GCSE MARKING SCHEME

METHODS IN MATHEMATICS
(LINKED PAIR PILOT)

JANUARY 2015

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 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

<table>
<tr><th>Methods Unit 1 Foundation Tier
January 2015</th><th>Mark</th><th>Comment</th></tr>
<tr><td>1. (a) (i) 9205
(ii) eight million, five hundred thousand
(b) (i) 112
(ii) 64
(iii) 9
(c) (i) 260
(ii) 7500
(d) 1, 2, 7, 14</td><td>B1
B1
B1
B1
B1
B1
B1
B2

9</td><td>
Accept eight and a half million

B1 for 3 or 4 correct factors and 1 incorrect factor OR for 2 or 3 correct factors and no incorrect factors</td></tr>
<tr><td>2. Rectangle
Parallelogram
Trapezium
Kite</td><td>B1
B1
B1
B1
4</td><td>

Award B0 for diamond.</td></tr>
<tr><td>3. (a) (i) even chance
(ii) impossible
(iii) unlikely
(b)
<table><tr><td>H(am)</td><td>W(ater)</td></tr><tr><td>H</td><td>M(ilk)</td></tr><tr><td>H</td><td>O(range juice)</td></tr><tr><td>C(heese)</td><td>W</td></tr><tr><td>C</td><td>M</td></tr><tr><td>C</td><td>O</td></tr><tr><td>S(andwich)</td><td>W</td></tr><tr><td>S</td><td>M</td></tr><tr><td>S</td><td>O</td></tr></table></td><td>B1
B1
B1

B3

6</td><td>

B2 for 6 correct combinations
B1 for 3 correct combinations

Ignore repeats

For incorrect combinations:
Add up the number of correct combinations and subtract the number of incorrect combinations (ignoring any repeats) and award marks based on this, e.g. 4 correct and 1 incorrect is 3 correct combinations so award B1.

Award SC2 for all combinations not explicitly given eg
ham with water, milk or orange juice
cheese with water, milk or orange juice
salad with water, milk or orange juice
Award SC1for 2 out of 3 of the above.</td></tr>
<tr><td>4. (a) 386

(b) 267
15 x
2670 OR 3000
1335 900
4005 105
4005

(c) 3.5
(d) 0.06
(e) 3
(f) 4</td><td>B1

M1

A1

A1

B1
B1
B1
B1
8</td><td>

Any correct method for multiplying 267 by 15

For either 2670 or 1335 OR 3000 or 900 or 105
(Apply ‘one error’ in other methods)
CAO
Place value errors get M0 A0</td></tr>
<tr><td>5. All three points plotted correctly</td><td>B3

3</td><td>B1 for each point plotted correctly.
Ignore a line joining the plotted points.
If B0 awarded, then SC1 for (1, 2), (4, 8), (-2, -4) shown</td></tr>
</table>

Methods Unit 1 Foundation Tier January 2015	Mark	Comment
6. **Team A** General Knowledge (5 × 5) + (5 × -3) (= 10) AND Picture Round (3 × 10) + (2 × -5) (= 20) <u>Total: 30</u> **Team B** General Knowledge (3 × 5) + (7 × -3) (= -6) AND Picture Round (4 × 10) + (1 × -5) (= 35) <u>Total:29</u> Team A AND by one point Look for: Clear workings and labelling eg solution above (no need for brackets) 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 B1 QWC 2 7	Alternative method: subtracting Team A and Team B for each of the correct and incorrect sections in both rounds eg (25 – 15) + (-15 - -21) = 16 (General knowledge) (30 – 40) + (-10 - -5) = -15 or 15 (Picture) Team A wins by 1 point. Apply M1 A1 for each row and B1 for the conclusion. Allow M1 for one slip in incorrect use of points. FT their answers for Team A and B provided at least M1 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 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) 0.07, 0.5, 0.507, 0.75 (b) (i) 2(/8) (ii) 4(/8) ½, 3/8, ¼	B1 B1 B1 B1 4	 CAO. Accept 4/8, 3/8, 2/8.
8. (a) *8a* *3a* **5a** *2a* *a* **4a** (b) **11x+y** *9x* **2x+y** *5x* **4x** *-2x+y*	B1 B1 B1 B1 B1 5	For the 5*a* For the 4*a* FT 'their 5*a*' - *a* For the 4*x* For the 2*x* + *y* FT 'their 4*x*' – 2*x* + *y* For the 11*x* + *y* FT 9*x* + 'their 2*x* + *y*', must be in the form a*x* + b*y*

