GCSE MARKING SCHEME

METHODS IN MATHEMATICS
(LINKED PAIR PILOT)

JANUARY 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE METHODS IN 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.

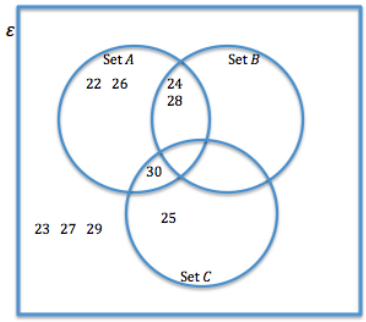
WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

METHODS - UNIT 1
FOUNDATION TIER

Methods Unit 1 Foundation Tier January 2014	Mark	Comments
1. (a) (i) 5025 (ii) ten million (b) (i) 121 (ii) 9 (iii) 48 (iv) 8 (c) (i) 1450 (ii) 1400	B1 B1 B1 B1 B1 B1 B1 B1 8	
2. Number other than 1-6 Any three different numbers from 1 to 6 Head OR Tail Yellow	B1 B1 B1 B1 4	 Eg, Odd (numbers) OR Even (numbers) OR any other correct answer e.g. '1,2, or 3' or 'a prime number''.
3. 1 | 2 | 3 | **4** 3 | 4 | -5 | **8** **5** | 4 | **3** | **-2** 1 | 0 | 9 | 0	B3 3	B2 for any 3 or 4 correct entries B1 for 2 correct entries
4. (Dylan saves) (1/10 × 400 =)(£) 40 (No of weeks) 250/ 40 6.25 (He can afford the bike after) 7 (weeks) Look for: • Clear workings and labelling • Correct use of units eg £, weeks QWC2: Candidates will be expected to • present relevant work clearly, with words explaining process or steps AND • make few if any mistakes in spelling, punctuation and grammar QWC1: Candidates will be expected to • present work clearly which is mostly relevant, with words explaining process or steps OR • make few if any mistakes in spelling, punctuation and grammar and include units in their final answer	B1 M1 A1 A1 QWC 2 6	 FT their 40 Any appropriate method eg 40 × 6 or 40 × 7 or 240 or 280 Any correct indication FT for equivalent level of difficulty 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 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.

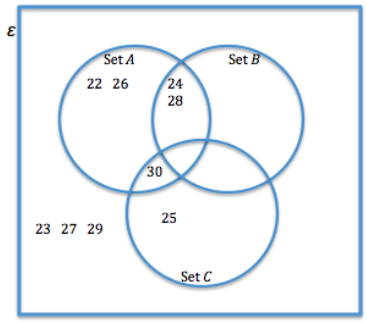
Methods Unit 1 Foundation Tier January 2014	Mark	Comments
5. (a) 9	B3	B2 for meeting any 3 clues e.g. 3, 15, 81,… B1 for meeting any two clues e.g. 1, 4, 5, 6, 7, 11, 12,...
(b) (i) 35 -10	B1	
(ii) 13 × 50 or 50 ×13	B1	
	5	
6. 6	B1	
Valid Reason	E1	E marks dependent on B marks Eg 6 × 12=12
7	B1	
Valid Reason	E1	Eg 1 and itself goes into it. Only 2 factors.
10	B1	
Valid Reason	E1	Eg 10 × 10 =100. Ten squared=100.
	6	
7. 180/3 or 60	B1	Or seen in diagram.
180- 60	M1	FT their 60
120	A1	CAO
	3	
8. (a) Correct diagram	B1	
(b) 14, 18, 22	B2	Award B1 for two correct entries
(c) Number of seats = Number of tables(t) × 4 +2	B2	Accept n for number of tables Award B1 for × 4 + 2 Do not accept 'add four '
(d) 30	B1	FT for equivalent level of difficulty
(e) (82 – 2)/4	M1	FT for equivalent level of difficulty Or equivalent method
=20	A1	
	8	
9. (a) $4x + 3y$	B2	Must be an expression, as shown. Award B1 for either of the 2 terms correct within an expression or both terms correct but not in an expression.
(b) (4 x 3) – 5	M1	
=7	A1	CAO
	4	
10. For 2 correct in a form which allows comparison	B1	
For all 3 correct in a form which allows comparison	B1	
3/8, ½, ,¾	B1	Answer only gets B1. CAO
	3	
11. (a) $x = 64$	B1	
$y = 30$	B1	
(b) $a = 80$	B1	
Noticing that b and b and 80 is 180	M1	FT their 80
$b = 50$	A1	
	5	

