GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2015

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 examination in GCSE APPLICATIONS OF MATHEMATICS (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.

APPLICATIONS UNIT 1
FOUNDATION TIER

Applications Unit 1 Foundation Tier January 2015	Mark	Comment
1.(a) 6000 (b) 1600 (c) 4/9 × 4500 2000 (d) (i) Correct reason given why statement is incorrect. (ii) 3200/5738	B1 B1 M1 A1 E1 B1 6	A correct statement that indicates more home supporters. Eg. "Because more tickets were sold to home supporters than away supporters." "Only 2538 tickets were sold to away supporters." "Not the same amount of tickets sold to home supporters and away supporters." "3200 home and 2538 away." "More home than away."
2. (a) (Spends) (£)26 + 2 × (£)15.99 (£)57.98 (Extra needed) (£)57.98 – (£)20 - (£)25 (£)12.98 Look for • spelling • clarity of labels • the use of notation (watch for the use '=' "£" 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 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 final answer (b) (i) Right angle (ii) 360 – (90 + 90 + 107) or 180 – 107 or equivalent 73(˚)	M1 A1 M1 A1 Q W C 2 B1 M1 A1 9	FT 'their 57.98' *Alternative method* *Uses one voucher to pay for the jeans so pays either £1 or £6 B1* *Method for using **other** voucher for paying for the 2 tops 2 × (£)15.99 - 20 (or 25) OR 20 (or 25) - 2 × (£)15.99 M1* *(pays) (£)11.98 or (£)6.98 A1* *(spends) (£)12.98 B1* 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. Do not accept 90 ˚ For the intention of subtracting 3 given angles from 360 or for subtracting 107 from 180
3. (a) Two numbers less than or equal to 4 AND two numbers greater than 4. (b) Four numbers less than 3	 B1 B1 2	For both parts accept use of appropriate decimal or fractional values. Eg 1, 2, 5, 6 OR 3, 4, 5, 6 OR 4, 4, 7, 7 etc Eg 0, 0, 0, 0 OR 2, 1, 0, -1 etc
4. **Given Information** / **Quadrilateral** This quadrilateral has all 4 sides equal in length — **Square** This quadrilateral has opposite sides equal in length — **Parallelogram** This quadrilateral only has one pair of parallel sides — **Trapezium** This quadrilateral does not have any parallel sides — **Kite**	 B3 3	Award B2 for 2 or 3 correct. Award B1 for 1 correct.

Applications Unit 1 Foundation Tier January 2015	Mark	Comment
5. (a)(i) Evidence of counting squares on at least 2 shapes Shapes B AND D (ii) Evidence of calculating perimeter of at least 2 shapes or the correct perimeter of one shape evaluated Shape A (b) Evidence of counting squares Answer in range 22 - 26 cm^2 (c) Correct triangle drawn with line of 9cm (±2mm) and 2 angles of 55°(±2°).	M1 A1 M1 A1 M1 A1 U1 B3 10	*(Area A=14, B=16, C=5, D=16)* Evidence may be seen on diagram *(Perimeter A=22, B=20, C=12, D=12)* Award SC1 for answer of A with no workings Award M1 for 6 × 4 Award A1 for 24 Independent mark Award B3 for a **complete** correct triangle Award B2 for 2 of the 3 measurements correct in a completed triangle OR all 3 correct but a **triangle** not completed Award B1 for 1 of the 3 measurements correct.
6. (a) Adding numbers (= 410) 410 ÷ 10 Mean = 41 (b) Put in order 34, 37, 38, 39, 41, 42, 42, 44, 45, 48 Median = 41.5 (c) Mode = 42 (d) Explanation given eg 'Yes because the mean is 41' or 'because all of the averages - mean, median and mode are about 41 or 42'	M1 m1 A1 M1 A1 B1 E1 7	Attempt to add numbers. Award M1 for sight of a value between 362 and 458 or sight of an answer from 35 – 48 as evidence of attempting to add FT 'their 410'÷ 10 CAO Sight of 41 and 42 only would gain M1 FT "their values". The explanation given must mention or imply the comparison of their averages or mean or median or mode.
6. (e) 40 ÷ 2.5 or equivalent 16 (inches) (f) 360 (grams)	M1 A1 B1 3	
6. (g)(i) Correctly labelled axes Uniform scales used All points plotted correctly Points joined with straight lines (ii) Explanation of graph given (iii) 18 – 3 15(°)	B1 B1 P1 L1 E1 M1 A1 7	 FT "their points". Accept solid or dotted lines. The explanation must imply that the temperature increase AND then decreases. Eg. "The temperature increases through the day and decreases through the evening." "It gets hotter during the middle of the day until the evening then goes down." Award E0 for explanations such as "The temperature at daytime rises."
7.(a)(i) Plotting at least two correct points Correct straight line through points (ii) Full explanation given using the graph Approximately 6300 (DKK) (b) 90 90 ÷ 18 5 days Total of 6 days	P1 L1 E1 B1 B1 M1 A1 B1 8	Accept (0,0) as one of the points plotted. CAO. If no clear evidence of points plotted but line is correct award P1 L1 Eg"he could find what £350 is and then double it". FT their graph Accept answers in the range 6200 – 6400 (DKK) May be seen or implied FT 'their 115 – 25' **Unsupported answer of 5 gets no marks.**
8.(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 2×6×7 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 *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.* B1 for sight of 12, or 'their attempt to sum number of trains'/50