Methods Unit 1 Foundation Tier January 2015	Mark	Comment
9. For any angle in the rectangle = 90(˚) (180- 30)/2 (<ABC) or (<ACB) = 75(˚) (<ABE) = 165(˚)	 B1 M1 A1 A1 4	Angles may be seen on the diagram. FT 'their 75˚+90˚ provided M1 awarded
10. (a) 8 yellow, 12 green, 6 blue balls Red: 4/30 Yellow: 8/30 Green: 12/30 Blue: 6/30 (b) 4/30 +6/30 =10/30	B2 B2 M1 A1 6	Award B1 for either 8 yellow or 12 green and total is 30 OR 8 yellow and 12 green and total is not 30 FT 'their number of balls' / ' their total' OR 'their number of balls' /30 Award B1 for two or three correct. Penalise incorrect notation once only Do not penalise incorrect reduction here. If used subsequently in (b) only award M1 A0. *B1 for consistent incorrect denominator* but correct numerators, e.g. 4/29, 8/29, 12/29, 6/29'. FT from 'their P(red)' + 'their P(blue)' in (a)
11 (a) 25x-3y (b) 5×-3 + 3 × 6 (= -15+18) 3 (c) 2p +5p² (d) 3y(x-3) (e) Expression Equation (f) Conclusion (stated or implied) that $(3x)^2$ is greater with either sight of $3x^2 = 12$ AND $(3x)^2 = 36$ OR statement that $(3x)^2$ is 3 times the value of $3x^2$ OR Sight of $(3x)^2 = 9x^2$ is sufficient	B2 M1 A1 B2 B2 B1 B1 B1 11	Must be in an expression, B1 for either 25*x* or -3*y* Award B1 for 25*x* + - 3*y* If use 3 not -3 award M0 CAO Must be in an expression, B1 for either 2*p* or 5*p²* B1 for correct partial factorisation eg 3(*xy* – 3*y*) or *y*(3*x* – 9), or 3y(… - 3) or 3y(x - ….)……… Allow sight of $3x^2 = 12$ AND $(3x)^2 = 36$ as implied conclusion
12 (a) 9/30 and 0.3 10/40 and 0.25 (b) 0.25 or equivalent Reason eg 'most throws', 'last value', 'uses all the data'.	B1 B1 B1 E1 4	 FT from 'their 9/30' If B0 awarded for part (a) award SC1 for 9/30 AND 10/40 FT their final column entry in (a) Do not accept 'better estimate'.
13. 33(°)	B3 3	B2 for sight of '101 – 68', or '180 – 68 - 79' or '180 – 147' or '112 – 79', OR B1 for appropriate indication of 101° or 147° or 112°

Methods Unit 1 Foundation Tier January 2015	**Mark**	**Comment**
14. (a) 20	B1	
(b) 154	B2	B1 for 2×7×11 or for finding multiples for both numbers i.e.(14,) 28, 42, … and (22,) 44, 66, .., or factors for both numbers (2×7 and 2×11) or sight of (14×22=) 308
(c) Method to find primes with 2 correct prime factors before the 2nd error	M1	At least 2 primes found before second error
2, 2, 3, 3, 5	A1	Ignore 1s
$2^2 \times 3^2 \times 5$	B1	Correct FT with no 1s and at least one power >1
	6	

METHODS UNIT 1
HIGHER TIER

<table>
<tr><th>Methods Unit 1 Higher Tier
January 2015</th><th>Mark</th><th>Comment</th></tr>
<tr><td>1(a)
<table>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td><td>13</td></tr>
<tr><td>2</td><td>5</td><td>8</td><td>11</td><td>14</td><td>17</td><td>20</td></tr>
<tr><td>3</td><td>7</td><td>11</td><td>15</td><td>19</td><td>23</td><td>27</td></tr>
<tr><td>4</td><td>9</td><td>14</td><td>19</td><td>24</td><td>29</td><td>34</td></tr>
<tr><td>5</td><td>11</td><td>17</td><td>23</td><td>29</td><td>35</td><td>41</td></tr>
<tr><td>6</td><td>13</td><td>20</td><td>27</td><td>34</td><td>41</td><td>48</td></tr>
</table>

(b)
4/36
9/36

27/36
2/36</td>
<td>B3

B1
B1

B1
B1
7</td>
<td>All 10 entries correct

B2 for any7 correct entries, B1 for any 4 correct entries
<u>FT for their completed table in (b) and ignore incorrect cancelling</u>
Penalise incorrect notation, e.g. ‘out of’, ‘in’, only once.
FT throughout consistent incorrect denominator

FT 1 – ‘their 9/36’, i.e. 1 – P(even)</td></tr>
<tr><td>2(a) Attempt at method 7÷8
= 0.875

(b) Numerator 0.48 OR correct first stage of simplification
Multiplying numerator and denominator by suitable multiple of 10 (if correct 100) – for eliminating decimals OR sight of answer 0.01
1/100

(c) 99

(d) Method to evaluate, allow 1 slip in tables
10.983
rounded to 11</td>
<td>M1
A1

B1

B1

B1

B2

M1
A1
A1

10</td>
<td>Or equivalent complete method

FT depending on their numerator.

CAO. B3 for an unsupported answer of 1/100

B1 for sight of 33, or x /3 + 7 = 40, or sight of 40-7 followed by ‘their 33’ ×3
or 2 trials substituted and correctly evaluated
Answer only ‘11’ is B0

Accept digits 1 0 9 8 3 with incorrect place value

FT their 10.983 provided M1 awarded
Do not allow 11.00 as a final answer.
Do not accept unsupported answer of 11</td></tr>
<tr><td>3. 33(°)</td><td>B3

3</td><td>B2 for sight of ‘101 – 68’, or ‘180 – 68 - 79’ or ‘180 – 147’ or ‘112 – 79’, OR
B1 for appropriate indication of 101° or 147° or 112°</td></tr>
</table>

