GCSE MARKING SCHEME

APPLICATIONS OF MATHEMATICS (LINKED PAIR PILOT)

JANUARY 2013

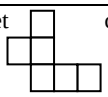
INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 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.

UNIT 1 - FOUNDATION TIER

Applications Unit 1 Foundation Tier January 2013		Final
1. (a) Moscow at -8°C Los Angeles at 13°C (b) 21(°C)	B1 B1 B1 3	 Accept between 12 and 14 exclusive Accept -21(°C)
2.(a) Sian AND valid explanation eg "5 divides (exactly) into 10" David AND valid explanation eg "5 isn't in the 10 times table" or "10 is a multiple of 5" or "5 is a factor of 10" (b)(i) No AND valid explanation eg "No because 3^2 is 9" or "when you square an odd number you get an odd answer" (ii) No AND valid explanation eg "No because 3 × 5 = 15" or " 3(or 5) goes into 15" or " 3(or 5) is a factor of 15" (c) Valid explanation eg. (2^3 =) 8 or " it's 2 × 2 × 2 not 2 × 3	E1 E1 E1 E1 E1 5	Sian may be implied from valid explanation. Do not accept "Sian is correct because 5 is a factor of 10." David may be implied from valid explanation No may be implied No may be implied
3. total ticket sales = 108770 Cost of tickets = 108770 × 24 (£) 2610480 2610500	B1 M1 A1 B1 4	 FT their 108770 FT 'their 2610480' rounded to the nearest 100 *Alternative method* *18535 × 24 + 26750 × 24 + 19125 × 24 + 15400 × 24 + 28960 × 24 M2* *(444840 + 642000 + 459000 + 369600 + 695040)* *Award M1 for multiplying at least 3 of the number of tickets at each venue by 24 with an intention to add OR for multiplying all 5 of the number of tickets at each venue by 24 with no intention to add* *(£)2610480 A1* *2610500 B1* *FT 'their 2610480' rounded to the nearest 100 for last B1*
4. (a) For attempting to count squares Accept in range 24 to 32 (centimetre squares) (b) Area of lawn in range 78 to 86 Their area × 5 Area in range 390 to 430 (m^2)	M1 A1 B1 M1 A1 5	Accept use of πr^2 M1 for correct method, $\pi \times 3^2$ A1 for correct answer. 28 – 28.3 ISW if their pond area × 5 FT 110 (area of rectangle) – their (pond)(a) FT their area *If no marks awarded in (b) award SC1 for sight of 550 (implies × 5)*
5. (a) Correct net  circled or clearly indicated (b) Area of one face = 49 (cm^2) Total surface area = 49 × 6 = 294 cm^2	B1 B1 M1 A1 U1 5	 FT their 49 but not 7
6. (a) Mean for Andy = 336 ÷ 6 = 56 (b) Put in order 39, 40, 42, 62, 70 71 Median of Jim = 52	M1 m1 A1 M1 A1 5	Attempt to add all given values for Andy FT 'their 336' CAO Sight of 42 and 62 only would gain M1

Applications Unit 1 Foundation Tier January 2013		Final
7. (a) S = 0.6 × 3.8 × 32.5 = 74.1 (b) Marks = 100.8 ÷ (4.2 × 0.6) = 40	M1 A1 M1 A1 4	
8. (a) Angle LQN = 180 – 118 = 62(°) Angle LQP (= 62 + 90) = 152(°) (b) circle drawn with radius 4cm (c) 125° or 80° drawn Accurate completed shape	 M1 A1 B2 B1 M1 A1 7	Look at diagram, may be seen or implied Or 360 – (118 + 90 + 90) FT their 62. Award B1 for angle PQN = 90(°) (may be on diagram) *Alternative method* *Sum of interior angles of pentagon = 540 (°) B1* *Angle PON or QPO = 90(°) B1* *540 – (118 + 90 + 90+ 90) M1* *152(°) A1* ±2mm ±2°
9. (Andrea) (£)10.75 (Ravinder) (£)7.85 (Erika) (£)10.65 (Total Bill) (£)29.25 (Each pays) 29.25 ÷ 3 (£)9.75 Andrea(benefits the most) by (£)1(.00) 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	B2 B1 M1 A1 A1 QWC 2 8	Award B1 for any 2 of Andrea, Ravinder & Erika correct. FT their '10.75 + 7.85 + 10.65' (£)29.25 implies B2 B1 FT their total bill (£)9.75 implies all previous marks FT their values. Unsupported correct answer implies all previous marks. 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.
10. (a) Plotting at least two correct points Correct straight line through points (b) Approximately 110 (lbs) (c) Clear method shown Approximately 91 (kg). Accept answers in range 85 - 95	P1 L1 B1 M1 A1 5	 FT their graph, within 1 small square Accept use of graph or 200 ÷ 2.2 or other valid method. FT their line Award SC1 for unsupported answers in the ranges 80 – 84.9 or 95.1- 100 Incorrect answers from a correct method but still in range award M1 A0