Applications Unit 1 Foundation Tier January 2015	Mark	Comment
9. (a) Appropriate arc(s) (dashes) shown on both lines, AND intersection arcs shown, using first set of arcs	M1	± 2 mm M0 if no arcs seen ± 2mm
Angle bisector drawn	A1	*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*
(b)(i) 3×3.75 + 3 × (4 × 16.25 + 2 × 18.5(0))	M2	M1 for sight of the terms 3×3.75 and 4 × 16.25 + 2 × 18.5(0) (11.25) (65+37 = 102) OR M1 for sight of the terms 3 × 4 × 16.25 and 3× 2 × 18.5(0)) (195) (111) OR M1 for 3.75 + 4 × 16.25 + 2 × 18.5(0) (= 105.75)
(Sian's pay is 11.25 + 195 + 111 = £) 317.25	A1	FT from M1
(ii) 4 × 3.75 (= 15)	B1	May be seen in stages of working
(4 ×) 2y × 18.5(0) + (4 ×) y × 16.25	B2	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
P = 15 + 213*y*	B1	CAO. Must be a formula ISW *If no marks allow SC1 for P = 12y (+15)*
	9	
9. (c) $\pi \times 6^2$ Between 113.04 to 113.1(43m^2) inclusive, or 113(m^2)	M1 A1	Ignore incorrect rounding or truncation if a correct response is seen. Accept 36π (m^2) as the final answer
	2	
10. (a) 1 share seen or implied 2380 ÷10 or 238	B1	
(Connelly Boats pay) 2380 ×2 ÷10 **OR** (Water Watch pay) 2380 ×5 ÷10	M1	B1 implied if both appropriate calculations seen
(Connelly Boats pay £) 476	A1	If these answers are unlabelled they must be in the correct order
(Water Watch pay £) 1190	A1	
(The 7 friends altogether have to pay £) 714	B1	FT 2380 minus the sum of their Connelly Boats and Water Watch payments, i.e. 2380 – 'their 476' – 'their 1190' correctly evaluated
(Each of the seven friends has to pay 714 ÷ 7) (= £) 102	B1	CAO depends on the award of all previous marks
(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"	B1	*Allow 30.80 ÷ 7 = 4.4(0) or 30.80 ÷ 4.4(0) = 7* *Do not allow they were charged 4.4(0) per metre*
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 …	E1	*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*
	8	

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	S1	At least 3 correct multiples for both
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 2×6×7	M1	12, 24, 36, 48, 60, 72, 84 14, 28, 42, 56, 70, 84
Sight of 84 (as common multiple or number of minutes) Time 11:24	A1 A1	OR 1 hour 24 minutes FT time from 10:00 for their number of minutes provided S1 and M1 awarded *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.*
(b) 12/50 or equivalent (ISW)	B2 6	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	M1	± 2 mm M0 if no arcs seen ± 2mm
Angle bisector drawn	A1	*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*
(b)(i) 3×3.75 + 3 × (4 × 16.25 + 2 × 18.5(0))	M2	M1 for sight of the terms 3×3.75 and 4 × 16.25 + 2 × 18.5(0) (11.25) (65+37 = 102) OR M1 for sight of the terms 3 × 4 × 16.25 and 3× 2 × 18.5(0)) (195) (111) OR M1 for 3.75 + 4 × 16.25 + 2 × 18.5(0) (= 105.75)
(Sian's pay is 11.25 + 195 + 111 = £) 317.25	A1	FT from M1
(ii) 4 × 3.75 (= 15) (4 ×) 2y × 18.5(0) + (4 ×) y × 16.25 P = 15 + 213*y*	B1 B2 B1 9	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 *If no marks allow SC1 for P = 12y (+15)*
2(c) $\pi \times 6^2$ Between 113.04 to 113.1($43m^2$) inclusive, or 113(m^2)	M1 A1	Ignore incorrect rounding or truncation if a correct response is seen. Accept 36π (m^2) as the final answer
(d) (1 revolution measures) 2 × π × 0.24 × 32 or × 14 (West field) 48.2 to 48.3(2m), or 48(m) AND (Storage building) 21.(1…m)	M1 m1 A1 5	May be embedded in working (C = 1.507…m)

