

GCSE

Methods in Mathematics

(Linked Pair Pilot)

93651F

Unit 1: Foundation Tier

Mark Scheme

9365

June 2014

Version 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
M dep	A method mark dependent on a previous method mark being awarded.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
Q	Marks awarded for quality of written communication.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
25.3 ...	Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

M1 Foundation Tier

Q	Answer	Mark	Comments
1(a)	15 000	B1	
1(b)	$\frac{4}{8}$	B1	
1(c)	35%	B1	
2	Alternative method 1		
	1461 × 24 or 35 064 or 1461 × 60 or 87 660 or 24 × 60 or 1440	M1	
	1461 × 24 × 60 or their 35 064 × 60 or their 87 660 × 24 or their 1440 × 1461 or 2 103 840	M1dep	
	2 103 840 and Yes	Q1	Strand (ii) SC2 2 102 400 and Yes SC1 2 102 400
	Alternative method 2		
	2 000 000 ÷ 60 or 33 333(.3...) or 2 000 000 ÷ 24 or 83 333(.3...) or 24 × 60 or 1440	M1	
	2 000 000 ÷ 60 ÷ 24 or their 33 333(0....) ÷ 24 or their 83 333(0....) ÷ 60 or 2 000 000 ÷ 1440 or [1388, 1389]	M1dep	
	[1388, 1389] and Yes	Q1	Strand (ii) SC2 2 102 400 and Yes SC1 2 102 400

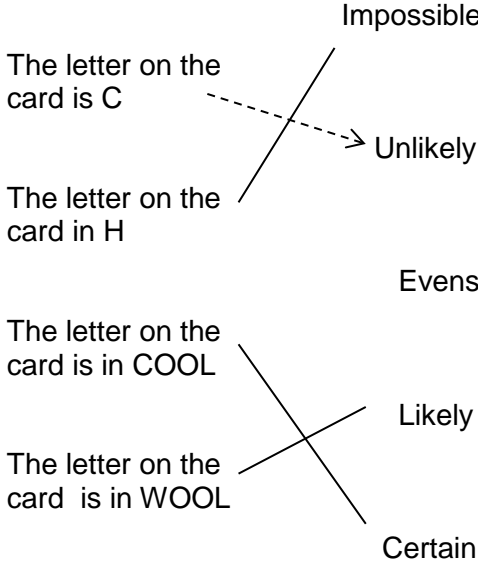
Q	Answer	Mark	Comments
3(a)	Point plotted at (5, 1)	B1	
3(b)	Points plotted at (3, 1) and (5, 3)	B2ft	B1 for either ft their point plotted in (a)
3(c)	4, 2	B1ft	ft their points plotted in (b)
4	4961	B3	B2 2561 3661 6461 8161 3601 3602 4901 4902 6401 6402 8102 6149 B1 Any other 4 digit number beginning 36.. 49.. 64.. 81.. or any other number ending 61 or a list of at least three 2-digit square numbers or 61 seen as a factor of 122
5(a)	1400×0.11	M1	oe
	154	A1	
5(b)	$\frac{4}{5} \times 295$ or $295 \div 5$ or 59	M1	oe
	236	A1	

Q	Answer	Mark	Comments
6(a)	(2, 2)	B1	
6(b)	Alternative method 1		
	Draws line through their two correct points crossing x -axis or plots point on x -axis consistent for their two correct points	M1	
	3.5, 0	A1ft	ft the two points not selected in (a) SC1 0, 3.5
	Alternative method 2		
	$2x (+ 0) = 7$	M1	
	3.5, 0	A1	SC1 0, 3.5
7	30 – 13 or 17 or 30 – 8 or 22 or 11	M1	
	30 – 13 and $(30 - 8) \div 2$ or their 17 and their $22 \div 2$ or 17 and 11	M1dep	
	6	A1	
	Alternative method 2		
	Subtracts a total of 8 passengers from 13 and 17	M1	eg subtracting 5 male and 3 female gives 8 and 14
	Completes another trial	M1	eg subtracting 3 male and 5 female gives 10 and 12
	6	A1	