Methods Unit 1 Foundation Tier January 2014	Mark	Comments
12. (a) | | 1 | 2 | 3 | 4 | 5 | 6 | | Head | H1 | H2 | **H3** | **H4** | **H5** | **H6** | | Tail | T1 | **T2** | **T3** | **T4** | **T5** | **T6** |	B2	B1 for at least 6 correct entries
(b) 1/12	B1	Across parts (b) and (c), penalise incorrect notation, e.g. 1 in 12, once only.
(c) 2/12	B1 4	ISW FT for consistent incorrect denominator
13. (a) $5x - 20 + 6x - 3$ $11x - 23$ (b) $4x(2 - y)$	B1 B1 B2 4	B1 for $4x(\ldots - y)$ or $4x(2 - \ldots.)$ or correct partially factorised
14(a) $180 - 126$ (=54°)	B1	1st step of appropriate working OR an appropriate 54(°) indicated on the diagram. Allow B1 even if then incorrectly assuming an 'isosceles trapezium'
x indicated as (180 – 58 – '54' =) 68(°)	B1	FT 'their 54°' (=180 – 126) evaluated correctly May be on diagram, do not accept contradiction in answers for x in working space and on diagram
Two appropriate stages of explanation given, e.g. 'angles on a straight line 180°'AND • 'angles in a triangle 180°', or • corresponding angles or equivalent, or • interior angles, or equivalent	E1	Accept reference to 'C' and 'F' angles Allow FT for 'isosceles trapezium' provided both stages explained, i.e. parallel fact and sum 360° If no marks: SC2 for x = 61° from an isosceles triangle with explanation of triangle sum 180° AND a parallel line fact, OR SC1 for x = 61° from an isosceles triangle *Alternative method* *M1 126 – 58* *A1 = 68(°)* *B1 Explanation: 'exterior angle of a triangle is the sum of the two other angles' AND 'corresponding angle'*
(b) Sight of 40(°)	B1	May be shown on a diagram, showing angles at a point, or a diagram showing they do tessellate
Showing or stating 140 + 140 + 40 + 40 OR 140 + 40 = 180° WITH straight line sum 180° stated	B1	FT their '180 - 140'
Use of, or statement that, angles at a point add to 360(°)	E1 6	OR 'angle sum of the tile is 360(°). For award of E1 360(°) at a point MUST be stated, not simply implied If no marks then allow B2 for the statement 'all quadrilaterals tessellate', then possible E1 for an explanation, e.g. 'angle sum at a point is 360(°)'
15(a) All 4 correct entries | Fraction | Decimal | Recurring or terminating? | | | | | | 3/20 | | Terminating | | | 0.6363(63…) | Recurring |	B1 B1 B1 3	3/20. Do not accept 15/100 0.6363... Do not accept 0.63 unless 0.6363 seen in working Terminating and recurring in the correct cells. CAO

Methods Unit 1 Foundation Tier January 2014	Mark	Comments
16(a) **No** AND a reason, e.g. 'y coordinate is not 3 times the x coordinate', or 'a=-5 then 3a=-15' (b) All 5 points plotted fit rule (a, 3a), with no incorrect plots	E1 B2 3	Any counter example ((-5, -15) or (-2/3, -2)) must be relevant and correct with NO stated B1 for at least 3 correct plots and no more than 2 incorrect plots, OR B1 for 5 sets of possible coordinates listed, which may be outside the grid
17(a) All 9 numbers placed correctly  	B3	B2 for any 7 or 8 numbers placed correctly, the other numbers omitted or incorrectly placed, OR B1 for any 5 or 6 numbers placed correctly, the other numbers omitted or incorrectly placed. *Any ambiguous duplicates are marked as an incorrect placement for that number*
(b) Venn diagram 2 AND full reason, e.g. 'multiples of 4 are a subset of multiples of 2 and there is a multiple of 2 which is a multiple of 5', or 'set B is a subset of set A, and set A intersects with set C', or 'A & B share some of the numbers, but C only shares numbers with A', or 'C & B have nothing in common, and B shares everything with A'	E2 5	OR selects Venn diagram 2 and explains why the other 2 Venn diagrams are not selected E1 for choice of Venn diagram 2 AND a partial reason, i.e. only mentions 1 aspect or attempts an explanation e.g. '4 times table is within 2 times table', or 'shows which of A are within 4 times table', or '22 is in A but not in C', or 'no multiples of 4 in C' OR E1 for selection of Venn diagram 2 and explains why 1 of the other 2 Venn diagrams are not selected *Accept informal words such as 'within' for 'subset', 'overlap' for 'intersection'*