Applications Unit 1 Foundation Tier January 2013		Final
11. (a) (y = 1 is line) q (x = -3 is line) s (b) (i) x: -2, -1, 0, 1, 2, 3 y=2x - 1: -5, **-3**, -1, 1, **3**, 5 (ii) Plotting points correctly Correct line drawn	B1 B1 B2 P1 L1 6	 Award B1 for each FT their points for P1 CAO Award P1, L1 for line drawn passing through the correct points
12(a) Square | Kite, Rhombus, Parallelogram (b) Square, Rhombus, Parallelogram | Kite	B2 B2 4	B1 for any 3 unambiguous correct entries B1 for any 3 unambiguous correct entries
13.(a) 3e + 2f (p) (b) $\frac{3e + 2f}{100}$ or 0.03e + 0.02f (p) or equivalent	B2 B1 3	Allow 3×e + 2×f B1 for either 3e (or 3×e or e×3) or 2f (or 2×f or f×2) If B2, penalise further incorrect work -1 Must clearly show ALL divided by 100. FT their (a) if a sum of 2 terms, equivalent difficulty
14(a) 120° drawn from Start 040° drawn from the position of the first clue 280° drawn from the position of the second clue Line 7.5cm OR 9cm OR 2.5cm for the appropriate stage Accurate chart with lengths and angles correct (b) 300° (c) Distance (±2mm) from the position of the third clue to the start Bearing (±2°) from the position of the third clue to the start	 B1 B1 B1 B1 B1 B1 B1 B1 8	Accept 'their North' provided ±2° from the North given. Penalise 'their North' outside of this tolerance once only ±2° ±2° ±2° ±2mm Within tolerances allowed ±2°. FT from their diagram FT from their diagram (Actual is approximately 10.5×40 = 420m) FT from their diagram (Actual is approximately 250°)
15(a) Reason, e.g. all different age groups (b) Two boxes if you are 20 or refers to 'wide' group of older people (c) Suitable question with at least 3 boxes, no overlap or gaps (in pence) and prices from a low value upwards considered (d) Reason implying 'no' showing understand that repeating an experiment can lead to different results (e)(i) Reason implying no, such as: 'all columns total 20', 'all 60 answered', 'all people selected red, black or silver' (ii) Strategy to use all data (for 60 people) 12/60 (= 1/5 = 0.2)	E1 E1 E2 E1 E1 S1 B1 8	Not marking choice 'yes' or 'no', marking understanding of cross-section of people asked. So could be, e.g. 'yes, as older people don't go to the cinema', or 'no, as all sorts of people go to the cinema'. Look for focus on age in response. Do not accept contradiction of choice yes or no with reason. Do not accept reference to age related ownership of MP3 Do not accept 'people not liking to give age', or 'lie about age', or 'not enough boxes' (as ambiguous) E1 for suitable question with at least 3 boxes, max of 1 overlap or 1 gap, must be suitable for amounts such as £19.99, i.e. pence considered as well as £s, OR E1 for prices from a low value upwards considered, minimum acceptable range ≈£30 to ≈£50 Accept 'no, as different people have different thoughts/amount to spend' Accept more complex answers. Do not accept reference to just 20 people Ignore incorrect cancelling of 12/60. B0 for 12 out of 60, or 12 in 60, but either of these responses gets S1