Applications Unit 1 Higher Tier January 2015	Mark	Comment
3(a) 1 share seen or implied 2380 ÷10 or 238	B1	
(Connelly Boats pay) 2380 ×2 ÷10 **OR**		
(Water Watch pay) 2380 ×5 ÷10	M1	B1 implied if both appropriate calculations seen
(Connelly Boats pay £) 476	A1	If these answers are unlabelled they must be in the correct order
(Water Watch pay £) 1190	A1	
(The 7 friends altogether have to pay £) 714	B1	FT 2380 minus the sum of their Connelly Boats and Water Watch payments, i.e. 2380 – 'their 476' – 'their 1190' correctly evaluated
(Each of the seven friends has to pay 714 ÷ 7) (= £) 102	B1	CAO depends on the award of all previous marks
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	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 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) Sight of 7× 4.40 (= £ 30.80) OR clear description e.g. "They have rounded the length to 7m and charged them for that"	B1	*Allow 30.80 ÷ 7 = 4.4(0) or 30.80 ÷ 4.4(0) = 7* *Do not allow they were charged 4.4(0) per metre*
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 …	E1	*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*
	10	
3(c) (i)		Accept 'their North' provided ±2° from the North given. Penalise 'their North' outside of this tolerance once only
110° drawn from harbour	B1	±2°
320° drawn from the position of buoy 1	B1	±2°
055° drawn from the position of buoy 2	B1	±2°
Line 10cm OR 6cm OR 2.5cm for the appropriate stage	B1	±2mm
Accurate chart with lengths and angles correct	B1	Within tolerances allowed
(ii) 290°	B1	±2°. FT from their diagram ±2°
(iii) Distance (±2mm) from the position of buoy 3 to the harbour	B1	FT from their diagram (Actual is approximately 8 × 60 = 480 m)
Bearing (±2°) from the position of buoy 3 to the harbour	B1	FT from their diagram (Actual is approximately 250°)
(d) Lines following the shape of coast line at 5km	B1	1cm ± 2 mm
An arc of radius 20km from Funchal	B1	4cm ± 2mm
Perpendicular bisector (Ribeira Brava and Santa Cruz)	B1	±2°
Appropriate region indicated	B1	FT for region provided at least B2 previously awarded with an attempt at all three conditions
	12	
3(e)(i) 33 × 12 + 4 (=400 inches)	M1	*Allow M1 if 33 × 12 and an additional 4 seen in the working*
÷ 0.3937 (or × 2.54)	m1	Do not accept ×2.5
1016(.002….cm) or 1020(cm)	A1	
(ii) [10160 | 1(.016…) × 10^4]	B1	Left entry, 10160(.02) or 10200 or FT 10× 'their (e)(i)'
	B1	Right entry, 1(.016…) × 10^4. FT from use of 'their 10160'
	5	

Applications Unit 1 Higher Tier January 2015	Mark	Comment
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 $\Sigma fx/80$ Accept 193 or 194 if correct working is seen
(iii) 10 | 48 | 68 | 76 | 80	B1	
(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. Not cumulative no FT 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 *Accept statements such as "the results then show the viewing figures for a week"*
(ii) 4.27, 4.30, 4.34, 4.40, 4.33 (million)	B4 12	'0' representing hundredths must be shown as appropriate B3 for 4.27…. , 4.3, 4.34…, 4.4, 4.32857… (million) rounded or truncated, B2 for any three correct moving averages, rounded or truncated, B1 for a correct method seen, or 1 correct moving average (29.9/7, 30.1/7, 30.4/7, 30.8/7, 30.3/7)
4(d)(i) Correct histogram	B3	Accept missing labels for B2 or B1 B2 for sight of 0.06, 0.36, 0.24, 0.02 and 0.02 or histogram with at least 3 bars correct, OR B1 for histogram with any 1 bar correct, or for a suitable frequency density scale, uniform to a least 0.36
(ii) Median (76 + 1)/2 or 76/2 Attempt to identify 1/9 or 8/9 of the second bar Correct identification of the median	B1 B1 B1	FT from their histogram if possible Could also be 32.5/36 or 3.5/36 *Allow, in the answer space or indicated on the histogram the calculated value of 188.888…OR 190.2777 (people) truncated or rounded.*
(e)(i) 200×0.1 + 100×0.4 + 100×0.6 + 400 × 0.15 180 (people)	M2 A1	M1 for any 3 correct area calculations (20+40+60+60) FT for a summation of their 4 values provided M1 awarded
(ii) 200×0.1 + ½× 100×0.4 40 (people)	M1 A1 11	FT their values from (i)