METHODS UNIT 1
HIGHER TIER

Methods Unit 1 Higher Tier January 2014	Mark	Comment
1(a) (12 + 10)/(9 + 2)	M1	Allow 1 error with a sign or 1 slip
= 2	A1	CAO
(b) -18x – 33y	B2	Must be an expression as shown B1 for either of the 2 terms Do not ignore further work if B2 then -1
(c) $(2x + 7)^3$	B1	ISW
	5	
2(a) 180 – 126 (=54°)	B1	1st step of appropriate working OR an appropriate 54(°) indicated on the diagram. Allow B1 even if then incorrectly assuming an ‘isosceles trapezium’
x indicated as (180 – 58 – ‘54’ =) 68(°)	B1	FT ‘their 54°’ (=180 – 126) evaluated correctly May be on diagram, do not accept contradiction in answers for x in working space and on diagram
Two appropriate stages of explanation given, e.g. ‘angles on a straight line 180°’AND • ‘angles in a triangle 180°’, or • corresponding angles or equivalent, or • interior angles, or equivalent	E1	Accept reference to ‘C’ and ‘F’ angles Allow FT for ‘isosceles trapezium’ provided both stages explained, i.e. parallel fact and sum 360° If no marks: SC2 for x = 61° from an isosceles triangle with explanation of triangle sum 180° AND a parallel line fact, OR SC1 for x = 61° from an isosceles triangle
Look for: • Clear identification of any angles referred to on the diagram • Use of degree symbol • Appropriate use of ‘=’ • Use of correct terminology for angles, not ‘C’ or ‘F’ angles		*Alternative method* *M1 126 – 58* *A1 = 68(°)* *B1 Explanation: ‘exterior angle of a triangle is the sum of the two other angles’ AND ‘corresponding angle’*
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 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.
(b) Sight of 40(°)	B1	May be shown on a diagram, showing angles at a point, or a diagram showing they do tessellate
Showing or stating 140 + 140 + 40 + 40 OR 140 + 40 = 180° WITH straight line sum 180° stated	B1	FT their ‘180 - 140’
Use of, or statement that, angles at a point add to 360(°)	E1	OR ‘angle sum of the tile is 360(°). For award of E1 360(°) at a point MUST be stated, not simply implied If no marks then allow B2 for the statement ‘all quadrilaterals tessellate’, then possible E1 for an explanation, e.g. ‘angle sum at a point is 360(°)’
	8	

Methods Unit 1 Higher Tier January 2014	Mark	Comment
3(a) All 4 correct entries Fraction | Decimal | Recurring or terminating? 3/20 | | Terminating | 0.6363(63…) | Recurring	B1 B1 B1	3/20. Do not accept 15/100 0.6363... Do not accept 0.63 unless 0.6363 seen in working Terminating and recurring in the correct cells. CAO
(b) $\frac{0.0072}{0.002}$ OR 120×0.03 OR $\frac{24 \times 0.03}{0.2}$ $\frac{72}{20}$ OR 3.6 OR $\frac{0.72}{0.2}$ OR $\frac{7.2}{2}$ 18/5	M1 m1 A1 6	OR any appropriate **correct first calculation** Place value must be correct for M1 OR appropriate **correct second calculation** CAO. Allow sight of $3^3/_5$ Must be from correct working, watch for compensating errors. If no working then $3^3/_5$ allow M1 m1 A1
4(a) **No** AND a reason, e.g. 'y coordinate is not 3 times the x coordinate', or 'a=-5 then 3a=-15' (b) All 5 points plotted fit rule (a, 3a), with no incorrect plots (c) y = 3x	E1 B2 B2 5	Any counter example ((-5, -15) or (-2/3, -2)) must be relevant and correct with NO stated B1 for at least 3 correct plots and no more than 2 incorrect plots, OR B1 for 5 sets of possible coordinates listed, which may be outside the grid FT their points provided they fall on a straight line B1 for attempt to find the gradient as 3/1, or y = 3a, or equivalent
5(a) All 9 numbers placed correctly  (b) Venn diagram 2 AND full reason, e.g. 'multiples of 4 are a subset of multiples of 2 and there is a multiple of 2 which is a multiple of 5', or 'set B is a subset of set A, and set A intersects with set C', or 'A & B share some of the numbers, but C only shares numbers with A', or 'C & B have nothing in common, and B shares everything with A' (c) 3/9 (=1/3) 7/9 1/9	B3 E2 B1 B1 B1 8	B2 for any 7 or 8 numbers placed correctly, the other numbers omitted or incorrectly placed, OR B1 for any 5 or 6 numbers placed correctly, the other numbers omitted or incorrectly placed. *Any ambiguous duplicates are marked as an incorrect placement for that number* OR selects Venn diagram 2 and explains why the other 2 Venn diagrams are not selected E1 for choice of Venn diagram 2 AND a partial reason, i.e. only mentions 1 aspect or attempts an explanation e.g. '4 times table is within 2 times table', or 'shows which of A are within 4 times table', or '22 is in A but not in C', or 'no multiples of 4 in C' OR E1 for selection of Venn diagram 2 and explains why 1 of the other 2 Venn diagrams are not selected *Accept informal words such as 'within' for 'subset', 'overlap' for 'intersection'* FT their Venn diagram. FT a slip in the denominator used consistently FT a slip in the denominator used consistently