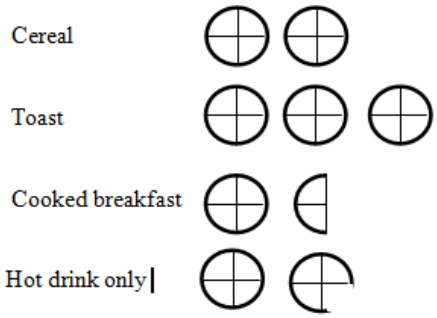
UNIT 1 - HIGHER TIER

Applications Unit 1 Higher Tier January 2013		Final
1.(a)(i) $3e + 2f$ (p)	B2	Allow $3\times e + 2\times f$ B1 for either $3e$ (or $3\times e$ or $e\times 3$) or $2f$ (or $2\times f$ or $f\times 2$) If B2, penalise further incorrect work -1
(ii) $\frac{3e + 2f}{100}$ or $0.03e + 0.02f$ (p) or equivalent	B1	Must clearly show ALL divided by 100. FT their (i) if a sum of 2 terms, equivalent difficulty
(b) 1000t	B1	Allow $1000\times t$ or $t\times 1000$
(c) $5x$	B1	Allow $5\times x$ or $x\times 5$
(d) $14q^2$ (cm^2) or equivalent	B2 7	B1 for $\frac{1}{2} \times 4q \times 7q$ If B2, penalise further incorrect work -1
2(a) Square | Kite, Rhombus, Parallelogram	B2	B1 for any 3 unambiguous correct entries
(b) Square, Rhombus, Parallelogram | Kite	B2 4	B1 for any 3 unambiguous correct entries
3(a) 255 $51(578 + 5)$ OR $6y^3 + 15y$ $= 29733$ Abby's code AND 1083	B1 M1 A1 B1	CAO CAO CAO. Answer space not a contradiction. FT 1083 AND all their 4 digit codes selected If correct evaluation accept blank 'Abby's code ....' space
(b) 1369	B2 6	B1 for sight of 37
4(a) Reason, e.g. all different age groups	E1	Not marking choice 'yes' or 'no', marking understanding of cross-section of people asked. So could be, e.g. 'yes, as older people don't go to the cinema', or 'no, as all sorts of people go to the cinema'. Look for focus on age in response. Do not accept contradiction of choice yes or no with reason.
(b) Two boxes if you are 20 or refers to 'wide' group of older people	E1	Do not accept reference to age related ownership of MP3 Do not accept 'people not liking to give age', or 'lie about age', or 'not enough boxes' (as ambiguous)
(c) Suitable question with at least 3 boxes, no overlap or gaps (in pence) and prices from a low value upwards considered	E2	E1 for suitable question with at least 3 boxes, max of 1 overlap or 1 gap, must be suitable for amounts such as £19.99, i.e. pence considered as well as £s, OR E1 for prices from a low value upwards considered, minimum acceptable range ≈£30 to ≈£50
(d) Reason implying 'no' showing understand that repeating an experiment can lead to different results	E1	Accept 'no, as different people have different thoughts/amount to spend'
(e)(i) Reason implying no, such as: 'all columns total 20', 'all 60 answered', 'all people selected red, black or silver'	E1	Accept more complex answers. Do not accept reference to just 20 people
(ii) Strategy to use all data (for 60 people)	S1	
12/60 (= 1/5 = 0.2)	B1 8	Ignore incorrect cancelling of 12/60. B0 for 12 out of 60, or 12 in 60, but either of these responses gets S1
5(a)		Accept 'their North' provided ±2° from the North given. Penalise 'their North' outside of this tolerance once only
120° drawn from Start	B1	±2°
040° drawn from the position of the first clue	B1	±2°
280° drawn from the position of the second clue	B1	±2°
Line 7.5cm OR 9cm OR 2.5cm for the appropriate stage	B1	±2mm
Accurate chart with lengths and angles correct	B1	Within tolerances allowed
(b) 300°	B1	±2°. FT from their diagram
(c) Distance (±2mm) from the position of the third clue to the start	B1	FT from their diagram (Actual is approximately $10.5\times 40 = 420$m)
Bearing (±2°) from the position of the third clue to the start	B1 8	FT from their diagram (Actual is approximately 250°)
6. $195/3$ (=65) $\times 10$ (£)650	M1 m1 A1 3	OR sight of 130, (195,) and 325 OR sight of 130+195+325 CAO