Applications Unit 1 Higher Tier January 2015	Mark	Comment
5(a) Strategy, e.g. to draw a tangent at 7.5 seconds	S1	
Use of difference v / difference t	M1	Must be differences, not readings from axes. Ignore signs
= 0.4 to 0.6	A1	Reasonable from their graph. *Allow a fraction for example 4/7*
m/s^2 or m per s^2	U1	Does not depend on previous marks Maybe shown on their graph
(b) Identifying the required area	S1	
Splitting area into areas that can be approximated	M1	Must include at least 1 calculation for an appropriate area, or correct statement of the trapezium rule
Complete calculation for the area required	M1	OR correct substitution into the trapezium rule, allow 1 slip
Accurately calculated area	A1 8	(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.
from graph ≈28 to 33 (e.g 3×10^{-2} , 3.1×10^{-2})	B1	For both readings correct for their graph
from graph ≈ 130 to 135 (e.g 1.32×10^{-1}, 1.33×10^{-1})	B1	FT expressed in km in standard form *If no marks, SC1 for one correct reading from their graph, as km and correctly given in standard form*
(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) $496 = ½ \times 9.8 \times t^2$	M1	
$t^2 = 101.2244898…$	A1	*Accept (t between) 10 and 10.1 from use of trial and improvement*
t = 10(.06…seconds)	A1 11	CAO

APPLICATIONS UNIT 2
FOUNDATION TIER

<table>
<tr><th>Applications Unit 2 Foundation Tier
January 2015</th><th>Mark</th><th>Comment</th></tr>
<tr><td>1. Accept the pairs in any order

Ahmed's cards are 8 and 17
Bethan's cards are 6 and 9
Caroline's cards are 18 and 2
Doug's cards are 16 and 5</td><td>B4

4</td><td>For 4 marks, no cards should be repeated

Ignore repeats if B4 not awarded.
If all four marks not awarded then award B1 for each correct pair of cards, up to a maximum of 3 pairs of cards (B3) OR award B1 for each alternative correct pair.
eg
A: 20 & 5 or 16 & 9
C: 9 & 1
D: 20 & 9 or 17 & 6</td></tr>
<tr><td>2.(a)(i) 7
(ii) 9 + 7 + 2 + 4 + 1
23
(iii) Dog
(iv) Labels of animals
key provided
All correct using their key</td><td>B1
M1
A1
B1
B1
B1
B2

8</td><td>
Attempt to add at least 3 frequencies

If no key given, award B0 here only
FT their intended key. Award B1 for 3 or 4 correct using their key</td></tr>
<tr><td>2.(b) 47 (minutes)
(c) 3.7 + 4.2 OR 5.8 + 2.9 (=8.7)
Shortest distance 7.9 (km)

(shortest route is) from surgery via Old Road then Red Hill to Pets R Us</td><td>B1
M1
A1

E1

4</td><td>Do not accept 47 hours

FT provided M1 awarded
Intention of the route must be clear e.g. via Old Road or Old Road then Red Hill. May be indicated on the diagram.</td></tr>
<tr><td>(d)(i)
<table><tr><th>Goods</th><th>Quantity</th><th>Cost</th></tr><tr><td>Dog Basket</td><td>1</td><td>£29.99</td></tr><tr><td>Flea Spray</td><td>3</td><td>£17.97</td></tr><tr><td>Dog Treats</td><td>5</td><td>£12.45</td></tr><tr><td>Large Dog Bowl</td><td>1</td><td>£7.00</td></tr><tr><td></td><td>Total Cost</td><td>£67.41</td></tr></table>
(ii) 5/100 × (£)67.41
(£)3.3705
(£)3.37 ISW
(e) Suitable explanation given implying 40 metres for a dog collar is far too big or the units should be cm.</td><td>

B1
B1
B1

B1

M1
A1
B1
E1

8</td><td>

CAO
CAO
CAO

FT if at least one B1 awarded. Award B4 for only an answer of £67.41

FT 'their £67.41'