Methods Unit 1 Higher Tier January 2014	Mark	Comment
6(a) (10) 20 30 40 50 (7/10) 14/20 20/30 24/40 28/50 (0.7) 0.7 0.66… 0.6 0.56 0.66 or 0.67 Not 0.6 (b) Relative frequencies plotted accurately (c) Conclusion, 'no, as there is still a variation in relative frequencies', 'no, the results are not settled', 'results are still going down'	B1 B1 B1 B2 E1 6	Cumulative numbers 7, 14, 20, 24, 28 Fractions, FT their cumulative numbers Decimals, FT their cumulative numbers as quotients over cumulative denominators, correctly evaluated Ignore if points joined or not FT their relative frequencies provided no more than 1 is outside the range 0.4 to 0.8. B1 for 3 plots accurate. Do not accept FT answers of yes. Allow 'no, needs more to get a more accurate answer'. Ignore further foolish comments. Do not accept 'no, need to throw more times'
7. Total of interior angles $5 \times 180(°)$ $= 900(°)$ 900 – sum of 4 angles given (594°) (=306) ÷3 (Each of the 3 angles is) 102(°)	M1 A1 M1 m1 A1 5	Or equivalent full method FT 'their 900' provided >594 Unique division by 3, no further operations Alternative: Corresponding exterior angles are 66(°), 30(°), 20(°) and 10(°) B1 Remaining exterior angles = 360 – sum of exterior angles found (126°) (=234°) M1 ÷ 3 m1 (Each of the remaining 3 exterior angles =) 78(°) A1 (Each of the remaining 3 interior angles =) 102(°) *FT provided B1, M1, m1, 180 – 'their 78'* A1
8(a) 18 (b) $\sqrt{(16 \times 9)}$ $= 12$ (c) Two of the prime factors are 2 and 5 Other factor is either 3 or 7 Missing number is 70	B1 M2 A1 M1 M1 A1 7	M1 for sight of each of 16 or 9 FT from M1 provided simplified using surd notation if necessary An answer of 2×5×7 gets M1, M1, A0 Award all 3 marks for sight of unsupported 70. An answer of 70 from incorrect working is not awarded all 3 marks *Example: An answer of 30 is M1, M1, A0 (as it meets M1, M1 for factors 2 and 5, with 3)* If no marks, allow SC1 for prime numbers which sum to 70 AND clues 2 to 4 are met, e.g. 2+31+37 *Alternative:* *Considering multiples of a number which would include 210 M1* *Considering multiples of 10 which would include 210, i.e. multiples of 30 or 70 m1* *Answer 70 A1*
9(a) Correct sketch (b) Correct sketch (c) Correct sketch	B1 B1 B1 3	FT reflection in x-axis of their (a)
10(a) $5\times40^2 - 3\times40 - 1$ with 5×40^2 evaluated as 8000 $= 7879$ (b) $n^2 + 3$ or equivalent	M1 A1 B3 5	Accept full description in words or given in a fully labelled diagram for B3, B2 or B1 as appropriate B2 for $1n^2 \pm \ldots$ (not for $1n^2$), OR B1 for $1n^2$ or for sight of the 2^{nd} difference 2

Methods Unit 1 Higher Tier January 2014	Mark	Comment
11(a) Correct entries 0.7 and 0.2 Other entries 0.8, 0.2 with 0.8 Labels correct for no cereal, no toast, toast and no toast (b) 0.3×0.2 $= 0.06$ (=6/100)	B1 B1 B1 M1 A1 5	 In this order if no labels, otherwise as their label order Not a FT need to match probabilities. If labels incorrect B0, however allow previous B1 for order 0.8, 0.2, 0.8 FT from their probability tree for M1 only CAO. Allow M1 for sight of an unsupported 0.6
12(a) $(2x + 5)(3x -1)$ (b) $dw = 3m^2$ $m^2 = dw/3$ $m = (\pm) \sqrt{(dw/3)}$ (c) $ab – bc = e$ $b(a – c) = e$ $b = \frac{e}{a-c}$	B2 M1 m1 A1 B1 B1 B1 8	B1 for $(2x\pm \ldots)(3x\pm \ldots)$ Square root must clearly be over dw/3 entirely If no marks SC1 for $\sqrt{(w/3d)}$ from 1 initial error Collect FT until 2nd error Factorise Divide
13. Strategy, e.g. suitable outline of a suitable tree diagram Sight of P(man red) = 1/5 or P(woman red) = 3/10 $1/5 \times 3/10$ $= 3/50$ Conclusion 'greater than' stated or implied, with reason, e.g. 6/100>5/100	S1 B1 M1 A1 E1 5	Listing WM, MW, MM, WW is not a suitable strategy The award of M1 also implies S1 FT provided at least 1 other mark has been awarded. Accept if compared with 6%, i.e. same format for 5% and their answer
14(a) $6x^2 + 14xy -15xy – 35y^2$ (+ xy) $= 6x^2 – 35y^2$ (b) $7x(3x – 2) + 2(2x + 3)$ as a numerator $(2x + 3)(3x – 2)$ as a denominator $21x^2 -14x + 4x + 6$ $\frac{21x^2 -10x + 6}{(2x + 3)(3x – 2)}$	B2 B1 M1 M1 A1 A1 7	B1 for any 2 of the expansion terms correct FT from B1. Mark final answer. Allow $6x^2 +– 35y^2$ Mark final answer. If the denominator is expanded it must be correct. FT from 1 error in numerator expansion, provided it is a trinomial
15. Selecting $4y = x$ AND $y = -4x$ Showing that $m_1 = ¼$ and $m_2 = -4$ $¼ \times -4 = -1$ or equivalent	B1 M1 A1 3	
16(a) P indicated correctly, where XY touches the circle (b) WXY is a tangent meeting the circle radius at 90° Corresponding angles equal (angles at X and W) OR Supplementary angles OR shows or states both angles are 90° (c) <HBG=160° or <ABW= 80° or equivalent Reason, e.g. 'angle at the centre is twice the angle at the circumference' 100° Reason, e.g. ' sum of angles in a quadrilateral is 360° (and right angle where tangent meets the radius)' or 'allied (interior) angles'	B1 B1 B1 B1 E1 B1 E1 7	 Accept description in words Accept description in words