Applications Unit 1 Higher Tier January 2013		Final
7.(a)(i) Mid-points 52, 56, 60 and 64	B1	
$52\times12 + 56\times32 + 60\times14 + 64\times2$ (= 3384)	M1	FT their mid-points including bounds
/60	m1	FT their $\Sigma fx/60$
56.4	A1	Accept 56 from correct working seen
(ii) Strategy to look back that 32 out of 60 are size 2, e.g. '(table shows) about half customers are size 2	M1	Accept reference back to (a)(i) table without specific numeral details provided 'salesman correct' stated.
Conclusion to give Salesman is correct	A1	
(b)(i) 242 235 229	B3	B2 for any two correct entries, B1 for a correct method seen, or 1 correct entry
(ii) Refers to 'smoothing out data', or 'giving a picture of a complete year's sales', or similar	E1 10	Do not accept 'makes it clearer' Accept 'averages data out'
8(a) Valid reason or explanation, e.g. 'pond fits inside a rectangle' or 'pond fits inside a rectangle' or 'approximates to a rectangle'	S1	Sight of the word rectangle. Needs to be precise in reference to rectangle, not vague referring to edges or banks of the pond being extra
Sight of 6×20	B1	
(b) E.g. Considers 2 semi-circles and a rectangle	S1	Idea of splitting up the area
Method of calculating area	M1	e.g. $\pi r^2 + l\times w$
Accuracy in establishing missing lengths / dimensions	M1	e.g. Sight of diameter 6m <u>or</u> radius 3m AND length of rectangle 20–6(=14)m, or $\pi\times3^2 + 14\times6$
Improved estimate	A1	e.g. 112(.27… m^2)
QWC1 for a clear explanation of 'their idea' with generally accurate spelling Look for • relevance • spelling • clarity of text explanations, • the use of notation (watch for the use '=' being appropriate) • units • labelling 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	QWC 2 8	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.
9.(a) $6.8(408) \times 10^7$	B2	B1 for 68408000 or $3.4(204) \times 10^7$
(b) 5.43×10^6 / 19 or $5.43 \times 10^6 / 19 \pm x$	M1	Ignore for some candidates realising 1 less gap for overall length , x is a small compensation value.
$\times 0.03$	m2	m1 for × 3
$8.57(368...) \times 10^3$ (m) or 8.6×10^3 (m)	A1 6	FT from M1, m1 but must be in standard form *If division by 19.03 leading to 8.56(0168…) $\times 10^3$ (m) mark as above, i.e. allow M1, m2 but award A0 for this misinterpretation of the gaps as extra*

Applications Unit 1 Higher Tier January 2013		Final
10(a) 40, 55, 60	B1	
(b) Correct cumulative frequency diagram, points plotted at bounds and joined by a curve or straight line	B2	FT from cumulative (i) . Allow 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
(c) Median 17 (±0.5)	B1	FT from their cumulative diagram. Not cumulative no FT
Intention to subtract readings from horizontal axis for vertical 45 & 15	M1	FT from their cumulative diagram. *Watch for an answer of 12 from LQ rather than interquartile range, must be IQR is (24-12 =) 12 if working shown*
Interquartile range (12±1)	A1	
(d) General idea of what box – whisker should be	S1	
Range ends 37 and 2 correctly indicated	B1	
Median line correctly indicated	B1	FT their median
UQ and LQ correctly indicated	B1	FT their UQ and LQ readings
(e) Strategy: use of median as same number above and below	S1	
Interpretation: half free + half at £4	M1	
Conclusion based on appropriate working that no difference expected, i.e. compares with all at £2	A1	
	13	
11(a)(i) Idea: 6 × … = 12	S1	
Height of 16 to 22 group indicated as 2	B1	
Correct uniform scale shown	B1	3 correct values, no incorrect values is sufficient
(ii) Method of summing width × height	M1	Must include at least 3 correct products. FT from their histogram with a uniform scale (6×0.5 + 4×5 + 4×6 + 6×2)
59	A1	CAO
(iii) Finding middle worker, i.e. 30th value (or 29 ½ th)	S1	FT from their histogram with a uniform scale
Realising within 12 to 16 interval	M1	
7 (or 6.5) out of the 24 in the group	M1	
13(.17seconds) or 13(.08 seconds)	A1	Must FT from histogram or either no working or correct working Do not accept an answer of 13 without working
(b) Correct histogram on the graph paper provided	B3	B2 for suitable uniform scale to at least 9, having worked with frequency density with at least 3 bars of the histogram correct B1 for working with frequency density, at least 3 calculations correct, OR sight of a uniform scale to 9 (not a scale to 36)
(c) '40 and over' with a reason based on the shape of the histogram or the skew of the data	E1	Accept 'over 40s' with a suitable reason Accept 'over 40s, other median is 13 seconds where as median for these lies in 8 to 12 second group'
	13	
12(a) Correct evaluation of at least 3 coordinates	M1	t: 0 1 2 3 4 5 6 7 8 v: 0 7 12 15 16 15 12 7 0
Suitable axes with appropriate scale and labels	A1	t= 0 to 8 and v = 0 to 16 (or 20). Must FT at least 3 correct points
Plotting at least 7 correct points (allow 2 slips)	M2	FT for their axes if reasonable. M1 for plotting between 3 and 6 correct points
Joining all 9 points with a curve	A1	
(b) (t =) 4 (seconds)	B1	FT from their graph
(c) Strategy, e.g. to draw a tangent at t = 7	S1	Accept appropriate other methods, e.g. close calculations to 7
Use of difference v / difference t	M1	Must be differences, not readings from axes. Ignore signs
= …… m/s^2 or ms^{-2}	A1 U1	Reasonable from their graph. Must be negative (e.g. -6) Does not depend on previous marks
(d) Identifying the required area	S1	Maybe shown on their graph
Splitting area into areas that can be approximated	M1	
Complete calculation for the area required	M1	
Accurately calculated	A1	(Possible answers include 80 (metres) using 2 triangles and 2 trapezia, or 84 (metres) using 2 triangles and 6 trapezia, 85.33... (metres)
	14	