FT 'their 3.3705' if unrounded answer is seen.
Do not accept explanations that may be based on a lead.</td></tr>
<tr><td>3. (a)(i)
<table><tr><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>1</td><td>2</td><td>4</td><td>1</td></tr></table>
(ii) No and explanation given that shape A and/or B does not have any lines of symmetry.
(iii) C
(b) Correct reflection drawn

(c) A and G or E and C
E and C A and G

B and D</td><td>B3

E1

B1
B2

B1
B1

B1

10</td><td>Award B3 for all correct, B2 for 3 correct, B1 for 2 correct. Condone consistent use of 0 or none instead of 1. (I.e. both must be 0 or none for the mark to be awarded.)

Accept "No" being implied

B1 for straight edges correct, B1 for curve

Accept letters in either order in (c)

If the 2 previous B1 marks have not been awarded, award SC1 for an answer of A & G OR E & C in the last part instead of B & D</td></tr>
</table>

Applications Unit 2 Foundation Tier January 2015	Mark	Comment
4. (a) $4n = 28$ (n =) 7 (b) $m/6 = 12$ (m =) 72	 B1 B1 B1 B1 4	*If no equation shown but answers given award B0 B1in each part.* Accept $28 = 4n$ or $n + n + n + n = 28$ or $n = 28/4$ or equivalent Accept embedded answers for this B1. Accept m ÷ 6 = 12 or 12 = $m/6$ or $m = 12 \times 6$ or equivalent Accept embedded answers for this B1
5.(a) (Cost of bike) 1100 – 1/10 × 1100 OR 9/10 × 1100 (£)990 (b) (Save each month) 20/100 × 600 (£)120 (Number of weeks) (925 - 470) ÷ 120 3.(79..) Conclusion given that it will take 4 weeks Look for • spelling • clarity of labels • the use of notation (watch for the use "=, +, -, ×, ÷, £" 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 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 final answer	M1 A1 M1 A1 M1 A1 A1 Q W C 2 9	 FT 'their 120'. Award M1 for repeatedly adding 120 onto 470 OR for adding 120s up towards 455. Award A1 for sight of 830 and/or 950 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
6. (5 tiles width =) 60 (cm) (1 tile length 60÷4 =) 15 (cm) (Area of 1 tile =) 12 × 15 × 14 (Area of hallway) 2520 (cm^2)	B1 B1 M1 m1 A1 5	Look for dimensions in appropriate places on the diagram for the first 2 B1 marks. *Award B marks then Alternative method:* *Award B1 Width = 12 + 2 ×15 (= 42)* *Award M1 for area = 60 × 42(FT their 42 for M1 if B1 awarded)* *Award A1 for 2520 (cm^2)*
7. (a) 50 × 30 × 40 60000 (cm^3) (2 × 60000 =) 120000 (cm^3) (b) 140000 ÷ 1000 140 (litres)	M1 A1 B1 M1 A1 5	 FT 2 × 'their 60000' provided M1 awarded *Alternative method* *50 × 30 × 40 M1* *× 2 m1* *120000* (cm^3) *A1*

Applications Unit 2 Foundation Tier January 2015	Mark	Comment
8. (a) 325 (euros) (b) 300 (euros) (c) Idea of scatter not showing which apartment is which so there is uncertainty, e.g. 'Suggest perhaps the apartment costing 300€, ≈3.2km from the centre may be the luxury apartment but there is not information to tell us this on the scatter diagram' (d) Suitable line of best fit, in appropriate direction with points above and below the straight line drawn (e) Accurate reading **from their line of best fit**	B1 B1 E1 B1 B1 5	 Must show uncertainty in the response Intention of straight line Tolerance within a small square
9. (a) 74 / 2.54, 75 / 2. 54 or 49 x 2.54 All 3 correct answers in the table 29 (inches) 30 (inches) 124 (cm) (b) All 3 correct entries, (buy) small (buy) medium (buy) large	M1 A2 B2 5	 A1 for correct unrounded answers, (29.13… 29.52…… 124.46…..) OR for 29 and 30 OR for 124 (or allow 125 from converting backwards) B1 for any 1 or 2 correct entries
10. (a) (Change into CYN) 460 × 9.28 (No coins, so can buy only) 4268 (CYN) (Cost to Dewi for 4268 CYN is) 4268 ÷ 9.28 (£) 459.91 (b) 928 ÷ 9.42 (£)98.51(38…) (Loss) (£) 1.49	M1 A2 M1 A1 M1 A1 B1 8	 A1 for an answer of 4268.8 (CYN) or 4269(CYN) *If no marks, then SC1 for an answer of 4333 (using incorrect rate & rounding down)* FT their whole number of CYN An answer of 459.91379… implies M1, A0 FT '100 – their 98.51' provided M1 awarded
11. (G2 =) C2 + D2 + E2 + F2 OR (G2=)sum(C2:F2) (H2=) 100*G2 / (4*B2) OR 100* (C2 + D2 + E2 + F2) / (4*B2)	B1 B4 5	 Award B3 for the fraction, i.e.*100 omitted but otherwise correct, or if 1 minor slip in the formula (not for omitted *4), e.g. missing bracket(s) or a missing term, (condone × for * and ÷ for /) Award B2 for 2 errors, e.g. 100* G2 / 4*20 (missing () and use of 20 not B2), or 100* (C2 + D2 + E2 + F2) / B2 (missing 4* and ()) Award B1 for 3 errors e.g. G2 / 4*20 or (C2+D2+E2+F2) / 4*20 or G2 / 80 or (C2+D2+E2+F2) / 80