Methods Unit 1 Higher Tier January 2014	Mark	Comment
17(a) a = 4 $x^2 + 8x + 16$ (-11) OR alternative method to find b b = -11 (b) $(x + 4)^2 - 11 = 0$ $(x + 4)^2 = 11$ $x + 4 = (\pm)\sqrt{11}$ $x = \pm\sqrt{11} - 4$	B1 M1 A1 B1 M1 M1 A1 7	Accept embedded answers Accept embedded answers Use of completing the square from (a), FT from their (a) provided equivalent format Must show $\pm$ Use of formula leading to $(-8\pm2\sqrt{11})/2$ gets B2, $(-8\pm\sqrt{44})/2$ gets B0

METHODS UNIT 2
FOUNDATION TIER

<table>
<tr><th>Methods Unit 2 Foundation Tier January 2014</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1. (a) 1469
(b) 9614</td><td>B1
B1
2</td><td></td></tr>
<tr><td>2. 25% and 2/8</td><td>B2

2</td><td>B1 for 1 correct and no more than 1 incorrect
OR B1 for 2 correct and 1 incorrect</td></tr>
<tr><td>3. (£) 20 – 4 x (£)4.99
£ 0.04 or 4p</td><td>M1
A2

3</td><td>
Allow £0.04p
A1 for 0.04 or 4 with wrong units or no units</td></tr>
<tr><td>4. (a) D and E
B and H

(b) Diameter
Tangent</td><td>B1
B1

B1
B1
4</td><td>Accept triangle(s)
Accept circle(s)</td></tr>
<tr><td>5. (a)(i) 8
cm³

ii) (Yes and Volume =) 2×2×2 implied or drawn

(b) 5 × 8 × 3
=120 (cm³)</td><td>B1
U1

B1

M1
A1
5</td><td>
Independent of all other marks.</td></tr>
<tr><td>6. (a) Correct diagram

(b) 4</td><td>B2

B1
3</td><td>B1 for straight lines correct or B1 for correct curve</td></tr>
<tr><td>7. (a)
<table>
<tr><th></th><th>8 pancakes</th><th>16 pancakes</th><th>80 pancakes</th></tr>
<tr><td>Flour</td><td>100g</td><td>200(g)</td><td>1000g</td></tr>
<tr><td>Eggs</td><td>1</td><td>2</td><td>10</td></tr>
<tr><td>Milk</td><td>250(ml)</td><td>500(ml)</td><td>2500ml</td></tr>
<tr><td>Melted Butter</td><td>1 tablespoon</td><td>2 tablespoons</td><td>10 tablespoons</td></tr>
<tr><td>Raspberries</td><td>150g</td><td>300g</td><td>1500(g)</td></tr>
</table>
(b) 100 :150 or equivalent

2 : 3 ISW</td><td>B4

M1

A1

6</td><td>B1 for each correct entry

FT ‘their flour’ for 16 pancakes or ‘their raspberries’ for 80 pancakes’
Award SC1 for 3:2</td></tr>
</table>

Methods Unit 2 Foundation Tier January 2014	Mark	Comments
8. (a) 23/100 x 52 =(£) 11.96 (b) 4/9 x 243 = 108	M1 A1 M1 A1 4	
9. For 2 correct in a form which allows comparison For all 3 correct in a form which allows comparison 76%, ¾ , 0.7	B1 B1 B1 3	
10.(a) a=8 a=1 a=3 (b) Equation with answer x=10 Equation with answer t =-4	B1 B1 B1 B1 B1 5	
11.(Width of rectangle=) 45 / 9 = 5cm (Perimeter=) 9 + 5 + 9 +5 =28cm Look for: Area = length x width Explanation of perimeter Correct use of Units QWC2: Candidates will be expected to • present relevant work clearly, with words explaining process or steps AND • make few if any mistakes in spelling, punctuation and grammar QWC1: Candidates will be expected to • present work clearly which is mostly relevant, with words explaining process or steps OR make few if any mistakes in spelling, punctuation and grammar and include units in their final answer	M1 A1 M1 A1 4 QWC 2 6	FT 'their width' 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 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.
12. (a) x=4 (b) y = 20 (c) 5a = 17 +8 a = 5 (d) b = 4 (e) 5d=8 (d=) 8/5 £1.6(0)	 B1 B1 B1 B1 B1 B1 M1 A1 8	Allow embedded answers in all parts FT from 1 error for equation in the form ma=n, m≠1 OR realising 5 drinks cost £8