UNIT 2 - FOUNDATION TIER

Applications Unit 2 Foundation Tier January 2013		Final
1. (a)(i) 2 × (£)1.99 + (£)2.10 + 3 × (£)1.80 (£)11.48 (ii) 6 × (£)1.29 (£)7.74 (b) 48 ÷ 6 8	M1 A1 M1 A1 M1 A1 6	Allow one omission/extra CAO FT 'their number of sandwiches' used in part (a) FT 'their number of men'
2. (a) 6 (b) 8 + 12 + 6 + 7 33 (c) For correct pictogram drawn with labels  	B1 M1 A1 B3 6	 For adding frequencies Award B2 for 3 correct, B1 for 2 correct Penalise -1 for no labels
3. (a) A and D B and H (b) F and G K and J	B1 B1 B1 B1 4	*Accept pairs of answers in any order in both parts*
4. (a) Correct completion of Rangoli Pattern (10 lines) (b) Triangle in correct position in 4th diagram	B2 B2 4	Award B1 for 5 or more lines correctly drawn Award B1 for the triangle drawn in correct position in 2nd or 3rd diagram OR award B1 for incorrect triangle drawn in 2nd diagram but then a correct FT drawn in (3rd and) 4th diagram(s).
5. (a) Length of pen – 14cm Height of door – 2m Weight of a tin of beans – 420g Capacity of a can of fizzy drink – 330ml Weight of a bag of sugar – 1kg (b) Better buy is 3kg of potatoes for 80 pence with a reason that 3kg is approx 6(.6)lbs, so are getting a greater weight of potatoes (for the same money).	B4 E2 6	Award B3 for 3 or 4 correct, B2 for 2 correct, B1 for 1 correct. Award E1 for a partial reason or award E1 for sight of 6(.6)lbs with no reason Eg if say 3kg is heavier than 5lbs award E1 Or 3 kg gives ore potatoes for the same money
6. (a) 40/100 × 140 (£)56 (b) coat on Tuesday costs (140 – 56 =) (£)84 20/100 × 84 (£)16.8(0) Coat costs (84 – 16.80=) (£)67.2(0)	M1 A1 B1 M1 A1 B1 6	Answer of (£)84 in this part gets M1 A0 FT 'their 56.' *Award this B1 if shown in part (a)* *Alternative method 80/100 × 84 M2* *=(£)67.2(0) A1* FT 'their 84 and 16.80' if at least M1 awarded in (a) or (b) *If no marks awarded in (b)* *Award SC2 for an answer of 112* *Or Award SC1 for sight of 28 or for 1 slip in workings towards answer of 112*