Methods Unit 1 Higher Tier January 2015	Mark	Comment
4. Intention to subtract the sum of the 4 angles given from 360° (Sum of remaining 3 angles is) 150(°) 40(°), 50(°), 60(°) 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	M1 A1 B2 QWC 2 6	360 – (34 + 46 + 53 + 77) *Alternative using interior angles:* *900 – (146+134+127+103)* *Sum of remaining 3 angles is) 390(°)* If M1 awarded, B1 for 3 values all multiples of 10 with sum 'their 150' *Alternative using interior angles:* *B1 for values of 120(°), 130(°), 140(°)* *If no marks, award SC1 for answers of 220(°), 230(°) and 240(°) following on from use of the interior angle sum of 900° and treating the given angles as interior. FT to award QWC 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.
5(a) 20 (b) 154 (c) Two fractions correctly written in a form that allows for comparison For all three correctly written in forms that allow for comparison 3/4, 13/20, 3/5 and in this order or equivalent (d) Method to find primes with 2 correct prime factors before the 2nd error 2, 2, 3, 3, 5 $2^2 \times 3^2 \times 5$	B1 B2 B1 B1 B1 M1 A1 B1 9	 B1 for 2×7×11 or for finding multiples for both numbers i.e.(14,) 28, 42, … and (22,) 44, 66, .., or factors for both numbers (2×7 and 2×11) or sight of (14×22=) 308 Allow reasonably accurate diagrammatic form (e.g. 13/20, 15/20, 12/20 or 0.65, 0.75, 0.6 or 65/100, 75/100, 6/10) CAO. Answer only allow final B1 only At least 2 primes found before second error Ignore 1s Correct FT with no 1s and at least one power >1
6(a) 47 (b) Conclusion (stated or implied) that $(3x)^2$ is greater with either sight of $3x^2 = 12$ AND $(3x)^2 = 36$ OR statement that $(3x)^2$ is 3 times the value of $3x^2$ OR Sight of $(3x)^2 = 9x^2$ is sufficient	B2 B1 3	B1 for 5×9 + 8×¼ (i.e. substitution with $-3^2 = 9$) or for $5\times-3^2 + 2$ (i.e. substitution shown, may be an arithmetic error in evaluating the 1st term, 8×¼ = 2 shown) (B0 for $5\times-3^2 + 8\times¼$ or $(\pm)15^2 + 8\times¼$) *If no marks SC1 for an answer of -43* Allow sight of $3x^2 = 12$ AND $(3x)^2 = 36$ as implied conclusion

Methods Unit 1 Higher Tier January 2015	Mark	Comment
7. $3 \times 35 \div 5$ OR $4 \times 35 \div 5$ OR equivalent 21(m) 28(m)	M1 A1 A1 3	 CAO CAO *Do not accept strategy 35/12 as a MR*
8. Intention to subtract 155 and 45 from 360° (Sum of remaining angles is) 160(°) Realising one of the remaining angles has to be 155° or 45° as a kite has 2 equal angles 155(°) AND 5(°) 45(°) AND 115(°)	M1 A1 B1 B1 B1 5	360 – 155 – 45 If considering exterior angles: 360 - (180 - 155) - (180 - 45) (Sum of remaining exterior angles is) 200(°) Realising that one of the remaining exterior angles is 35° or 135° *Allow B1 following M1 A0 for interior angles of (155, 45), and two angles equal to 'their 160'÷2* *An unsupported single correct set of all four angles e.g. (155, 45,) 155, 5(°) or (155, 45,) 45, 115(°) receives M1 A1 B1 with B1 B0 or B0 B1depending on the solution given.*
9(a) Indicates there are 4 ways of scoring 5 Indicates there are 40 possible outcomes, e.g. denominator 40 of a fraction 4/40 (= 1/10) (b) 200 × ⅛ or equivalent 25 (c) Explanation comparing answer from (b) with 80, e.g. 'six more often than expected' (d) Notices or implies that the (first) spinner must land on numbers other than 6 less often Implies best estimate would be less than (a)	B1 B1 B1 M1 A1 E1 M1 A1 8	1, 4 2, 3 3, 2 4, 1 Accept sight of …/8 × …/5 Do not accept …/8 + …/5 Ignore incorrect cancelling *Award B3 for an answer of 4/40* A final answer of 25/200 implies M1, A0 Accept explanation that states, e.g. '6 not used in scoring 5', or '6 is opposite the numbers needed to score 5' If no marks, SC1 if best estimate less than (a) with a reason based on an understanding of bias.
10(a) 6 (b) $n^2 + 5$ or equivalent	B1 B3 4	 Accept unsimplified equivalents B2 for sight of $n^2 \pm \ldots$ (not for n^2), or a partially correct expression (e.g. looking at strips) B1 for (9,) 14, 21, 30 with sight of second difference 2, or equivalent numerical pattern, or n^2
11(a) Correctly completing the tree diagram 0.2, 0.6. 0.6, 0.4 (b) 0.8×0.4 or $8/10 \times 4/10$ or equivalent = 0.32 or 32/100 or equivalent. (c) 0.2×0.4 or $2/10 \times 4/10$ or equivalent = 0.08 or 8/100 or equivalent	B2 M1 A1 M1 A1 6	B1 for any one pair of branches correct (total 1) An incorrect answer of 3.2 is awarded M1, A0 Or other complete method. FT for their P(stairs up) ×P(stairs down) correctly evaluated, or by alternative method An incorrect answer of 0.8 from a correct tree diagram is awarded M1, A0

