

GCSE

Linked Pair Pilot

Methods in Mathematics Paper 2 Foundation Tier
Mark scheme

9365/2F
November 2014

Version/Stage: 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.
- 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.

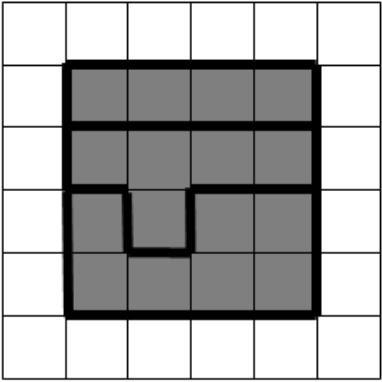
Work replaced

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
1a	24 and 35	B1	
1b	49	B1	
1c	24	B1	
1d	15	B1	
2a	Any perpendicular line drawn	B1	
2b	Any parallel line with length half of AB	B2	B1 either condition. Must be ruled for 2 marks
3a	21	B1	May be seen in sequence
3b	-1 or $-1, 3$ or $3, -1$	B2	B1 for 3 as second term or difference of 4 shown or difference of n shown (may be implied by value of second term) and $7 - 2n$ as answer
4a	Centre	B1	Mark circled word first. If blank mark the answer line at end of sentence
4b	Circumference	B1	Mark circled word first. If blank mark the answer line at end of sentence
4c	Segment	B1	Mark circled word first. If blank mark the answer line at end of sentence

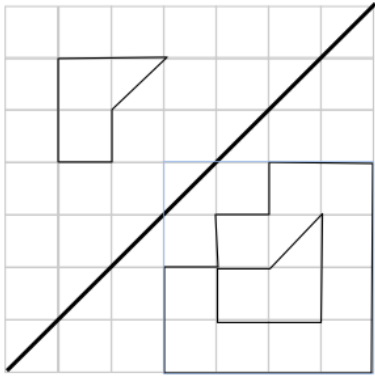
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5	<table border="1" data-bbox="240 689 746 768"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>1</td> <td>4</td> <td>7</td> </tr> </tbody> </table>	A	B	C	D	6	1	4	7	B3	<p>B2 for</p> <table border="1" data-bbox="906 521 1487 611"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>3</td> <td>2</td> <td>7</td> </tr> </tbody> </table> <table border="1" data-bbox="906 640 1487 730"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>4</td> <td>1</td> <td>7</td> </tr> </tbody> </table> <p>B1 for 1 condition, eg $A + B = 7$ or $B + C = 5$ or BCD in linear sequence. Zero and negatives negate one condition so B1 for</p> <table border="1" data-bbox="906 904 1487 994"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>6</td> <td>-1</td> <td>7</td> </tr> </tbody> </table>	A	B	C	D	4	3	2	7	A	B	C	D	3	4	1	7	A	B	C	D	1	6	-1	7
A	B	C	D																																
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6a	<i>B and F</i>	B1	Any order																																
6b	<i>C, E and F</i>	B2	B1 for any 2 correct if 2 or 3 answers given.																																
6c	<i>C</i>	B1																																	
6d		B1	<p>oe</p> <p>Shapes must be clear. If not clear on answer grid, use practice grid to check. Mark answer grid first. If blank mark practice grid.</p>																																

Q	Answer	Mark	Comments
7a	\div	B1	
7b	7	B2	B1 for LHS as 20 or correct answer following from their 20 eg 5 following 12 evaluated
8a	Shape congruent to A in any orientation	B1	
8b	Shape similar to B in any orientation	B1	
9a	$\frac{30}{4}, \frac{15}{2}, 7\frac{1}{2}, 7.5$	B1	oe
9b	36	B1	Do not accept embedded answer
9c	$2c = 11 + 6 (= 17)$ or $2c = 11 - 6 (= 5)$	M1	
	8.5	A1	Embedded answer M1, A0 oe
10a	54.872 or $\frac{6859}{125}$	B1	
10b	54.9	B1ft	ft their (a) if answer given to 2 dp or more or as fraction that evaluates to 2 dp or more.