Applications Unit 2 Foundation Tier January 2013		Final
7. (Cost of Sausages) 240 ÷ 15 × 5.20 (£)83.2(0) (Cost of Rolls) 240 ÷ 12 × 1 (£)20 (Total) (£) 103.2(0) 35/100 × 103.2(0) (£)36.12 (¼ × 103.2(0)=) (£)25.8(0) (103.2(0) – 36.12 – 25.8(0)=) (£)41.28 (41.28 ÷ 8 =) (£)5.16	M1 A1 M1 A1 B1 M1 A1 B1 B1 B1 10	 If M0 A0 Award SC1 for 16 (kgs) If answer given as **20 packs** Award SC1 FT 'their (£)83.20' + 'their (£)20' provided at least M1 awarded FT 'their (£)103.2(0)' FT 'their (£)103.2(0)' but not 'their (£)36.12' FT 'their (£)103.2(0) – 'their (£)36.12' – ' their (£)25.80' *Watch for 103.2(0) – 60% of 103.2(0) or 40% of 103.2(0)* FT 'their remaining cost' ÷ 8
8. (a) (area =) 45 × 25 1125(m^2) (Cost =) 1125 × (£)85 (£) 95625 Look for • spelling • clarity of text explanations, • the use of notation (watch for the use of '=', £, m^2 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) 60(±2) /360 ISW	M1 A1 M1 A1 Q W C 2 B2 8	 FT 'their area' *If no marks awarded* *Award SC2 for sight of (£)11900* *OR Award SC1 for × 85 correctly* 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. Award B1 for sight of 60 (±2°) or for a numerator <90 with a denominator of 360
9. $2x + x + 7 = 25$ $3x = 18$ $x = 6$	B1 B1 B1 3	FT until 2nd error This line implies 1st B1 Answer only of (x =) 6 award B0 B0 B1
10. 16000 × 6.5 ÷ 100 OR 16000 × 6.5 × 5 × 5 OR ÷ 100 Simple interest = (£)5200 Total paid (16000 + 5200 =) (£)21200	M1 m1 A1 B1 4	Or sight of 1040 FT their 5200 provided M1 awarded
11.(a) All 8 points correctly plotted (b) (£)40 (c) Implies "no" with a reason (e.g. points scattered, or not in line, etc.)	B2 B1 E1 4	B1 for at least 6 points correctly plotted, OR all correctly plotted but joined dot-to-dot OR FT from their graph for their oldest clock Accept statements saying it is 'not positive **and** not negative correlation'

Applications Unit 2 Foundation Tier January 2013		Final
12. No, Yes, No Far Flung: No and most expensive or most often late Statement that implies Celtic Flights is more reliable than Roly Air	 B1 E1 E1 3	Accept percentages used within comparison Do not accept percentages quoted without interpretation. Accept statements such as '<u>only</u> 74%' as a comparison No with statement of 1 of the 2 reasons Unambiguous and not contradicted. In either reason box for Celtic Flights or Roly Air
13.(a) (245/9.8(0) - 17) or (245−9.8(0)×17)÷9.8(0) (=25 – 17 = 8) ÷2 Conclusion D4 entry is 4 (i.e. half their 8) (b) (=) C3 × B3 + 2 × D3 × B3 OR (=) C3 × B3 + D3 × B3 + D3 × B3 OR (=) (2 × D3 + C3) × B3 OR equivalent	M1 m1 A1 B4 7	Or equivalent method that could lead to 8 Depends on M1. May be embedded CAO A correct answer in the table gets M1, m1, A1 Ignore 'E3 ='. Accept '*' as '×' Award *B3* for sight of C3 × B3 + D3 × B3, or 2 × D3 × B3, or D3 × B3 + D3 × B3, or (2 × D3 + C3) Award *B2* for sight of 'B3×C3' or 'B3×D3' Award *B1* if shown numerically, with an attempt then to use a cell reference *Penalise consistent incorrect row -1 only*
14. $AC^2 = 75^2 + 140^2$ $AC^2 = 25225$ OR $AC = \sqrt{25225}$ AC = 158.8(238017) or 159 (m)	M1 A1 A1 3	
15.(a) 5 | 4 and 2 | 5 (b) Median in £ / Range in £ / Mode in £ NewKey: 23 / 40 / 23 eLime: 36 / 37 / 31	B2 B4 6	B1 for either entered correctly *FT their entries, or no extra entries, to mark (b)* 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