Methods Unit 1 Higher Tier January 2015	Mark	Comment
12(a) 7×10^{-6}	B1	
(b) $7x - 3x = m + h$ or $4x = m + h$	B1	FT until 2nd error
$x = (m + h)/4$	B1	Allow $x = (m+h)/(7-3)$
(c) $(x + 7)(x - 7)$	B1	ISW
(d)(i) $2x^2 + 6x + x + 3$	B1	Any 3 correct terms
$2x^2 + 7x + 3$	B1	CAO
(ii) $2x^2 + 7x + 3 - 7 = 0$ or $2x^2 + 7x - 4 = 0$	M1	FT their $2x^2 + 7x + 3$ of equivalent difficulty
$(2x - 1)(x + 4)$ $(=0)$	M1	OR correct use of formula with b^2-4ac correctly evaluated (including FT equivalent difficulty)
$x = ½$ AND $x = -4$	A1	CAO
	9	
13(a) $a \times 16.4 = 12 \times 4.1$ or equivalent	M1	
$a = 3$ (cm)	A1	
(b) $b = 69(°)$	B1	
(c) Angle opposite 146° in cyclic quadrilateral, 180(°) – 146(°) (= 34(°)) OR Reflex angle at the centre 2 × 146(°) (=292(°))	M1	Accept indicated on the diagram or implied by further working. The calculation 180(°) – 146(°) (= 34(°)) alone or with a misinterpretation as the angle at the centre is M0 Allow (O =) 2 × 146(°) provided not indicated as the acute angle on the diagram
$c = 68°$	A1	CAO. Accept a correct answer without working for M1, A1; do not accept an incorrectly placed 68°.
	5	
14. Numerator of $7(3x + 5) - 4(x - 3)$	M1	
Denominator of $(x - 3)(3x + 5)$	M1	
$\frac{17x+47}{(x-3)(3x+5)}$ or $\frac{17x+47}{3x^2-4x-15}$	A2	FT 1 error from expansion of brackets or collection of like terms to allow A1, or A1 for a correct numerator with an incorrect expansion of the denominator or if the denominator un-simplified $(3x^2 - 9x + 5x - 15)$ If A2, penalise further incorrect work -1 *SC1 for sight of 17x + 47 if no other marks awarded*
	4	
15. Sight (gradient) -12/8 or 8/12 or equivalents	B1	
Selects $3y = 2x + 5$ AND $2x - 3y = 8$ **only**	B2	Provided 1st B1 is awarded, allow further B1 for either selected with no more than 1 incorrect selection. *Sight of gradient 12/8 with perpendicular gradient -8/12 award B0, B2 for y =(-2x+8)/3 AND 2x + 3y = 8, or B0 B1 for either selected with no more than one incorrect selection.*
Reason, e.g. 'gradient given times gradient of these lines is -1', or '(perpendicular) gradient is ⅔', or 'm×-1/m = -1', or 'product of gradients is -1'	E1	FT their gradient
	4	

<table>
<tr><th>Methods Unit 1 Higher Tier
January 2015</th><th>Mark</th><th>Comment</th></tr>
<tr><td>16(a) $a = 5$
$x^2 + 10x + 25 - 11$ or $(x+5)^2 -25 +14$
OR alternative full method to find b
$b = -11$

(b) $(x + 5)^2 - 11 = 0$
$(x + 5)^2 = 11$
$x + 5 = (\pm)\sqrt{11}$

$x = - 5 \pm \sqrt{11}$</td><td>B1
M1

A1

B1
M1
M1

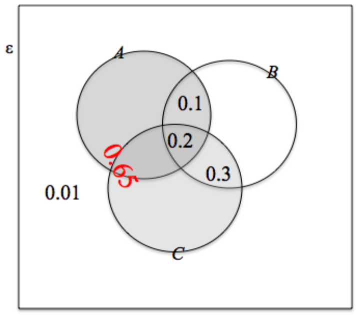
A1

7</td><td>Accept an embedded answer
FT their a

Accept an embedded answer

FT their (a) provided it is equivalent in difficulty

If 'their 11' is negative then M0

CAO Must show ± or two answers
Use of formula leading to $(-10 \pm 2\sqrt{11})/2$ gets B2,
$(-10 \pm \sqrt{44})/2$ gets B0</td></tr>
<tr><td>17.


Note: Shaded $P(A \cup C) = 0.65$

Method to find B not intersecting with A nor C,
e.g. $1 - 0.65 - 0.01$ $(= 0.34)$
$P(B) = 0.34 + 0.1 + 0.2 + 0.3$
$P(B) = 0.94$</td><td>
B1

B3

M1

M1
A1

7</td><td>Evidence for B marks may be seen in working
Correct indication of 0.01

For Venn diagram shown, correct indication of
• 0.1, 0.2 and 0.3, or
• the 0.3 shown and $A \cap B$ is 0.3 used
• the 0.1 shown and $B \cap C$ as 0.5 used

<u>If not B3 then mark individually as follows</u>:
B1 for correct indication of 0.2,
B1 for correct indication of 0.3,
B1 for correct indication of 0.1

Allow "P(B)" = 0.34 (not from 2 – 1.66)