Q	Answer	Mark	Comments																
8	$6x - 4x$ or $2x$ or $4x - 6x$ or $-2x$	M1	For M1M1 the rearrangements must be a correct pair: $6x - 4x$ or $2x$ and $7 + 11$ or 18 or																
	$7 + 11$ or 18 or $-11 - 7$ or -18	M1	$4x - 6x$ or $-2x$ and $-11 - 7$ or -18																
	9	A1ft	ft M1M0 or M0M1 with one rearrangement or arithmetic error																
9(a)	$180 \div (4 + 1)$ or $180 \div 5$ or 36 or $\frac{1}{5} \times 180$ or $\frac{4}{5} \times 180$	M1																	
	144	A1																	
9(b)	Their $144 \div 180$ or $4 \div 5$ or 0.8 or $\frac{\text{their } 144}{180}$ or $\frac{4}{5}$	M1																	
	80	A1ft	ft their (a)																
10(a)	Usually get a different outcome	B1																	
10(b)	More trials	B1																	
11(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td></td> <td>1</td> <td>2</td> <td>7</td> </tr> <tr> <td>4</td> <td>4</td> <td>4</td> <td>7</td> </tr> <tr> <td>5</td> <td>5</td> <td>5</td> <td>7</td> </tr> <tr> <td>8</td> <td>8</td> <td>8</td> <td>8</td> </tr> </tbody> </table>		1	2	7	4	4	4	7	5	5	5	7	8	8	8	8	B2	B1 any row or column correct
	1	2	7																
4	4	4	7																
5	5	5	7																
8	8	8	8																

Q	Answer	Mark	Comments
11(b)	2 and 5 on spinner C and 3 and 4 on spinner D	B2	B1 2, 3, 4 and 5 used but in the wrong position or all sections completed so that at least three probabilities are correct
12(a)	Correct set of four different prime numbers	B2	B1 all numbers prime and the calculation correct, but with repeated numbers used or all numbers different and three of the four numbers prime and the calculation correct or at least four prime numbers identified with no incorrect numbers or at least five prime numbers identified with one incorrect number
12(b)	2 is the only even prime number, so the sum must be even	Q2	oe Strand (ii) Q1 2 is the only even prime number or (with 2 in) the sum would be even or even + odd + odd = even or 2 can't be the answer (as it's the smallest prime number) or one or more correct numerical example(s) using 2, with no incorrect examples

Q	Answer	Mark	Comments																											
13(a)	1236	B1																												
13(b)	67	B1																												
13(c)	13	B1																												
13(d)	Attempt to multiply 93 by 60 and 7 or attempt to multiply 67 by 90 and 3	M1	<p>For example:</p> <table style="display: inline-table; vertical-align: middle;"> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">90</td> <td style="border: 1px solid black; padding: 2px;">3</td> </tr> <tr> <td style="border: none; text-align: right;">60</td> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">xx00</td> <td style="border: 1px solid black; padding: 2px;">xx0</td> </tr> <tr> <td style="border: none; text-align: right;">7</td> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">xx0</td> <td style="border: 1px solid black; padding: 2px;">xx</td> </tr> </table> <p>where x represents a digit, so that: xx represents a two digit number, xx0 represents a three digit number ending in zero, etc</p> <table style="display: inline-table; vertical-align: middle; margin-top: 10px;"> <tr> <td style="border: none; text-align: center;">9</td> <td style="border: none; text-align: center;">3</td> <td style="border: none;"></td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">5</td> <td style="border: 1px solid black; padding: 2px;">1</td> <td style="border: 1px solid black; padding: 2px;">6</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">6</td> <td style="border: 1px solid black; padding: 2px;">2</td> <td style="border: 1px solid black; padding: 2px;">7</td> </tr> </table> <p>54, 63, 18 and 21 correctly entered into the grid. Allow 1 error in the values</p>			90	3	60		xx00	xx0	7		xx0	xx	9	3		5	1	6	6	2	7						
			90	3																										
	60		xx00	xx0																										
7		xx0	xx																											
9	3																													
5	1	6																												
6	2	7																												
Adds all the required components	M1	<table style="display: inline-table; vertical-align: middle;"> <tr> <td style="border: none; text-align: right;">93</td> <td style="border: none;"></td> <td style="border: none; text-align: right;">67</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: right;"><u>67</u> ×</td> <td style="border: none;"></td> <td style="border: none; text-align: right;"><u>93</u> ×</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: right;">651</td> <td style="border: none;"></td> <td style="border: none; text-align: right;">201</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: right;"><u>5580</u> +</td> <td style="border: none;"></td> <td style="border: none; text-align: right;"><u>6030</u> +</td> <td style="border: none;"></td> </tr> </table> <p>At least 1 of the 2 parts correct and added</p> <table style="display: inline-table; vertical-align: middle; margin-top: 10px;"> <tr> <td style="border: none;"></td> <td style="border: none;"></td> <td style="border: 1px solid black; padding: 2px;">90</td> <td style="border: 1px solid black; padding: 2px;">3</td> </tr> <tr> <td style="border: none; text-align: right;">60</td> <td style="border: 1px solid black; padding: 2px;">5400</td> <td style="border: 1px solid black; padding: 2px;">180</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: right;">7</td> <td style="border: 1px solid black; padding: 2px;">630</td> <td style="border: 1px solid black; padding: 2px;">21</td> <td style="border: none;"></td> </tr> </table> <p>At least 3 of the values correct and all 4 added</p> <p>Napier's Bones method: At least three of 54, 63, 18 and 21 correct and all four numbers added in the correct manner</p>	93		67		<u>67</u> ×		<u>93</u> ×		651		201		<u>5580</u> +		<u>6030</u> +				90	3	60	5400	180		7	630	21	
93		67																												
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		90	3																											
60	5400	180																												
7	630	21																												
6231	A1																													