UNIT 2 - HIGHER TIER

Applications Unit 2 January 2013 Higher Tier GCSE		Final
1.(a) 4.5(00 m) (b) 3200 × 750 with an attempt to change units 2.4 (m^2) (c) 600 × 750 × .... = 405 000 000 900 (mm)	B1 M1 A1 M1 A1 5	 Attempt to change units needs evidence of $\div 10^n$ where $n \geq 3$ Or equivalent method
2.(a) All 8 points correctly plotted (b) (£)40 (c) Implies "no" with a reason (e.g. points scattered, or not in line, etc.)	B2 B1 E1 4	B1 for at least 6 points correctly plotted, OR all correctly plotted but joined dot-to-dot OR FT from their graph for their oldest clock Accept statements saying it is 'not positive **and** not negative correlation'
3. (a) (i)250 × 4.37 = 1092.5(0) (Buys)1050 (zloty) (ii) 1050 ÷ 4.37 = (£)240.27(46) (b) (1050 – 340.40 =) 709.6(0) 709 ÷ 4.43 (£) 160.04	M1 A1 A1 M1 A1 B1 M1 A1 8	 FT provided M1 awarded FT 'their 1050 zloty' provided rounded to the nearest 50,must be in zloty not £s FT 'their (a)' provided >340.40 FT rounding down their 709.60 to whole number Accept (£)160.05 An answer of (£)160.18 should be awarded B1 then SC1 in (b) An answer of (£)160.27 should be awarded SC1, with B1 only if 709.6(0) seen
4. No, Yes, No Far Flung: No and most expensive or most often late Statement that implies Celtic Flights is more reliable than Roly Air	 B1 E1 E1 3	Accept percentages used within comparison Do not accept percentages quoted without interpretation. Accept statements such as '<u>only</u> 74%' as a comparison No with statement of 1 of the 2 reasons Unambiguous and not contradicted. In either reason box for Celtic Flights or Roly Air
5.(a) (245/9.8(0) - 17) or (245−9.8(0)×17)÷9.8(0) (=25 – 17 = 8) (78.4(0) ÷9.8(0) =8) ÷2 Conclusion D4 entry is 4 (i.e. half their 8) (b) (=) C3 × B3 + 2 × D3 × B3 OR (=) C3 × B3 + D3 × B3 + D3 × B3 OR (=) (2 × D3 + C3) × B3 OR equivalent	M1 m1 A1 B4 7	Or equivalent method that could lead to 8 Depends on M1. May be embedded CAO A correct answer in the table gets M1, m1, A1 Ignore 'E3 ='. Accept '*' as '×' Award *B3* for sight of C3 × B3 + D3 × B3, or 2 × D3 × B3, or D3 × B3 + D3 × B3, or (2 × D3 + C3) Award *B2* for sight of 'B3×C3' or 'B3×D3' Award *B1* if shown numerically, with an attempt then to use a cell reference *Penalise consistent incorrect row -1 only*
6.(a) 5 | 4 and 2 | 5 only (with no other entries) (b) (c) Shows understanding that the pie charts don't show how many phones were sold	B2 B4 B1 7	B1 for either entered correctly *<u>FT their **2** entries, or 'nil entries', or if **1** extra entry to mark (b)</u>. However if responses in (b) are correct then award marks as appropriate* 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

	Median in £	Range in £	Mode in £
NewKey	23	40	23
eLime	36	37	31

Applications Unit 2 January 2013 Higher Tier GCSE		Final
7.(a) (Driftwood) $\frac{68\times36 - 2000}{2000}$ (×100) 22.4(%)	M1 A1	(2448 – 2000)/2000 or 0.224 Accept 22(%) from correct working *If no marks SC1 for an answer of 122(.4%)*
(Grain Bank) 0.1×2000 + 15×146 (= 2390) $\frac{\text{'their 2390'} - 2000}{2000}$ ×100 19.5(%)	M1 m1 A1	(200+2190-2000)/2000 or 0.195 An answer of 19(%) or 20(%) is A0 *If M1 only, then also award SC1 for an answer of 119.5(%), 119(%) or 120(%)*
Other considerations, e.g. reference to time period Look for • spelling • clarity of text explanations, • 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	E1 Q W C 2	Accept reasonable ideas, i.e. 'consider other bank terms/rates', 'length of time business will last', 'able to repay the loan each month' 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)(i) 26.60/3.5 (£)7.6(0) (ii) 26.60/1.3 (£)20.46	M1 A1 M1 A1 12	For an answer of 8.06, implying division by 3.3, award SC1 Accept (£)20.47 Award M1 only for 20.4615...
8. $2f + 3g = 5$ and $3f + 4g = 4$ Method, e.g. equal coefficients Correct first variable Method to find 2nd variable, e.g. substitution Correct second variable	B1 M1 A1 m1 A1 5	 FT provided at least 1 correct equation and solving is of equivalent difficulty Allow 1 slip in non-equalised variable $f = -8$ or $g = 7$
9.(a) 34990 / 1.175 × 1.24 36930 (euros) (b) Sight of 1769.5 (mm) Sight of 2007.5 (mm) 2007.5 – 1769.5 (÷2) (One wing mirror) 119(mm) (c) 11.5 × 7.5 × 5.5 474.4(cm^3)	M1 M1 A2 B1 B1 M1 A1 M1 A2 11	(29778.72(34)) Independent of 1st M1 CAO Not FT from M0, M1. A1 for 36925(.617 euros) or if incorrectly rounded to 36920 If M0, M1 also allow SC1 for an answer of 35790 (euros) Or half of this Or half of this Must FT from correct working A1 for 474.375 rounded or truncated, but not to 1dp as required An answer of 472.4699… comes from 11.49, 7.49 and 5.49 which is M0, A0, A0
10.(a) 2.0×10^4 (b) 1.1×10^5	B2 B2 4	B1 for 2×10^4 or $1.9(984) \times 10^4$. B1 for $1.(05191) \times 10^5$
11. Opposite = Tan56°× 19 = 28.168658….(m) Height of the tree = 29.968658…(m)	M2 A1 A1 4	M1 for tan56° = opposite/19 Accept rounded or truncated from working Accept rounded or truncated from working, and FT from their rounded or truncated 28.168…