(FT 'their 0.34')
CAO
Alternative
$P((A \cup C) \cap B') = 0.65 - 0.2 - 0.3 - 0.1$ $(= 0.05)$ M1
$P(B) = 1 - 0.01 - 0.05 = 0.94$ (FT 'their 0.05') M1
$P(B) = 0.94$ (CAO) A1</td></tr>
</table>

METHODS UNIT 2
FOUNDATION TIER

Methods Unit 2 Foundation Tier January 2015	Mark	Comment
1. + − ÷ × × + ÷ − **or** − ×	B1 B1 B1 B1 B1 B1 6	
2. (a) (i) 4679 (ii) 9647 (b) 20%, 0.2, 1/5 indicated (c) (i) 400 000 or four hundred thousand (ii) 250 or two hundred and fifty (d) 12 and 24 indicated	B1 B1 B3 B1 B1 B2 9	 B2 for 3 correct and 1 incorrect B2 for 2 correct and no more than 1 incorrect B1 for 1 correct and no more than 2 incorrect B1 for 2 or 3 correct and 2 incorrect B1 for 2 correct and 1 incorrect OR 1 correct and no more than 1 incorrect
3. D and H E and G	B1 B1 2	
4. (a) (£)3.60 ÷ 20 (£)0.18 or 18(p) (£)0.18 × 4 or 18 × 4 (£) 0.72 or 72 (p) (b) 53/100 × 4.2 or equivalent 2.226	M1 A1 m1 A1 M1 A1 6	OR 1 correct step, e.g. 10 pens cost (£)1.80 FT their 0.18 or 18 if M1 awarded Do not accept £72 or 0.72p Award SC1 for sight of (5.5 × 4 =) 22(p) or 5.55… × 4 = 22.22… following 20 ÷ 3.60 *Alternative solution:* *20 ÷ 4 = 5* *M1* *(£)3.60 ÷ 5* *M1* *= (£)0.72 OR 72(p)* *A2* *For incorrect units, award A1 only* *e.g. 0.72p or £72* Accept 2.2 or 2.23 if the correct answer is seen. Otherwise, award SC1 for unsupported an answer of 2.2 or 2.23.
5. (a) 13 × 9 117 (cm^2) (b) Attempting to add two pairs of numbers to make 36 or any two numbers that add to 18 Attempting to add two numbers (or two pairs of numbers) with one being double the other Length = 12, Width = 6	M1 A1 M1 M1 A1 5	 Numbers must be less than 18 Numbers must be less than 18 CAO (Allow Length = 6, Width = 12)

Methods Unit 2 Foundation Tier January 2015	Mark	Comment
6. (a) Correct Diagram	B2	B1 for lines, B1 for curvature of the curve
(b) 4	B1	
2	B1	
(c) Tangent	B1	
(d) Enlargement of scale factor 2	B2	B1 for any two lines correct or 3 points correct B1 for correct enlargement using different scale factor or B1 for a 'nearly correct' enlargement using scale factor 2
	7	
7. (Total cost =) (12.45 + 3.9(0) + 24.6(0)) ÷ 3	M1	Or dividing each individual price by 3
(Each person pays £) 13.65	A1	Or (£)4.15, (£)1.3(0), (£)8.2(0)
Any one correct first step / strategy	S1	E.g. (Ceri overspent £)24.6(0) – (£)13.65 FT 'their (£)13.65, (£)4.15, (£)1.3(0), (£)8.2(0)'
Any TWO of: Ceri overspent (£)10.95 Alwen underspent (£)1.20 Brian underspent (£)9.75	B1	OR Brian and Ceri owe Alwen (£)4.15 each AND Alwen and Ceri owe Brian (£)1.30 each AND Brian and Alwen owe Ceri (£)8.20 each
Conclusion: Alwen owes Ceri (£)1.20 AND Brian owes Ceri (£)9.75	B2	OR Brian owes Alwen (£)2.85 AND Alwen owes Ceri (£)4.05 AND Brian owes Ceri (£)6.90 Award B1 for either answer correct OR all THREE of: Ceri overspent (£)10.95 Alwen underspent (£)1.20 Brian underspent (£)9.75 ***Awarding last B2 or B1 implies all previous marks*** Award SC2 instead of the last 4 marks for a complete solution with correct values but names reversed and award SC1 for a similar solution with no more than one arithmetical error. Award SC1 instead of the last 4 marks for a correct conclusion with final values given correct to the nearest pound, e.g. Alwen owes Ceri £1 and Brian owes Ceri £10.
Look for: • accuracy of spelling • clarity of labels • correct units (£) • the use of notation (watch for the use of '=', '–' and '÷' being appropriate) 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	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 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.
	8	

