55..% is incorrect, hence B0 'Wednesday sales 55.5…% of Friday sales', is incorrect, hence E0
(ii) Notices that the pictogram is number of cases not prices/costs	E1	Accept 'no' as implied within a suitable explanation
	9	

	Median in £	Range in £	Mode in £
Subidas	56	46	42
Dinkey	66	40	54

Applications Unit 2 Foundation Tier June 2014	Mark	Comment
13. (a) Example, 'output is the measurement in km', or 'conversion to km'	E2	Must have engaged with change of units for E2. E1 for correct but vague responses, e.g. 'measurements are smaller', 'changing units', 'changing measurements' Allow E1 for 'change to metres' or for the idea that is involves conversion
(b) Correct flowchart with appropriate symbols Accept equivalent ways For example,  	B6 8	I*gnore if start/stop 'rounded rectangle' missing.* Accept shapes not drawn using a ruler. Mark as follows: B1 Shape of boxes –Decision boxes shown as rhombus, non-decision boxes as rectangle, input/output boxes shown as parallelograms B1 for including entry of a **whole number** B1 for correct use of **'is it odd?'** or equivalent question B1 **Yes/No** labelled to appropriate next step B1 for following on from odd numbers to '**add 1**' B1 Bringing back together **and** including 'output of even number' or 'output number' *Do not accept flowchart based on checking numerically only without being generic, although it may be possible to award B1, B0, B0, B1, B0, B0*

UNIT 2 (HIGHER TIER)

Applications Unit 2 Higher Tier June 2014	Mark	Comment
1. 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 *If no marks SC1 for evidence of 25×1.001(08…) AND 2.54 × 1.001(08…)*
2(a)(i) (=) B2 + C2 or sum(B2:C2) or sum(B2,C2)	B1	Or equivalent through percentage
(ii) (=) 100 * B3/D3 or 100 * B3/(B3+C3) or equivalent correct alternatives	B2	B1 for sight of B3/D3 or through MR 100 * C3/D3 Accept × for *, and ÷ for /
(b) (Total carbohydrate in 360g pack is) 64.5 × 360÷100 (Number of bars found by) ÷15.48 (Number of bars) 15 (bars)	M1 M1 A1	Method may be shown in either order *Alternative method:* *(Weight of one bar is)* *15.48 × 100÷64.5 (=24g) M1* *(Number of bars)* *360 ÷24 M1 FT 'their 24'* *(Number of bars)* *15 (bars) A1*
Look for: • Calculations linked to text • Units given as appropriate, g or 'bars' • Spelling • Final statement	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.
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 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 × 64.5(0) ÷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	Accept appropriate descriptions
(d)(i) Example of 'takings' ÷ 'number of visitors' or decision to **compare takings with number of visitors** Manager might think 'takings' ÷ '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' ÷ '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 7	Or states that 'takings' ÷ '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.

<table>
<tr><th>Applications Unit 2
Higher Tier June 2014</th><th>Mark</th><th>Comment</th></tr>
<tr><td>4(a)(i) 87 AND Subidas
(ii)
<table>
<tr><th></th><th>Median in £</th><th>Range in £</th><th>Mode in £</th></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÷1.40 (=64.2857…) or 4.5÷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</td>
<td>B1

B4

E1

B1

E1

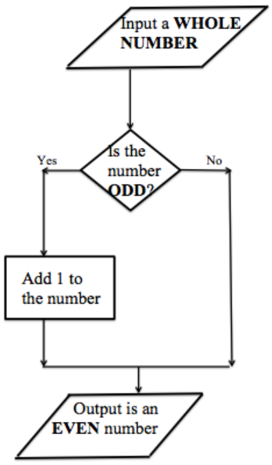
E1

9</td>
<td>Do not accept indication on the diagram unless 87 seen
Median, mode and range correct, OR
B3 for 4 or 5 correct entries
B2 for 3 correct entries
B1 for 1 or 2 correct entries
Do not accept reason based on range
Accept responses where means have been calculated and compared (59.9 & 64.9)
Accept comparison of the totals (659 & 714)
Do not accept ‘On average, Dinkey’, as a repeat of the question, however average ‘Dinkey because their averages are higher’

Depends on B1
Alternative:
Sunday = 90 and Wednesday = 50 leading to either 90/50 or 40/50 B1
which indicates 80% more sold on Sunday rather than 40% E1