Applications Unit 2 January 2013 Higher Tier GCSE		Final
12.(a) $t + f \leq 30$ and $3t + 4f \geq 80$	B3	B2 for $t+f \leq 30$ and $3t+4f \ldots 80$, or $t+f \ldots 30$ and $3t+4f \geq 80$, or $t+f < 30$ and $3t+4f > 80$ B1 for either inequality correct, or $t+f \ldots 30$ and $3t+4f \ldots 80$ FT their inequalities if possible provided similar level of difficulty
(b) Line $t+f=30$ drawn correctly	B1	
Line $3t+4f=80$ drawn correctly	B1	
The region indicated	B1	FT from 2 lines with at least one line drawn correctly
(c) Any correct point from the correct region, using whole numbers only	B1 7	OR FT their graph for whole number solutions only
13.(a) Calculation that would lead to a correct answer for TOTAL 2009, 2010, 2011 and 2012	M1	Calculations are: 2009: 2300 2010: 2300×3 2011: 2300×3×3 2012: 2300×3×3×3
92000 (T-shirts)	A2	A1 for correct answer for 2009, 2010, 2011 & 2012 as 2300, 6900, 20700, 62100 T-shirts SC1 for an answer of 6900, 20700 or 62100 T-shirts only *Treat starting with 2009 as 2300×3 and continuing with appropriate pattern of trebling as MR-1 and mark accordingly*
(b) Idea that 3.60 is 112% of previous year price	B1	
$3.60 \div 1.12^3$	M2	M1 for equivalent of $3.60 \div 1.12$
(£)2.56	A1	
(c) Strategy to use quadratic similarity	S1	This may be linear or cubic *The following answers imply S1:* *for linear, 6.468 or 6.46 or 6.47* *for cubic, 12.677 or 12.67 or 12.68*
Sight of 50^2 with 70^2, or 5^2 with 7^2, or 1.4^2, or $(5/7)^2$	M1	
$(4.62/50^2)\times70^2$ or equivalent	A1	
(£)9.06	A1 11	Accept (£)9.05(52)
14.(a) Area of 5 faces of the cuboid 2304 (cm^2)	B1	(144+ 540+ 540+ 540 + 540 = 2304)
Slant height$^2 = 18^2 + 6^2$ (=360)	M1	Or alternative complete method
Slant height = 18.97…. or 19(cm)	A1	
Area 1 triangular face = ½ ×12×'slant height' (=113.84..)	M1	FT for their 18.97, provided not 18
OR 4 triangular areas (= 455.36798…)	A1	Rounded or truncated
Total area 2759.36798…(cm^2)	B1	FT provided includes 'their area of 4 triangles' and 'their total area of rectangles' only if at least 4 rectangles have been considered *Allow rounding or truncation errors if method clear, however if consistent rounding or truncation errors then penalise PR-1*
(£0.045 × Total area =) (£) 124.17		
(b) Appropriate sketch (may be implied) with realisation that 1st step is to find the height/length of the cylinder, then subtraction from 22 will give the height of the cone	S1 M1 A1	
$\Pi \times 6^2 \times$ height of cylinder = 1018	M1	FT '22 – their height of cylinder'
Height of the cylinder 9(.00..cm)	A1	
Volume cone = $1/3 \times \Pi \times 6^2 \times$ (22- height of cylinder)	A1	CAO from correct working
Volume cone, answers in range 489.8 to 490.3 (cm^3) Overall volume1.5 (litres)	12	

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