Methods Unit 2 Foundation Tier January 2015	Mark	Comment
8. (a) 49 (b) $5y = 55$ $y = 11$ (c) (i) $x = 5$ $y = -1$ (ii) $(2 \times 5) + (3 \times -1)$ 7	 B1 B1 B1 B1 B1 B1 B1 7	Accept embedded answers in (a), (b) and (c)(i). FT one error ISW FT 'their x', i.e. $y = 4 -$ 'their x' FT 'their x' and 'their y' for B1, and for B2 provided $y < 0$
9. 113.6	B2 2	B1 for 113(.5997747…) OR B1 for 134.2(…) – 20.6(…)
10. 282/3 or $450 \times 20/100$ 94 90 Missing number 92	M1 A1 A1 A1 4	
11. Examples: (a) $(8 + 4) \times 5$ or $7 \times 8 + 4$ or $5 \times 8 + 24 - 4$ (= 60) (b) $24 \div 4 - (8 + 5)$ or $2 - (5 + 4)$ or $(5 + 2) \div 7 - 8$ (= -7) (c) $7 \times (5 - 2)$ or $7 \times (8 - 5)$ or $24 + 2 - 5$ (= 21)	 B1 B1 B1 3	**Accept equivalent correct responses using ONLY the cards given, not repeats within a single calculation** Brackets must be used correctly Accept $-24 \div 2 + 5$ or $24 \div -2 + 5$
12. (a) $\ldots \times \ldots \times 11 = 385$ or $385 \div 11$ Attempt to find two whole numbers to multiply to 35 7(cm) and 5(cm) OR 35(cm) and 1(cm) (b) $½ (4.5 + 8.8) \times 1.9$ 12.6(35) cm^2 (c) $\pi \times 8^2$ 201.(06….cm^2)	S1 M1 A1 M1 A1 U1 M1 A1 8	Idea towards area of the base Correct answers awarded all 3 marks. Independent mark Accept 200.9(6) to 201.143
13. (a) $x + 17 = 5 \times 3$ $x = -2$ (b) $5x < 22 + 188$ $x < 42$	 M1 A1 M1 A1 4	Accept embedded answer in (a) Or $x/3 = 5 - 17/3$ No marks for '=' unless finally replaced to give $x < 42$, then award M1, A1. An answer of $x < 210/5$ gets M1, A0 CAO If no marks, award SC1 for $5x < 166$ ($x < 166/5$) with an answer $x < 33.2$, or for $5x < 200$ with an answer $x < 40$

Methods Unit 2 Foundation Tier **January 2015**	**Mark**	**Comment**
14.(a) Correct reflection (b) Correct rotation	B2 B2 4	B1 for reflection in the *y*-axis OR B1 for 4 of the vertices reflected correctly B1 for clockwise 90° rotation about (1, -1) OR B1 for anticlockwise 90° rotation about (-1, 1)
15. $(p^2 =)\ 2.7^2 + 4.1^2$ $p^2 = 24.1$ or $p = \sqrt{24.1}$ $(q^2 =)\ 14.6^2 – 6.2^2$ or $14.6^2 = q^2 + 6.2^2$ $q^2 = 174.72$ or $q = \sqrt{174.72}$ (p =) 4.9(09175…cm) AND (q =) 13.2(18..cm)	M1 A1 M1 A1 A1 5	Correct statement Power 2 or intention to take square root must be shown Correct statement Power 2 or intention to take square root must be shown Accept rounded or truncated from correct working *Alternative method using trigonometry:* *M1 complete method to obtain an expression involving p, e.g. angle = $\tan^{-1}(2.7/4.1)$ AND sin(angle) = 2.7/p* *A1 expression with p as subject: e.g. p = 2.7/sin(angle)* *M1 complete method to obtain expression involving q, e.g. angle = $\sin^{-1}(6.2/14.6)$ AND cos(angle) = q/14.6* *A1 expression with q as subject: e.g. q = 14.6cos(angle)*

METHODS UNIT 2
HIGHER TIER

Methods Unit 2 Higher Tier **January 2015**	**Mark**	**Comment**
1.(a) $100 \times 249.6/960$ 26(%) (b) 0.061 or 6.1×10^{-2} (c) $9.6 - \frac{5}{16} \times 88$ or $9.6 - 27.5$ - 17.9 (d) 0.042	M1 A1 B1 M1 A1 B3 8	 Not for reversed unless answer is correct showing intention. *If no marks award SC1 for an answer of 17.9* B2 for sight of 0.042151… rounded or truncated, OR B1 for sight of (1/)23.724….
2. Examples: (a) (8 + 4) × 5 or 7 × 8 + 4 or 5 × 8 + 24 - 4 (=60) (b) 24 ÷ 4 – (8 + 5) or 2 – (5 + 4) or (5 + 2) ÷ 7 – 8 (=-7) (c) 7 × (5 - 2) or 7 × (8 - 5) or 24 + 2 - 5 (= 21)	 B1 B1 B1 3	**Accept equivalent correct responses using ONLY the cards given, not repeats within a single calculation** Brackets must be used correctly *Accept use of brackets for multiplication e.g. 2(24) (=48)* Accept use of the – sign to create negative numbers e.g.-24 ÷ 2 + 5 or 24 ÷ -2 + 5
3.(a) … × … × 11 = 385 or 385 ÷ 11 Attempt to find two whole numbers to multiply to 35 7(cm) and 5(cm) OR 35(cm) and 1(cm) Look for spelling clarity of text explanations, the use of notation and units 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 (b) ½ (4.5 + 8.8) × 1.9 12.6(35) cm^2	S1 M1 A1 QWC 2 M1 A1 U1 8	Idea towards area of the base Correct answers awarded all 3 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. Independent mark
4. Area smaller circle = $\pi \times 6.2^2$ Process to find part shaded, e.g. ×5 ÷4 or ×9÷4 to find area of larger circle (and subtract area of the smaller circle) Area shaded = $\pi \times 6.2^2 \times 5 \div 4$ or $\pi \times 6.2^2 \times 9 \div 4 - \pi \times 6.2^2$ Area shaded = 151 (cm^2)	M1 B1 m1 A2 5	 (271.71… - 120.76…) A1 for answers between 150.87… to 151.014… *If M1 only, then also award SC1 for 121*