Q	Answer	Mark	Comments
14(a)	 <p>Impossible</p> <p>The letter on the card is C</p> <p>Unlikely</p> <p>The letter on the card in H</p> <p>Evens</p> <p>The letter on the card is in COOL</p> <p>Likely</p> <p>The letter on the card is in WOOL</p> <p>Certain</p>	B3	B1 for each correct answer
14(b)	O on exactly two of the three cards	B1	
15	2×5 or 10 or 3×4 or 12 or $6 \times \frac{1}{2}$ or 3	M1	
	10 and 12 and 3	A1	
	19	A1ft	ft correct calculation with their three values, two of which must be correct
16	Any three of $1 + 2 + 3 + 4 = 10$ $1 \times 2 \times 3 + 4 = 10$ $1 + 2 + 3 \times 4 = 15$ $1 + 2 \times 3 \times 4 = 25$	B3	B1 for each
17(a)	-1 and 6	B1	Either order
17(b)	-9 and 4	B1	Either order
17(c)	-5 and 3	B1	Either order

Q	Answer	Mark	Comments
17(d)	4, -5 and -1 or -5, 4 and -1	B1	Correct order only
18(a)	9a	B1	
18(b)	5	B1	
18(c)	6	B1	
18(d)	20	B1	
19	Uses digits 9, 8, 7, 6, 5 and 4	B1	
	Their six different digits arranged in optimal order or 9 in hundreds place and 8 and 7 in tens places and 6, 5 and 4 in units places and	B1ft	
	Correct addition of their three digit, two digit and one digit numbers	B1	1065 gets full marks
20	Alternative method 1		
	20 (%)	B1	
	100 – their 20 – 25 or 100 – 45 or 55	M1	
	$\frac{\text{their } 55}{100}$	M1dep	
	$\frac{11}{20}$	A1ft	ft their 20
	Mark scheme for question 20 continued on next page		

Q	Answer	Mark	Comments
20	Continuation of mark scheme from previous page		
	Alternative method 2		
	$\frac{1}{4}$	B1	
	$\frac{4}{20} + \frac{5}{20}$ or $\frac{9}{20}$	M1	oe with common denominator Correct adding of fractions
	1 – their $\frac{9}{20}$	M1dep	
	$\frac{11}{20}$	A1ft	ft their $\frac{1}{4}$
	Alternative method 3		
	0.2 and 0.25	B1	
	1 – their 0.2 – their 0.25 or 0.55	M1	
	$\frac{\text{their } 55}{100}$	M1dep	
$\frac{11}{20}$	A1ft	ft their 0.2 and 0.25	
21	$(9^5 \times 9^7 =) 9^{12}$ or $9^{(1)} \times 9^7$ or $9^5 \times 9^3$ or $5 + 7$ or $5 - 4$ or $7 - 4$	M1	
	9^8	A1	SC1 9^{31}

Q	Answer	Mark	Comments
22	Alternative method 1		
	$(a =) 12 \div 3$ or 4	M1	
	$2b + \text{their } a = 24$ or $2b + 4 = 24$ or $b = 10$	M1	
	$2 \times \text{their } a + \text{their } b + 2c = 30$ or $8 + 10 + 2c = 30$ or $2c = 12$ or $c = 6$ or sum of middle column is $30 - \text{their } a$	M1	
	22, 26 and 18	A1	SC2 first and third column totals correct SC1 totals of $3a + b$, $a + b + 2c$, $2a + b$
	Alternative method 2		
	$(a =) 12 \div 3$ or 4	M1	
	$2b + \text{their } a = 24$ or $2b + 4 = 24$ or $b = 10$	M1	
	$(12 + 24 + 30) - \text{their totals for first and third columns}$ or $66 - \text{their } 22 - \text{their } 18$	M1	
	22, 26 and 18	A1	SC2 first and third column totals correct SC1 totals of $3a + b$, $a + b + 2c$, $2a + b$

Q	Answer	Mark	Comments
23(a)	$\frac{3}{8}$	B1	oe
23(b)	0.2 + 0.4 or 0.6 oe (for bag B) or 0.625 or 62.5(%) (for bag A)	M1	
	0.62(5) or 0.63 and 0.6 and bag A	A1	oe both probabilities correct in the same format and bag A eg $\frac{25}{40}$ and $\frac{24}{40}$ and bag A