Methods Unit 2 Foundation Tier January 2014	Mark	Comments
13. Enlargement scale factor 2	B2 2	B1 for any two lines correct or 3 points correct
14. (a) 5 (b) 2.744 (c) 10 (d) 0.45 (e) $5x>15$ $x>3$	B1 B1 B2 B2 M1 A1 8	 B1 for 10.3(199…) B1 for 0.45267… rounded or truncated CAO
15 (a) ½ × 4.6 × 2.3 5.29 (cm^2) or 5.3(cm^2) (b) (hypotenuse^2 =) $4.6^2 + 2.3^2$ h(ypotenuse)^2 = 26.45 or hypotenuse = $\sqrt{26.45}$ h(ypotenuse =) 5(.14… cm)	M1 A1 M1 A1 A1 5	 Only accept 5(cm^2) from correct working Allow FT from M1, A0
16.(a) $\pi r^2 = 36\pi$ 6 (cm) (b) (Perimeter) $2x + x – 6 + 2x + 8 + x – 8$ $= 132$ $6x - 6 = 132$ or $6x = 138$ $x = 23$ (Height of the trapezium $(x – 8)$cm =) 15 (cm)	M1 A1 M1 M1 A1 A1 B1 7	For equating, or r = $\sqrt{36}$, or $r^2 = 36$ *If no marks allow SC1 for 5.9(9..cm) from calculation* Algebraic notation not required for M, A and B marks FT their sum of terms, including x and number terms, equated to 132 FT their collection for equivalent difficulty FT for evaluation, not left as a fraction FT their x-8 provided M2 awarded *Alternative: Trial and improvement* *M1 Trial to sum the correct 4 sides* *M1 Clearly working towards 132, more than 1 trial and moving closer* *A1 Clearly working towards 132, one below and one above* *A1 23* *B1 (Height) 15(cm) FT their x-8provided M2 awarded*
17. Position | Name 1 | Catrin 33(.33...)% 2 | Debbie 32(.144…)% 3 | Beatrice 31% 4 | Abbie 27(.38…)%	B3 3	Names in the correct order **and** all results appropriately and correctly compared (same form) B2 for at least 3 results correctly in a suitable format to compare **and** their comparisons appropriately sorted B1 for at least 2 results correctly in a suitable format to compare **and** their comparisons appropriately sorted, OR B1 for at least 3 results correctly in a suitable format to compare *Remember: format of 1 of the result with 2 others to compare counts as 3 results* *If no other marks, then award SC1 for names in the correct order* If fractions used for comparison they need to be common denominators or awareness of size, e.g. 1/3 =9/27 compared with 9/28 same numerator Fractions: Catrin 28/84, Debbie 27/84 (=9/28), Beatrice ≈26/84, Abbie 23/84 Marks: Catrin 28, Debbie 27, Beatrice ≈26, Abbie 23

Methods Unit 2 Foundation Tier January 2014	Mark	Comments
18.(a) 2/15 ISW	B2	B1 for sight of 15, e.g. …/15 or $\frac{2}{2+5+8}$
(b) (£400 ×) 1.26 (×) 0.76 or equivalent, in either order	B2	B1 for sight of either 1.26 or 126/100 OR for 0.76 or 76/100 If no marks SC1 for sight of 383.04
	4	

METHODS UNIT 2
HIGHER TIER

<table>
<tr><th>Methods Unit 2 Higher Tier January 2014</th><th>Mark</th><th>Comment</th></tr>
<tr><td>1.(a) 20
(b) 12x – 39 = 45 OR 4x – 13 = 45/3
12x = 84 OR 4x = 28
x = 7
(c) x + 4 = 6 × 12
x = 68</td><td>B1
B1
B1
B1
M1
A1
6</td><td>
FT until 2nd error

Or x/12 = 6 - 4/12</td></tr>
<tr><td>2. 0.45</td><td>B2
2</td><td>B1 for 0.45267… rounded or truncated</td></tr>
<tr><td>3.(a)
<table><tr><td>Kite</td><td>1</td><td>1</td></tr><tr><td>Parallelogram</td><td>0</td><td>2</td></tr><tr><td>Rhombus</td><td>2</td><td>2</td></tr></table>
(b) $\pi r^2 = 36\pi$
6 (cm)</td><td>B3

M1
A1
5</td><td>B2 for any 4 or 5 correct entries,
B1 for any 2 or 3 correct entries
Allow ‘0’ in top right hand cell