APPLICATIONS UNIT 2
HIGHER TIER

Applications Unit 2 Higher Tier January 2015	**Mark**	**Comment**
1(a) 325 (euros) (b) 300 (euros) (c) Idea of scatter not showing which apartment is which so there is uncertainty, e.g. 'Suggest perhaps the apartment costing 300€, ≈3.2km from the centre may be the luxury apartment but there is not information to tell us this on the scatter diagram' (d) Suitable line of best fit, in appropriate direction with points above and below the straight line drawn (e) Accurate reading **from their line of best fit**	B1 B1 E1 B1 B1 5	 Must show uncertainty in the response Intention of straight line Tolerance within a small square
2(a) 74 / 2.54 75 / 2. 54 or 49 x 2.54 All 3 correct answers in the table 29 (inches) 30 (inches) 124 (cm) (b) All 3 correct entries, (buy) small (buy) medium (buy) large	M1 A2 B2 5	 A1 for correct unrounded answers, (29.13… 29.52…… 124.46…..) OR for 29 and 30 OR for 124 (allow 125 from converting backwards) B1 for any 1 or 2 correct entries Allow use of the appropriate range of measurements as the indication of size
3(a) (Change into CYN) 460 × 9.28 (No coins, so can buy only) 4268 (CYN) (Cost to Dewi for 4268 CYN is) 4268 ÷ 9.28 (£) 459.91 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) 928 ÷ 9.42 (£) 98.51(38…) (Loss) (£) 1.49	M1 A2 M1 A1 QWC 2 M1 A1 B1 10	 A1 for an answer of 4268.8 (CYN) or 4269(CYN) *If no marks, then SC1 for an answer of 4333 (using incorrect rate & rounding down)* FT their whole number of CYN An answer of 459.91379… implies M1, A0 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. FT '100 – their 98.51' provided M1 awarded For B1 the answer must be to the nearest penny.

Applications Unit 2 Higher Tier January 2015	Mark	Comment
4(a) Volume = $\pi \times 23^2 \times 125$ Answers in the range 207.6 to 207.8(…) or 208 (litres)	M1 A2	Ignore place value changes for '23' and '125' Accept 66.125 π A1 for answers in the range 207600 to 207822 or 208000(cm^3) or 207 (litres) or 66125 π *If no marks, award SC1 for use of 46 for radius giving) approximately 831 litres*
(b) 150 × 4500 × …… = 1.2 million	B1	Ignore errors for their 1.2 million providing unambiguous.
Cost per litre 1 200 000 ÷ (150 × 4500)	M1	Calculation that could lead to a correct answer, may be shown in stages Do not accept 1.2 million ÷ (150 × 4500) for M1 unless answer of 1.7(777….)
(£)1.78	A1	Accept 1.77(77…). If units are given they must be correct.
(c) Either (100 ×) 1000/1700 or 1000 × 159 ÷ 1700 or equivalent	B1	
58.8(%) or 59(%)	B1	
Answers in the range 93.5(..litres) to 94(.. litres)	B1 9	FT their % provided initial B1 awarded Accept unsupported answer or an answer provided no inappropriate working is seen for B3
5(a) (G3 =) C3 + D3 + E3 + F3 OR (G3=) sum(C3:F3)	B1	
(H3=) 100*G3 / (4*B3) OR 100* (C3 + D3 + E3 + F3) / (4*B3)	B4	Condone × for * and ÷ for / Award B3 for the fraction, i.e.*100 omitted but otherwise correct, or if 1 minor slip in the formula (not for omitted *4), e.g. missing bracket(s) or a missing term. Award B2 for 2 errors, e.g. 100* G3 / 4*30 (missing () and use of 30 not B3), or 100* (C3 + D3 + E3 + F3) / B3 (missing 4* and ()) Award B1 for 3 errors e.g. G3 / 4*30 or (C3+D3+E3+F3) / 4*30 or G3 / 120 or (C3+D3+E3+F3) / 120
(b) G3 27 AND G4 23	B1	
(7+6+3+11)/(4 × 30) (×100) H3 22.5	M1 A1	
H4 57.5	B1	FT their G4×100÷40 correct to 1dp
F5 4 AND G5 8	B1 10	CAO
6(a) 11	B1	
(b) (£)62	B1	
(c)	B4	All entries correct OR B3 for 5 correct entries B2 for 3 or 4 correct entries B1 for 1 or 2 correct entries
(d) Shows understanding that median (and range) similar, mode for Hollow Electric indicates more expensive, accept conclusion Jenkins cheaper or that the two makes are quite similar	B1 7	FT their table provided at least B2 previously awarded B0 if range considered as an average. Allow conclusion from their correct calculation of means: Jenkins 511 ÷12 = 42.5833… Hollow Electric 482 ÷ 11 = 43.8181…