Do not accept
100 × 50/90 = 55.55..% is incorrect, hence B0
‘Wednesday sales 55.5…% of Friday sales’, is incorrect, hence E0

Accept ‘no’ as implied within a suitable explanation</td></tr>
<tr><td>5(a) Example, ‘output is the measurement in km’, or ‘conversion to km’

(b) Correct flowchart with appropriate symbols
Accept equivalent ways
For example,

</td>
<td>E2

B6

8</td>
<td>Must have engaged with change of units for E2.
E1 for correct but vague responses, e.g. ‘measurements are smaller’, ‘changing units’, ‘changing measurements’
Allow E1 for ‘change to metres’ or for the idea that is involves conversion

<u>Ignore if start/stop ‘rounded rectangle’ missing.</u>
Accept shapes not drawn using a ruler.

<u>Mark as follows</u>:
B1 Shape of boxes –Decision boxes shown as rhombus, non-decision boxes as rectangle, input/output boxes shown as parallelograms

B1 for including entry of a <u>whole</u> number

B1 for correct use of ‘is it odd?’ or equivalent question

B1 Yes/No labelled to appropriate next step

B1 for following on from odd numbers to ‘add 1’

B1 Bringing back together and including ‘output of even number’ or ‘output number’

Do not accept flowchart based on checking numerically only without being generic, although it may be possible to award B1, B0, B0, B1, B0, B0</td></tr>
</table>

Applications Unit 2 Higher Tier June 2014	Mark	Comment
6(a)(… the) cost of a sandwich in pence AND (… the) cost of a drink in pence	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 2nd 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 (×100 ×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 = $\sqrt{105800}$	M1 A1	diagonal base = 325.269…., ½ diagonal base = 162.63… or $115\sqrt{2}$
path^2 = (½ diagonal base)^2 + 146^2 path^2 = 47766 or path = $\sqrt{47766}$ Path 218.6 or 218.5(543…) (m)	M1 A1 A1	FT ½ their diagonal base, but not 230 or 115 Must be for correct ½ diagonal base used Accept 218 or 219 from correct working *Alternative for the 1st 3 marks:* *path² = 115² +115² +146²* *M3* *OR* *115² +115²* *OR 115² +146²* *M1* *= 26450* *OR* *= 34541* *A1* *path^2 = 26450 + 146^2 OR path^2 = 34541 + 115^2* *M1*
(ii) tan e = 146/ '½diagonal' or sin e = 146/path or cos e = '½diagonal'/path e = 41(.9…°) or 42(°)	M1 A2	FT throughout for their '½ 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 ÷ 2.2 or equivalent (side on smaller triangle x =) 8 (cm) y = 2.2 × 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*(lates) = 0
9. Considering (1 dollar =) 1÷ 1.29(= 0.7751938 euros) Considering(1 dollar =) 1 ÷ 1.61 (= £0.62111801…) Realising (£)1 ÷ 1.61 = 1÷ 1.29 (euros) ((£)1 = 1.61 × 1÷ 1.29 =) 1.24(8 euros) OR 1.25(euros)	B1 B1 M1 A1 4	Award B1, B1, M1 for sight of 1.61 ÷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(cm^2) or answers in the range 12.03 to 12.05 (cm^2)	B1 M1 A1 3	Seen in working Or equivalent

Applications Unit 2 Higher Tier June 2014	Mark	Comment
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…)* *Accept 551.15(7….)* *B1 and SC1 for depreciation 363.45(099..), but no FT for a conclusion* *Simple interest answer of 543.6(0) is awarded only the B1*
(£) 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 (ii) Greater AND a reason, e.g. 'interest is accumulated through the year (each three months)'	B1 E1	CAO
(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) *SC1 for (2500) 625, 156.25, 39.0625, 9.76.. plotted AND joined with a curve*
(ii) From their graph	B1	
(b) $f = m \times 3^5/4^5$ or $f = 243m/1024$ or $f = m \times 0.75^5$ or $f = m \times 0.237304687$	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: ¾, 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

Applications Unit 2 Higher Tier June 2014	Mark	Comment
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 $1000 = \pi \times 4^2 \times h + \frac{2}{3} \times \pi \times 4^3$	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.
$h = \frac{1000 - \frac{2}{3} \times \pi \times 4^3}{\pi \times 4^2}$	M1	For the isolation of h. 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	

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