For equating, or r = √36, or $r^2 = 36$
If no marks allow SC1 for 5.9(9..cm) from calculation</td></tr>
<tr><td>4.
<table><tr><th>Position</th><th>Name</th></tr><tr><td>1</td><td>Catrin 33(.33...)%</td></tr><tr><td>2</td><td>Debbie 32(.144…)%</td></tr><tr><td>3</td><td>Beatrice 31%</td></tr><tr><td>4</td><td>Abbie 27(.38…)%</td></tr></table></td><td>B3

3</td><td>Names in the correct order and all results appropriately and correctly compared (same form)

B2 for at least 3 results correctly in a suitable format to compare and their comparisons appropriately sorted
B1 for at least 2 results correctly in a suitable format to compare and their comparisons appropriately sorted, OR
B1 for at least 3 results correctly in a suitable format to compare
Remember: format of 1 of the result with 2 others to compare counts as 3 results

If no other marks, then award SC1 for names in the correct order

If fractions used for comparison they need to be common denominators or awareness of size, e.g. 1/3 =9/27 compared with 9/28 same numerator
Fractions:
Catrin 28/84, Debbie 27/84 (=9/28), Beatrice ≈26/84, Abbie 23/84
Marks:
Catrin 28, Debbie 27, Beatrice ≈26, Abbie 23</td></tr>
<tr><td>5.(a) 2/15 ISW

(b) (£400 ×) 1.26 (×) 0.76 or equivalent, in either order

(c)(i) 2/5 × 1 ¼ or 15min per 5cm or 5cm in 15 min or 1cm in 3 min
½ (hour) or 30 (minutes)

(ii) 20/75 or 3min per 1cm or 5cm in 15 min or 1cm in 3 min

25 × 20/75 or 0.266... × 25 or 6.66.... or 20/3 or (⅓ or)0.33..cm in 1 min or 3.33.. cm in 10 min

6.67 (cm)</td><td>B2

B2

M1

A1

B1

B1

B1
9</td><td>B1 for sight of 15, e.g. …/15 or $\frac{2}{2+5+8}$

B1 for sight of either 1.26 or 126/100
OR for 0.76 or 76/100
If no marks SC1 for sight of 383.04

Do not accept 2/5 × 1.15, recording of time must be correct

If units are given they must be correct

FT from (c)(i)

FT their depth corrected to 3 significant figures</td></tr>
</table>

Methods Unit 2 Higher Tier January 2014	Mark	Comment
6. (Perimeter) $2x + x – 6 + 2x + 8 + x – 8$ $= 132$ $6x - 6 = 132$ or $6x = 138$ $x = 23$ (Height of the trapezium $(x – 8)$cm =) 15 (cm) Look for • the use of notation (watch for the use of '=' being appropriate) • steps shown, not $6x = 636/6$ • labels given 'perimeter', 'height' • (*in trial and improvement, the trials and choices need to be clearly explained*) QWC2: Candidates will be expected to • present work clearly, with words explaining start, 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 start, process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer	 M1 M1 A1 A1 B1 Q W C 2 7	Algebraic notation not required for M, A and B marks FT their sum of terms, including x and number terms, equated to 132 FT their collection for equivalent difficulty FT for evaluation, not left as a fraction FT their x-8 provided M2 awarded *Alternative: Trial and improvement* *M1 Trial to sum the correct 4 sides* *M1 Clearly working towards 132, more than 1 trial and moving closer* *A1 Clearly working towards 132, one below and one above* *A1 23* *B1 (Height) 15(cm) FT their x-8provided M2 awarded* 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.
7.(a) $b = 2c$ OR $c = ½ b$ ISW (b) $5n + 7 < 52$ $5n < 45$ OR $n < 45/5$ $n < 9$	B1 B1 B1 B1 4	 Do not accept use of '=' in (b) FT from 1 error FT only for a whole number answer
8.(a) Correct rotation (b) Correct enlargement (scale factor 2) in lower left quadrant Correct position	B2 B1 B1 4	B1 for a near miss or for 90° anticlockwise rotation appropriate FT to lower left quadrant
9.(a) Semi C = $½ \times \pi \times 6.2$ $+ 6.2$ 15.9(cm) to 15.94(…cm) (b) Volume = $\pi \times 4.5^2 \times 10.3$ 654.9(...) to 655.5(4…) cm^3	M1 m1 A1 M1 A1 U1 6	 Accept 16(cm) from correct working For answer of 9.7(...) allow M1 and SC1 If no marks SC1 for sight 19.4(7...) to 19.4(8...) or 25.6(7...) to 25.6(8...) Independent mark