	Median in £	Range in £	Mode in £
Jenkins	46.5(0)	35	32
Hollow Electric	47	34	48

Applications Unit 2 Higher Tier January 2015	Mark	Comment
7. 6B + 5C = 116 AND 4B + 8C = 138	B2	B1 for either equation FT provided at least 1 equation is correct
Method to solve, e.g. equal coefficients with an appropriate attempt to subtract the equations	M1	Allow 1 slip in non equated variable
Correct first value	A1	
Method to find the second variable	m1	FT from their first value
Correct second value with indication showing order, such as completing the table, e.g. Ben (£)8.5(0) per hr, Ceri (£)13(.00) per hr	A1 6	Unsupported answers gain no marks
8(a)(Length) 6.2 × 2.4/4 or equivalent 3.7(2 cm)	M1 A1	Ignore any incorrect place value with '2.4' and '6'
(Area) 8.9(28cm^2)	A1	(2.4×3.72 = 8.928) FT 'their 3.72 × 2.4' correctly evaluated provided M1 awarded
(b) Explains he is incorrect, e.g. 'Leo is wrong it has reflection (symmetry)' or 'the original does not have (rotational) symmetry'	E1 4	Must mention the reflection (symmetry) of the new OR that the original does not have (rotational) symmetry. Allow if incorrect is stated or implied with a correct reason provided no more than one incorrect statement is given
9(a) b)5600 × 1.85/100 or 5600 × 0.0185 (= 103.60)	B1	May be embedded in further calculation
$(1 + 0.0185)^{15} \times 5600$	M1	OR sight of a full cumulative method for at least 13 years
(£) 7372(.308954…)	A1	Accept correct evaluation from at least 13years cumulative (e.g. 13years gives (£)7106(.8..) to (£)7107) *B1 and SC1 for depreciation 4231.97…, but no FT*
Conclusion, e.g. 'Yes (he will have more than he needs)'	E1	FT interpretation provided B1 and M1 awarded *If M0 awarded and simple interest used with interest shown or implied as over (£)1400 for 14 or 15 years award SC1 or with conclusion 'Yes' award SC2.* *If also stated that using compound interest the amount will be greater award SC3*
(b) (AER% =) $100\left(1 + \frac{2.15}{100 \times 12}\right)^{12} - 100$ OR 100(1 + 2.15 ÷ (100 × 12))^{12} - 100 = 2.17(…...%)	B4	For B4 condone missing brackets in the denominator if the answer correct. Award B3 for correct formula (including brackets in the denominator) but incorrect answer between 1 and 5 inclusive. Award B2 for correct formula and answer not between 1 and 5. Award B1 for one error in the formula e.g. missing brackets, 2000 not 100, a 12 missing, 0.0215 used.
Advise, e.g. 'Greenash as more interest (at 2.18%p.a.)'	E1 9	FT their appropriate interpretation provided at least B2 awarded and APR for Greenash is 2.18%.