Methods Unit 2 Higher Tier January 2015	**Mark**	**Comment**
5.(a) Indication of: C: 1.23×600 K: $^1/_6\times400$ D: $^2/_5\times500$ A: $1^2/_5\times700$	B3	All 4 correct calculations, or B2 for any 3 correct, or B1 for any 1 or 2 correct
(b) (x) **× 1.2(0)** or equivalent, where $x\neq0$	M1	Need not be shown as a measure with units, ignore units Accept algebraic working throughout
(x × 1.2(0)) **× 0.8(0)** or equivalent, where $x\neq0$	M1	FT their value of (x × 1.2(0)) provided >x *Accept sight of ×1.2 for M1 and ×0.8 for M1,* *or sight of ×0.96 for M2*
x×1.2(0)×0.8(0) correctly evaluated	A1	x × 0.96 correctly evaluated Accept a conclusion that less than the original because decrease amount > increase amount, provided both amounts have been correctly evaluated.
	6	
6.		Accept embedded answers in (a) , (b) & (c)
(a) (x =) 4	B1	
(b) 12x – 27 = 33 OR 4x – 9 = 33/3 12x = 60 OR 4x = 20 x = 5	B1 B1 B1	FT until 2nd error
(c) x + 17 = 5 × 3 x = -2	M1 A1	Or x/3 = 5 - 17/3
(d) x < 349/66 or x < 5.2878…. or x < $5^{19}/_{66}$ Answer of 5	M1 A1	 An answer of 5 implies ‘<’ applied, so M1, A1
(e) 5x < 22 + 188	M1	No marks for ‘=’ unless final replaced to give x<42 then award M1, A1. An answer of x<210/5 gets M1, A0
x< 42	A1	CAO Mark final answer If no marks award SC1 for 5x<166 (x<166/5) with an answer x<33.2, or for 5x < 200 with an answer x < 40
	10	
7. (p^2 =) $2.7^2 + 4.1^2$ p^2 = 24.1 or p = √24.1 (q^2 =) $14.6^2 - 6.2^2$ or $14.6^2 = q^2 + 6.2^2$ q^2 = 174.72 or q= √174.72	M1 A1 M1 A1	Correct statement Power 2 or intention to take square root must be shown Correct statement Power 2 or intention to take square root must be shown Accept rounded or truncated from correct working *Alternative method using trigonometry:* *M1 complete method to obtain an expression involving p* *e.g. angle = $\tan^{-1}$(2.7/4.1) AND sin(angle) = 2.7/p* *A1 expression with p as subject: e. g. p = 2.7/sin(angle)* *M1 complete method to obtain expression involving q,* *e.g. angle = sin-1(6.2/14.6) AND cos(angle) = q/14.6* *A1 expression with q as subject: e.g. q = 14.6cos(angle)*
(p =) 4.9(09175…cm) AND (q =) 13.2(18… cm)	A1 5	
8.(a) Correct reflection	B2	B1 for reflection in the y-axis OR B1 for 4 of the vertices reflected correctly
(b) Correct rotation	B2	B1 for clockwise 90° rotation about (1, -1) OR B1 for anticlockwise 90°rotation about (-1, 1)
(c) 0, 0 -½ or -0.5 or ‘negative half’ or equivalent	B1 B2 7	 B1 for sight of ½ or 0.5 or half (including +½)