Methods Unit 2 Higher Tier January 2014	Mark	Comment
10(a) ½ × 4.6 × 2.3 5.29 (cm^2) or 5.3(cm^2) (b) (hypotenuse^2 =) $4.6^2 + 2.3^2$ h(ypotenuse)^2 = 26.45 or hypotenuse = $\sqrt{26.45}$ h(ypotenuse =) 5(.14… cm)	M1 A1 M1 A1 A1 5	 Only accept 5(cm^2) from correct working Allow FT from M1, A0
11.(a) x = $4.5 \times 10^6 \times 3.4 \times 10^{-2}$ $= 1.5 \times 10^5$ (b) y = $1.2 \times 10^8 - 5.5 \times 10^6$ $= 1.1 \times 10^8$	M1 A2 M1 A2 6	Intention to multiply A1 for 15.3×10^4 or 1.53×10^5 or equivalent including to 2 sig. figs. Intention to subtract in the correct order A1 for 1.145×10^8 or $0.11..\times 10^9$ or $11.4\ldots\times 10^7$ (attempt standard form) or equivalent including to 2 sig. figs.
12.(a) PQ = 5.6 × 5.88 / 8.4 or equivalent 3.92(cm) (b) BC = 2.24 ÷ (5.88 / 8.4) or equivalent 3.2(cm)	M1 A1 M1 A1 4	Or equivalent calculation that could lead to correct answer Accept 3.9(cm) FT premature approximation of the scale factor or equivalent premature approximation Or equivalent calculation that could lead to correct answer *(Alternative: scale factors 0.7 or 10/7 may be used)*
13. Third angle 40(°) or 68(°) Statement that this implies similar Statement 'sides could be different' clearly implies not necessarily congruent	B1 E1 E1 3	 Depends on the B1 Accept 'Thomas is correct because sides may be different'. Award this E1 without previous B1 and E1.
14. Rearrange of equation(s) to format that could lead to a solution Method to find first variable, e.g. equal coefficients, equating a variable to give equation in 1 variable First variable Method to find second variable, e.g. substitution shown for first variable Second variable	M1 M1 A1 m1 A1 5	e.g. 3x + 2y = 1 with 2x - 5y = -50, or making either x or y the subject FT from 1 error in rearrangement only Allow 1 error, but not in non equate variable FT their first variable **x = -5 and y = 8**
15. - (3**x** + 7**y**) + 4**x** + 2**y** = **x** – 5**y**	M1 A1 2	Allow for intention of using -**OA** + **OB**, e.g. -3**x**+7**y**+4**x**+2**y** or **x** + 9**y** Accept 1**x** – 5**y**
16.(a) Statement C selected Reason, e.g. 'inverse implies the nature is opposite' (b) f α $1/g^2$ OR f = k/g^2 4 = $k/5^2$ f = $100/g^2$ (c) g: 1/2, 5, **(±)100** f: **400**, 4, 0.01	B1 E1 B1 M1 A1 B2 7	 Accept numerical examples Do not accept a repeat of the statement given FT non linear only Maybe implied in part (b) FT their non linear expression B1 for each value
17. BC = 8.6/cos15 BC = 8.9(03375….) Tan AĈB = 3.8/BC AĈB = $\tan^{-1}$0.4268… 23(.113…°)	M2 A1 M1 M1 A1 6	M1 for cos 15 = 8.6/BC FT their BC provided not 8.6 or 3.8 OR alternative using AC, following evaluation of AC using Pythagoras' Theorem

Methods Unit 2 Higher Tier January 2014	Mark	Comment
18. $\frac{x}{x+y} = \frac{z}{AC}$ or $\frac{x}{x+y} = \frac{z}{z+BC}$	M1	Or alternative correct first step
$AC = \frac{z(x+y)}{x}$ or $x(z + BC) = z(x + y)$	m1	Rearranged in form 'AC= …'
$BC = \frac{z(x+y)}{x} - z$ or $xz + xBC = xz + yz$	M1	FT BC = AC – z provided AC in terms of x, y or z
$BC = \frac{xz+yz}{x} - z$ or $x\,BC = yz$	M1	Or alternative correct stage of manipulation
$BC = yz/x$	A1 5	CAO *If no marks then SC2 for BC=yz/x without working, OR SC1 for BC/y = z/x or BC/z=y/x or equivalent*
19. General cosine curve with appropriate orientation and position	M1	
1 and -1 indicated on y-axis, passes through (0°, 1), (90°,0), (-90°,0) and approximately (-180°,-1) and (180°,-1)	A1	
General tan curves with appropriate orientation and position	M1	
Correct indication or use of asymptotes	A1 4	*If no marks, SC1 for slight error in 'tends to infinity' or idea of 'the shape of tanx'*
20. Use of area = ½ absinC and cosine rule	S1	
½ × 3.9 × x × sin 96° = 22.8	M1	
x = 22.8/(½ × 3.9 × sin 96°)	A1	Correct rearrangement
x = 11.7567…(cm) rounded or truncated	A1	
(longest side y) $y^2 = 3.9^2 + x^2 - 2\times3.9\times x\times\cos96°$	M1	FT their x, not 3.9 or spurious value
y^2 accept values between 163 and 164.1	A1	
y = 12.8 (cm)	A1 7	Accept 13(cm) from correct working, not scale diagram Final A1 depends on previous A1

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