

GCSE

Linked Pair

Methods in Mathematics Paper 1 Foundation Tier
Mark scheme

9365/1F
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Version 1.0 Final Mark Scheme

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.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme 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.

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.

Q	Answer	Mark	Comments
1(a)	(0).25	B1	Allow any number of zeros after the 5
1(b)	(0).3	B1	Allow any number of zeros after the 3
1(c)	$\frac{9}{10}$ or (0).9	B1	oe For the decimal answer, allow any number of zeros after the 9
1(d)	$\frac{25}{40}$	B1	
2(a)		B3	B1 each correct answer Allow any indication
	Additional Guidance		
	Two lines/arrows from the same event to two or more different chances cannot score that particular B mark (even if one of them is correct) ie NOT (for example)		
Two or more lines/arrows going from different events to the same chance, eg may still score a mark (if one of the lines/arrows is correct)			

Q	Answer	Mark	Comments
2(b)	Indicates half of 7 is not a whole number or for an evens chance there needs to be an even number of books	B1	
	Additional Guidance		
	You cannot halve 7 (to make a whole number)		B1
	7 cannot be divided equally		B1
	You can't have half a book		B1
	$7 \div 2 = 3.5$		B1
	7 is not an even number 7 is an odd number 7 is an odd number so there must be 3 of one and 4 of the other		B1 B1 B1
There could be 5 English and 2 Science books		B0	
If $7 \div 2$ is evaluated it must be correct eg $7 \div 2 = 4.5$ (you can't have half a book)		B0	
3	A 'Yes' B 'No' C 'Yes' D 'No'	B4	B1 for each one correct Allow any indication
4(a)	an expression	B1	
4(b)	an inequality	B1	
4(c)	a formula	B1	Condone both 'an equation' and 'a formula' circled
4(d)	$10a$	B1	

Q	Answer	Mark	Comments
5	Alternative Method 1		
	$1 + 2 + 2 + 5 + 10 + 10 + 25 + 25 + 50$ or 130	M1	Allow an omission or duplication of 1 card If no sum seen allow $80 \leq \text{total} \leq 180$ as evidence of adding
	Their $130 \div 2$ or 65	M1dep	
	50, 10, 5 and 25, 25, 10, 2, 2, 1 or 50, 10, 2, 2, 1 and 25, 25, 10, 5	A1	Either order SC1 25, 10, 5 and 25, 10, 2, 2, 1
	Alternative Method 2		
	50 in one group and both 25s in the other	M1	
	10 in each group or $30 \div 2$ or 15	M1 dep	
	50, 10, 5 and 25, 25, 10, 2, 2, 1 or 50, 10, 2, 2, 1 and 25, 25, 10, 5	A1	Either order SC1 25, 10, 5 and 25, 10, 2, 2, 1
	Additional Guidance		
	If answer line is blank check the diagram for an indication of sorting into groups, eg A written by 50, 10 and 5		
	The second method mark on Alt 1 can be implied by correct sets for half of their total		
	Examples: 50, 10 and 25, 25, 10 (by Alt Method 2) 50, 10, 2 and 25, 25, 10, 2 (by Alt Method 2)	M1 M1 A0 M1 M1 A0	

Q	Answer	Mark	Comments
6(a)	11.05	B1	oe eg $11\frac{1}{20}$ or $11\frac{5}{100}$ or $\frac{221}{20}$
6(b)	21	B1	
7	$\sqrt{2025}$ or 45	M1	oe
	(their $45 + 1$) ²	M1dep	
	2116	A1	SC1 1 026 169
8(a)	2 and any other prime number	B1	Either order
8(b)	Any one of the following: 2, 2, 2 2, 3, 5 2, 2, 11 3, 5, 7 5, 5, 5 2, 5, 23 2, 11, 17	B1	Numbers can be in any order SC1 1, 2 in (a) and 1, 1, 1 or 1, 1, 3 or 1, 2, 2 or 1, 2, 3 or 1, 2, 7 or 1, 3, 11 or 1, 7, 7 in (b)
8(c)	Any four prime numbers with a sum which is a multiple of 25 For example: 2, 3, 3, 17 2, 3, 7, 13 3, 3, 3, 41 3, 5, 11, 31 2, 2, 2, 19 7, 11, 13, 19 etc	B1	Numbers can be in any order SC1 1, 2 in (a) and/or 1, 1, 1 or 1, 1, 3 or 1, 2, 2 or 1, 2, 3 or 1, 2, 7 or 1, 3, 11 or 1, 7, 7 in (b) and 1 used in an otherwise correct answer here (eg 1, 2, 3, 19)
	Additional Guidance		
	The use of 1 in an otherwise correct answer should not be penalised after the first occasion		