Methods Unit 2 Higher Tier January 2015	Mark	Comment
9.(a) (b =) 3/24 (=1/8) (a =) 48 / $^{1}/_{8}$ or (a =) 48 × 8(/1) (a =) 384	M1 M1 A1	(a =) 48 / $^{3}/_{24}$ gains M2 FT 'their calculated b' CAO
(b) (Scale factor =) 4/0.8 (=5) OR 0.8/4 (= 0.2) OR y = kx with 0.8 = k×4 or x=ky with 4 = k×0.8 OR $\frac{x}{4} = \frac{6}{0.8}$ OR $\frac{x}{6} = \frac{4}{0.8}$	M1	
(x =) 6 × (4/0.8) OR 6 / (0.8÷4) (6 × 5) (6 / 0.2)	M1	Allow M1 for correct substitution for their SF in their proportion equation, or for a reversed substitution in their proportion equation correctly evaluated
= 30	A1 6	CAO A0 if left as 30 proportional to 6
10.(a) 5.4(4) × 10^8	B1	
(b) 2 × 10^{18}	B1	
(c) 1000 × 6 000 000 or 6 000 000 000 or 1000 × 6 × 10^6 6 × 10^9	M1 A1 4	
11. Correct substitution into the quadratic formula x = (-5 ±√(5^2 - 4×1×2)) / 2×1 x = (-5±√17)/2	M1 A1	Allow 1 slip in substitution OR sight of 0.43(84…) with -4.5(615...) *Alternative using completing the square:* M1 for $x + \frac{5}{2} = \pm\sqrt{\frac{25}{4} - 2}$ A1 for $x = -\frac{5}{2} \pm \sqrt{\frac{17}{4}}$
x = -0.44 with x = -4.56	A1 3	Must be to 2 decimal places Award all 3 marks for correct unsupported answers.
12. Label axes 'length (of tile in cm)' and 'width (of tile in cm)' Both scales uniform from 0 to 20 inclusive Sight of any two points correct, in list or plotted Straight line drawn from (0,20) to (20,0) exclusive	B1 B1 M1 A1 4	Either order. Accept l and w. Allow (0,20) and (20,0) Accept including (0,20) and (20,0) Allow if the line touches the axes, but intention clear to end at the axes (allow ±2mm). However, A0 if this line extends beyond an axis.
13.(a) x/8.32= 3.6/5.76 or equivalent or sight of scale factor 1.6 or 0.625 if used appropriately (x =) 5.2 (cm)	M1 A1	
(b) Sight of 1.6^2 or 0.625^2 or equivalent (Area larger shape =) 1.6^2 × 13.6 or 13.6 ÷ 0.625^2	B1 M1	FT their scale factor from (a) provided it was >1 and <2 (or its reciprocal provided >0.5 and <1)
34.8(16) (cm^2)	A1 5	Accept an answer of 35 (cm^2) from correct working only.
14.(a) **MN** = **-OM** + **ON** (= -(2**a**+3**b**) +(5**a** + 7**b**)) = 3**a** + 4**b**	M1 A1	Accept intention of brackets CAO. Must be simplified form
(b) Sight of -½(8**a**- 2**b**) or ½(8**a**- 2**b**)	B1	May be simplified at a later stage
RN = -½**OP** + **ON** ((= -½(8**a**- 2**b**) +(5**a** + 7**b**))	M1	Intention of brackets Award SC1 for -4**a** - **b** + 5**a** + 7**b** if B1 not previously awarded.
= **a** + 8**b**	A1 5	CAO. Must be simplified form

Methods Unit 2 Higher Tier January 2015	Mark	Comment
15. Strategy: attempt to calculate BD, then CD and then attempt ½abSinC $BD^2 = 6.2^2 + 5.8^2 - 2\times6.2\times5.8\times\cos78(°)$ $BD^2 = 57.1269912…$ or $BD = \sqrt{57.12…}$ (=7.558..cm) DC = sin65° × BD/sin85(°) DC = 6.876…(cm) Area DEC = ½ × 3.7 × DC × sin 59(°) 10.9(…cm^2)	S1 M1 A1 M2 A1 M1 A1 8	 Correct substitution Accept rounded or truncated M1 for correct use of sine rule with DC implicit Accept rounded or truncated FT correct evaluation with their BD provided all previous M marks awarded FT correct evaluation with their DC provided all previous M marks awarded and without PA Penalise (PA) premature approximation only by not awarding this final A mark
16.(a) ½(x + 3)(y +6) (= 28.875) xy + 3y + 6x + 18 = 2 × 28.875 OR ½xy +1.5y + 3x +9 = 28.875 xy + 3y + 6x = 39.75 (b) y + x+3 + y + x + 3 = 20 or y + x + 3 = 10 or 2y + 2(x+3) = 20 or equivalent Method to solve, e.g. appropriate substitution of either x = 7 – y or y = 7 – x into xy + 3y + 6x = 39.75 $x^2 - 10x + 18.75 = 0$ or $y^2 - 4y - 2.25 = 0$ (x – 2.5)(x - 7.5) = 0 or (y – 4.5)(y + 0.5) = 0 or (2x –5)(2x - 15) = 0 or (2y – 9)(2y + 1) = 0 or equivalent x = 2.5(cm) AND y = 4.5(cm) Dimensions of the rectangle are (y=) 4.5(cm) AND (x+3 =) 5.5(cm)	B1 M1 A1 B1 M1 A1 A1 A1 B1 9	Intention of brackets must be shown in subsequent working Must be convincing from correct working Intention of brackets may be shown in subsequent working Accept sight of unsimplified substitutions, intention clear. For the intention of substitution not the accuracy of the transformed equation, so FT x = 'their ±7 ± y' or y = 'their ±7 ± x' and other similar substitutions following B0, for M1 and possible final B1 only. OR $-x^2 + 10x - 18.75 = 0$ or $-y^2 + 4y + 2.25 = 0$ OR $x = (10 \pm\sqrt{25})/2$ or $y = (4\pm\sqrt{25})/2$ Ignore inclusion of x = 7.5 or y = -0.5 A0 B0 if the **only** solutions given do not satisfy -3 < x < 7 and 0 < y < 10 **Special case:** Area of rectangle = 20 B0 Eliminating y (leading to 6x = 19.75) SC M1 x = 3.2(9166…) AND y = 3.1(788…) truncated or rounded A0 A0 SC A1 Only depends on the award of M1 With no extra spurious dimensions
17.(a) Idea of right angled triangle shown or used with height b, base a cos θ = a(/1) tan θ = b/a sin θ = b(/1)	M1 A1 A1 A1 4	Any correct answer implies M1 OR $a /\sqrt{(a^2 + b^2)}$ OR $b /\sqrt{(a^2 + b^2)}$ Penalise -1 once only for consistent use of values other than a and b providing the hypotenuse is still 1

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