Q	Answer	Mark	Comments
Alternative method 1			
11	Three given points plotted correctly	B1	
	4 th point correctly plotted for their initial plots	M1	
	(4, 4)	A1ft	ft their plots if a centre can be identified. If coordinates reversed, answer is same so allow 2/3
Alternative method 2			
11	Mid-point of any two of the three given points found using $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	M1	
	x – coordinate correct	A1	
	y – coordinate correct	A1	
12a	$2n$	Q1	Strand (i)
12b	$w - 5$	B1	Accept any letter
12 c	$1\frac{1}{2}x$	B2	B1 for $6x$ or $6\frac{1}{2}x$ or $1\frac{1}{2}$
13	$\pi \times 14^2$	M1	oe
	[607, 616] or 196π	A1	
	mm^2	B1	

Q	Answer	Mark	Comments
14	$108 \div 3 (= 36)$	M1	
	$\sqrt{\text{their } 36}$ or $\sqrt{\text{their } (36 \times 4)}$	M1Dep	
	their 6×8 or their 12×4	M1Dep	
	48	A1	144 implies M1
15a	55	B1	
15b	20	B1	
15c	$2y + 3y + 70 = 360$	M1	oe $(360 - 70) \div 5$
	$5y = 290$	M1	$290 \div 5$
	58	A1	
16	0.24×360	M1	oe Allow build up method for M1 if 24% clearly broken down, eg $10\% + 10\% + 4 \times 1\%$ or $20\% + 5\% - 1\%$ and at least one of 10%, 5%, 1% or 20% correct
	$110 \div 5 \times 4$	M1	oe
	88 or 86.4	A1	
	Correct conclusion based on their values if both Ms awarded	Q1ft	Strand (iii)
17a	Parallelogram and Rhombus	B2	B1 each

Q	Answer	Mark	Comments
17b	Any valid property that distinguishes the kite from the others Only one pair equal angles Diagonals cross at right angles No rotational symmetry Rotational symmetry 1 Opposite sides of rectangle and parallelogram are equal. Opposite sides of a kite are not equal 1 line of symmetry One set of angles same Diagonals do not bisect each other	B1	
17c	diagonals bisect each other	B1	
18	Correct working for the area of a 'rectangle' from the cross-section. ie $3 \times 6 (=18)$, $4 \times 8 (= 32)$, $4 \times 5 (=20)$ or $2 \times 3 (= 6)$ or $5 \times 2 (= 10)$	M1	
	Their $4 \times 8 +$ their 2×3 or Their $3 \times 6 +$ their 4×5 or $6 \times 8 -$ their 5×2 or 38	M1dep	
	Their cross-sectional area $\times 12$	M1dep	NB $12 \times 8 \times 6 - 12 \times 5 \times 2$ or $12 \times 8 \times 4 + 12 \times 3 \times 2$ or $12 \times 3 \times 6 + 12 \times 4 \times 5$ are M3
	456	A1	

Q	Answer	Mark	Comments
19a	Correct reflection 	B2	B1 for shape in correct orientation, wholly within the outline.
19b	$\begin{pmatrix} 6 \\ -3 \end{pmatrix}$	B2	B1 for $\begin{pmatrix} 6 \\ a \end{pmatrix}$ or $\begin{pmatrix} b \\ -3 \end{pmatrix}$ or '6 right and 3 down' (oe) or $(6, -3)$ or $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$
Alternative method 1			
20	$3 \times 7 = 21$ or $3 \times 5 = 15$	M1	Side of 3 or side of 7 or side of 5 marked on diagram
	Area face = 35	A1	
	$2 \times (21 + 15 + \text{their } 35)$	M1	
	142 and a full method	Q1ft	Strand (iii). ft their sides if both Ms awarded or if a common factor other than 3, such as 1 or 1.5 is chosen as the height.
Alternative method 2			
20	Height of 1.5 chosen $1.5 \times 14 = 21$ or $1.5 \times 10 = 15$, Area face = 140, $2 \times (21 + 15 + 140)$, 352		M0, A0, M1, Q1

Q	Answer	Mark	Comments
21a	18	B1	Allow $\frac{18}{23}$
21b	3	B2	B1 for any multiple of 3, ie 6 or 9 or 2 : 1 seen or 10 : 5 seen Multiple of 3 must come after 2 : 1 or equivalent eg $\frac{1}{2}$ seen
22	1, 2, 19, 38, 53, 106, 1007, 2014	B3	B2 for any 3 of 38, 106, 1007, (1 or 2014) B1 for any 1 of 38, 106, 1007 –1 each wrong factor Factors must come from an understanding of factors, ie 2×1007 , followed by 2×503.5 then do not allow 1007 for B1 Ignore repeats.
23	$85^2 - 77^2 (= 1296)$	M1	$x^2 + 77^2 = 85^2$ $85^2 + 77^2$ or 13 154
	$\sqrt{1296}$	M1Dep	
	36	A1	SC1 [114.69, 115]