Q	Answer	Mark	Comments
9	Alternative Method 1		
	0.96 × 625 or 0.04 × 625	B1	oe correct method to find 96% of 625 or 4% of 625
	$\sqrt{625} = 25$ or $25^2 = 625$	B1	
	0.96 × 625 = 600 and 625 – 600 = 25 or 0.04 × 625 = 25 and $\sqrt{625} = 25$ or $25^2 = 625$	Q1	oe Strand ii Fully correct proof with all working shown SC1 25
	Alternative Method 2		
	$\sqrt{625} = 25$ or $25^2 = 625$	B1	
	$\frac{25}{625} \times 100$ or $\frac{600}{625} \times 100$	B1	
	$\sqrt{625} = 25$ or $25^2 = 625$ and $\frac{25}{625} \times 100 = 4$ or $\frac{600}{625} \times 100 = 96$ and $100 - 96 = 4$	Q1	oe Strand ii Fully correct proof with all working shown SC1 25
	Additional Guidance		
	4% of 625 = 25 = $\sqrt{625}$ oe		B0 B1 Q0
It is impossible to score the Q mark without B1 B1			

Q	Answer	Mark	Comments
10(a)	$\frac{25}{60}$	B1	oe $\frac{5}{12}$ or 0.41 $\dot{6}$ or 41.6%
	Additional Guidance		
	For all parts of this question, do not accept an answer in ratio form, although it is possible that the M mark in 2(c) could come from a ratio		
	For all parts of this question, ignore descriptive words such as 'likely'		
	For all parts of this question, ignore incorrect attempts to cancel a correct fraction or convert it to decimal or percentage form		
	For all parts of this question, accept an answer given in words if it is also seen in a correct format		
10(b)	$\frac{11}{60}$	B1	oe 0.18 $\dot{3}$ or 18.3%
	Additional Guidance		
	If otherwise correct answers to (a) and (b) are only given in words withhold the first mark For example, '25 in 60' in (a) and '11 in 60' in (b)		B0 B1
10(c)	$\frac{6}{60}$ or 6 or 9 seen	M1	excluding 9 seen in $\frac{9}{10}$
	$\frac{9}{60}$	A1	oe $\frac{3}{20}$ or 0.15 or 15%
	Additional Guidance		
	If otherwise correct answers to (a) and/or (b) and (c) are given in words withhold the first mark only For example, '25 in 60' in (a) and '11 in 60' in (b) and '9 in 60' in (c) '14 in 60' in (a) and '11 in 60' in (b) and '9 in 60' in (c)		B0 B1 M1 A1 B0 B0 M1 A1

Q	Answer	Mark	Comments
11	$x^2 + 3x - 4x + 20$	M1	Four terms with at least three correct
	$x^2 + 3x - 4x + 20$	A1	
	$x^2 - x + 20$	A1ft	ft if M1 awarded, a term in x^2 and no further errors SC2 $x^2 - x - 20$
	Additional Guidance		
	Allow, for example, $-1x$ for $-x$		
	$x^2 + 3x - 4x - 20$ followed by $x^2 - x - 20$		M1 A0 A1
	Ignore further attempts to simplify the expression by combining two or all of the terms for the first A mark, but not for the second For example, $x^2 + 3x - 4x + 20$ followed by $x^2 - x + 20$ followed by $x + 20$ $x^2 + 3x - 4x - 20$ followed by $x^2 - x - 20$ followed by $x - 20$ However, ignore attempts to factorise an expression worth A2 or A1ft or SC2		M1 A1 A0 M1 A0 A0
	For the first mark accept the terms given individually, but for the second and third marks the terms must be presented correctly as an expression		
	Ignore attempts to 'solve' their expression by equating it to 0		
	For the first mark accept the terms given individually, but for the second and third marks the terms must be presented correctly as an expression		
12(a)	$50 - 17 - 20$ or 13	M1	oe
	$\frac{13}{50}$ or 0.26 or 26%	A1	oe $\frac{52}{200}$ SC1 $\frac{163}{200}$ or (0).815 or 81.5%
	Additional Guidance		
	$\frac{13}{200}$		M1 A0

Q	Answer	Mark	Comments
12(b)	0.39 or 200 spins and indicates that more trials usually results in better estimates	B1	oe
	Additional Guidance		
	'more reliable' or 'more accurate' on their own		B0
	'more trials' or 'most trials' on their own		B1
13(a)	30 014	B1	
13(b)	5 hundreds	B1	
13(c)	99 889	B2	B1 99 988 or 98 989 or 98 899 or 98 765
14	Any one of the following: 2, 7, 8 2, 4, 14 1, 2, 56 1, 4, 28 1, 7, 16 1, 8, 14	B2	Numbers can be in any order B1 4, 4, 7 or 2, 2, 28 or 1, 1, 112 or 112 expressed as the product of two integers, <u>not</u> using 1, eg $2 \times 56 (= 112)$ or a correct division of 112 seen, but <u>not</u> by 1, eg $112 \div 2 = 56$
	Additional Guidance		
	Accept, for example, 2 and 56 on a factor tree as a product of two factors		B1
15(a)	18	B1	
15(b)	0	B1	

Q	Answer	Mark	Comments
15(c)	7.5 or $7\frac{1}{2}$ or $\frac{15}{2}$	B1	
	Additional Guidance		
	Ignore any units written, eg £, %, etc		
	In the decimal form, allow zeros after the '5', eg 7.50		B1
16(a)	HH HT TH TT	B1	
	0.25 marked on line	B1ft	Any indication Mark intention ft a correct marking from a list of at least 3 pairings
16(b)	(0).7	B1	oe $\frac{7}{10}$, 70%, etc
	Additional Guidance		
	Ignore descriptive words such as 'likely'		
	0.7 likely (ignore 'likely')		B1
	0.70 (ignore any number of zeros after the 7)		B1
	$\frac{70}{100}$		B1
17(a)	1.26	B1	
17(b)	-24	B1	

Q	Answer	Mark	Comments
17(c)	$\left(\frac{1}{9} +\right) \frac{6}{9}$ or both fractions changed to another common denominator eg 18, 27, etc, with at least one of the numerators correct	M1	
	$\frac{7}{9}$	A1	oe
	Additional Guidance		
	Ignore incorrect cancelling of a correct answer eg $\frac{21}{27}$ cancelled to $\frac{6}{9}$ (and maybe to $\frac{2}{3}$)	M1 A1	
18(a)	– 1	B1	
18(b)	Correct ruled line from (0, 3) to (4, –5)	B2	B1 correct ruled line not reaching one or both of (0, 3) and (4, –5) or correct straight line from (0, 3) to (4, –5) but not ruled or at least 3 points correctly plotted (including ft their point)
	Additional Guidance The correct ruled line scores 2 marks Ignore extra points plotted if the line is correct The line <u>must</u> be ruled Points must be plotted with a ± 1 mm tolerance The line must be within 1 mm of the correct points Ignore anything drawn for $x < 0$ and $x > 4$ If the line does not reach (0, 3) or (4, –5) it must be ruled from (a, b) to (c, d) where $c - a \geq 2$ If there is an incorrect line or no line at all then ignore up to 2 extra incorrect points, but remember that (2 , their (a)) does not constitute an incorrect point		

Q	Answer	Mark	Comments	
18(c)	$3x$ or $3 \times x$ or $x \times 3$ or $y \div 3$ or $\frac{y}{3}$ or y is 3 times x or x is a third of y	B1	oe	
	$y = 3x$ or $\frac{y}{3} = x$ or $3 = \frac{y}{x}$	Q1	oe Strand i	
	Additional Guidance			
	For the Q mark simplified algebraic notation must be used			
	Allow $3 \times x$ or $x \times 3$ or $y \div 3$ for B1 but not the Q mark eg both $3 \times x$ and $y = 3 \times x$ score the same			B1 Q0
	$x3$			B0 Q0
$y = x3$			B0 Q0	
19	0.1×400 or 40 or 0.9×400	M1	oe	
	360	A1	Allow any number x such that $360 \leq x < 361$ SC1 359 or 361	

Q	Answer	Mark	Comments
20	$(2^3 =) 8$ or $(3^3 =) 27$ or $(4^3 =) 64$ or 100 or 10^2	M1	
	$(m =) 100$ and $(n =) 100$ or $(m =) 10^2$ and $(n =) 10^2$	A1	m and n evaluated in the same format oe
	$m = n$	Q1ft	Strand iii ft their values provided M1 awarded and methods for finding m and n are correct with at most 1 numerical error
	Additional Guidance		
	Examples:		
	$(m =) 1 + 8 + 27 + 64 = 100$ $(n =) (1 + 2 + 3 + 4)^2 = 10^2$ $m = n$ (m and n not in the same format)	M1 A0 Q1	
	$(m =) 1 + 8 + 27 + 64 = 100 = 10 \times 10$ $(n =) (1 + 2 + 3 + 4)^2 = 10^2$ $m = n$ (m and n not in the same format) BUT compare with next example	M1 A0 Q1	
	$(m =) 1 + 8 + 27 + 64 = 100$ $(n =) (1 + 2 + 3 + 4)^2 = 10^2$ $10 \times 10 = 100$ (taken as evaluating 10^2 for n) $m = n$	M1 A1 Q1	
	$(m =) 1 + 8 + 27 + 46 = 82$ $(n =) 100$ $m < n$ (only one error in the two calculations)	M1 A0 Q1ft	
	$(m =) 1 + 8 + 27 + 46 = 72$ $(n =) 100$ $m < n$ (two errors in the calculation for m)	M1 A0 Q0ft	
$(m =) 1 + 8 + 27 + 64 = 100$ $(n =) 1 + 4 + 9 + 16 = 30$ $m > n$ (incorrect method for finding n)	M1 A0 Q0ft		

Q	Answer	Mark	Comments	
21	$7x + x$ or $8x$ or $-x - 7x$ or $-8x$	M1	For M1M1 the rearrangements must be a correct pair: $7x + x$ or $8x$ and $3 - 1$ or 2 or $-x - 7x$ or $-8x$ and $1 - 3$ or -2	
	$3 - 1$ or 2 or $1 - 3$ or -2	M1		
	$(0).25$ or $\frac{1}{4}$	A1ft	oe ft M1 M0 or M0 M1 with one rearrangement or arithmetic error	
	Additional Guidance			
	It is possible that the M1 which scores may not be seen, but implied: $6x + 1 = 3$ followed by $x = \frac{1}{3}$ $7x = 4 - x$ followed by $x = \frac{1}{2}$			M0 M1 A1 M1 M0 A1
	$8x$ from $7x + 1$ or 2 from $3 - x$ score M0			
A correct embedded value of 0.25 (oe) scores			M1 M1 A0	

Q	Answer	Mark	Comments
22	Alternative Method 1		
	$110 \div 2$ or 55(%) or (0).55 or $\frac{55}{100}$	M1	oe $(200 - 110) \div 2$ or 45 oe and $100 - 53$ or 47 oe
	Zac and 55(%) or Zac and $\frac{55}{100}$ or Zac and (0).55 and (0).53	A1	Zac and 45 and 47
	Alternative Method 2		
	53×2 or 106 or $\frac{106}{200}$	M1	oe $(100 - 53) \times 2$ or 94 oe and $200 - 110$ or 90
Zac and 106 or Zac and $\frac{106}{200}$	A1	Zac and 94 and 90	
23	1 or 100%	B1	Condone 'Certain'
	Odd + even = odd	B1	
	Additional Guidance		
	For the first mark, accept a probability in the form $\frac{n}{n}$		
	To gain the second mark there must be some reference to odd + even = odd It is not sufficient simply to say the sum is always odd		

Q	Answer	Mark	Comments
24(a)	$-3 < x < 5$ or $5 > x > -3$	B2	B1 for either side correct SC1 $-3 \leq x \leq 5$ or $5 \geq x \geq -3$
	Additional Guidance		
	If the student writes this as two inequalities award one mark for either or both written correctly $x > -3$ and $x < 5$ $x > -3$ and $x > 5$		B1 B1
24(b)	$-1, 0, 1, 2$	B2	B1 $\frac{-2}{2}, \frac{0}{2}, \frac{2}{2}, \frac{4}{2}$ or $-1.5 < \frac{x}{2} < 2.5$ or any two or three correct values with no incorrect values or all four correct values with one incorrect or $-1, -0.5, 0, 0.5, 1, 1.5, 2$ or $-1, -\frac{1}{2}, 0, \frac{1}{2}, 1, 1\frac{1}{2}, 2$ or $x = -2, 0, 2, 4$ or $x = -1, 0, 1, 2$

Q	Answer	Mark	Comments
25(a)	$24 \div 3 (\times 2)$ or $8 (\times 2)$ or 16	M1	
	40	A1	
	Additional Guidance		
	24 : 16		M1 A0
25(b)	3 : 1	B1	oe any ratio where the first number is three times the second
	Additional Guidance		
	$\frac{3}{4} : \frac{1}{4}$ or $\frac{75}{100} : \frac{25}{100}$ or (0).75 : (0).25 or 6 : 2 etc		B1
	Do not allow the ratio reversed, eg 1 : 3		B0