Applications Unit 2 Higher Tier January 2015	Mark	Comment
10. Plot 1 Opposite side = 25 × sin 37 Opposite side 15(.04537…metres) Adjacent side = 25 × cos 37 Adjacent side = 19.9658…metres or 20 (metres)	 M2 A1 M2 A1	 M1 for sin37 = opposite side/25 M1 for cos37 = adjacent side/25 Accept rounded or truncated to 19.97 or 19.96 or 19.9 or 20.0 *Alternative 3 marks once opposite or adjacent side found are:* *$25^2 - opp^2 = adj^2$ or $25^2 - adj^2 = opp^2$* *Substitution of 25 and their(FT) appropriate measurement M1* *opp^2 =226.36… or opp=√226.36… or adj^2 = 398.6(3…) or adj = √398.6(3…) or FT with their appropriate measurement A1* *Opposite or adjacent as before or FT A1*
Perimeter Plot 1 (25 + 15 + 20 =) 60 (metres)	B1	FT provided at least 1 method mark for each stage of Plot 1 working has been awarded
Plot 2 unknown^2 = 36^2 - 25^2 unknown length 25.9(036.. metres) or 26(metres) Perimeter Plot 2 (25 + 36 + 26=) 87 (metres)	 M1 A1 B1	 FT provided at least M1 for Plot 2 awarded
Plot 3 Strategy, considers fraction of a circle OR sight of 2×π×36 Arc = 2× π × 36 × 22.5/360 Answers between 14 (metres) to14.14…(metres) inclusive Perimeter Plot 3 (36 + 36 + 14 =) 86 (metres)	 S1 M1 A1 B1 14	 OR equivalent to 72π or a fraction (percentage) of 72π in working An answer of 226.(.. metres) implies S1 only (Allow 9pi/2) FT provided at least S1 awarded for Plot 3 <u>Do not penalise not rounding each perimeter to the nearest metre more than once, i.e. first B0 then FT to allow unrounded for further B marks</u>
11(a) G + B < 4000 0.3(0)G + 0.2(0)B > 960 (b) Line G + B= 4000 shown Line 0.3G + 0.2B=960 shown Region between the lines indicated (left hand end only) (c) **Using their graph** to show Ifor's point outside the region with 'No' in the table **Using their graph** to show Simone's point inside the region with 'Yes' in the table	B1 B1 B1 B1 B1 B1 B1 7	*If no marks, then SC1 for G+B…4000 AND (0.)3(0)G +(0.)2(0)B…960, with the gaps here both being inequalities* FT from their inequalities if possible Accept FT from either line correct but for a similar region **MUST** be a FT from their (non spurious) graph in (c) Do not accept numerical explanations. Accept unambiguous unlabelled plots provided the table is completed correctly
12. Sight of 297.5 and 302.5 (litres) AND 239 and 241 (seconds) (Least) 297.5/241 1.23 (litres per second) (Greatest) 302.5/239 1.27 (litres per second)	B2 M1 A1 M1 A1 6	B1 for any 2 of these FT their litres and seconds provided neither 300 nor 240 used, and appropriately > or < these values *If neither A mark awarded, then SC1 for unrounded or truncated answers (greatest 1.26569… AND least 1.2344…)*

Applications Unit 2 Higher Tier January 2015	Mark	Comment
13. (a)(i) Carli index $\left(\frac{\frac{1.02}{0.92}+\frac{0.93}{0.91}+\frac{0.92}{0.90}+\frac{0.94}{0.94}}{4}\right)\times 100$ 103.8(2239…)	 M1 A2	*Ignore irrelevant missing zeros for pence throughout* Correct formula and substitution A1 for 4.15(289…)(÷4 ×100)
(ii) Dutot index $\left(\frac{\frac{1.02+0.93+0.92+0.94}{4}}{\frac{0.92+0.91+0.90+0.94}{4}}\right)\times 100$ 103.8(147..)	M1 A2	Correct formula and substitution, both ÷4 may be omitted, however if ÷3 shown in the formula M0 A1 for 3.81/ 3.67 (×100) or 0.9525/ 0.9175 (×100) *If no marks then* • *for answers from inverting substitution, SC1 for Carli 96.46… or 96.5, and SC1 for Dutot 96.325…* • *for answers from showing ÷3, SC1 for Carli 138.3… or 138.4.., and SC1 for Dutot 103.8..(or 104 from 1.27÷1.22(33…)*
(b) 3.8(%) AND 3.8(%)	B1	FT for their difference from 100 provided at least 1 mark awarded in each of (a)(i) and (a)(ii) Accept any indication of this knowledge
(c) Indicates that the division by the number of supermarkets on the numerator and the denominator are common and can be cancelled or omitted	E1	(Allow in words)
	8	

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk