AQA Qualifications

GCSE

Methods in Mathematics (Linked Pair Pilot)

93652F
Unit 2: Foundation Tier
Mark Scheme

9365
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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.

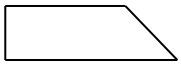
Work replaced

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

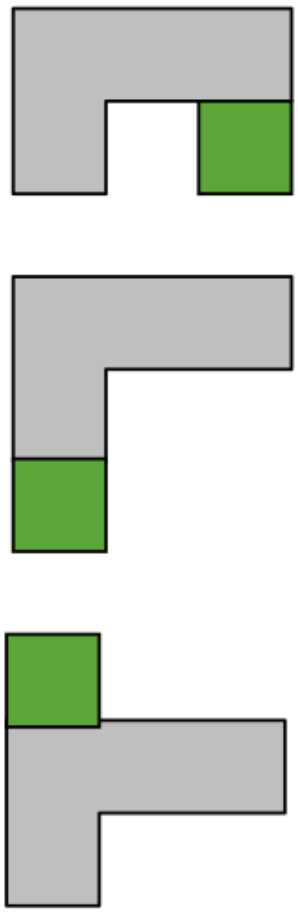
Premature approximation

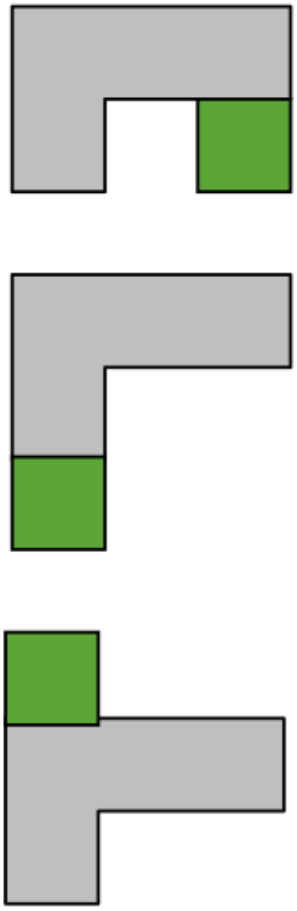
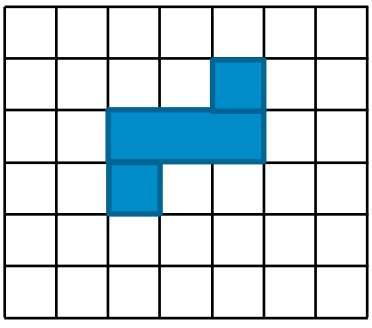
Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

M2 Foundation Tier

Q	Answer	Mark	Comments
1(a)	(4, 1)	B1	
1(b)	Correct plot at (–2, 4)	B1ft	Allow point at (4, –2) if (a) stated as (1, 4)
2	1 + 4 + 5 (=10)	M1	
	21 – *their* 10 (=11)	M1dep	Can be implied if *their* answers total 11
	5 and 6 or 6 and 5	A1	
3(a)		B1	
3(b)		B1	
4(a)	*D*	B1	
4(b)	*B*	B1	
4(c)	*E*	B1	
4(d)	*F*	B1	
4(e)	*E*	B1	
4(f)	Stepped repeated pattern **and** another row of at least 2 adjacent additional shapes started ***or*** only rectangle(s) drawn using given shape. Any additional 'L's must not prohibit further tessellation.	B1	

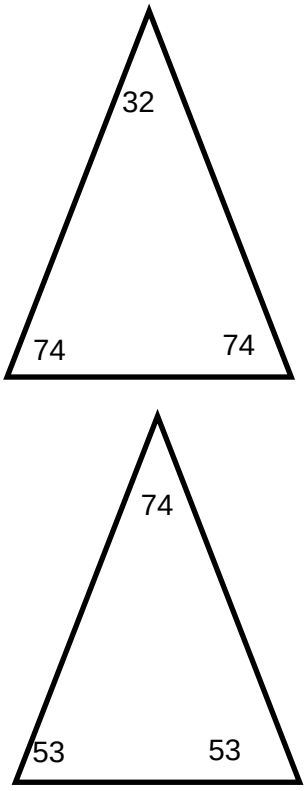
Q	Answer	Mark	Comments
5(a)	Parallel line drawn	B1	Acetate will be provided to check that line is within ±2°
5(b)	Perpendicular line drawn, any length	B1	Allow if lines have right angle indicated and line doesn't appear to be perpendicular. Lines do not have to cross. Acetate will be provided to check that line is within ±2°
6	11 and 19	B2	B1 for one condition. or $x + y = 30$ **and** $x - y = 8$

Q	Answer	Mark	Comments
7(a)		B1	B1 for any of these

Q	Answer	Mark	Comments
7(b)		B1	B1 for any of these if different from **7(a)**
7(c)		B1	

Q	Answer	Mark	Comments
8	Area of rectangle = 24 squares	B1	Can be on diagram
	Evidence of counting whole and part squares for irregular shape *or* area of B [34, 39] stated *or* clear indication of 24 whole squares plus parts e.g. rectangle drawn	B1	'24+' is not sufficient.
	Correct conclusion that shape B is larger and a statement that area of B is larger than 24 either implicitly or explicitly,	Q1ft	Strand (iii) ft if B1 awarded, 2 areas stated and a correct conclusion for those areas.
9(a)	Radius	B1	
9(b)	Sector	B1	
9(c)	Diameter passes through the centre. Chord is smaller Diameter cuts into equal (half) sections, Chord cuts into unequal sections	B1	Ignore irrelevant statements, correct or otherwise. Any reference to diameter and/or chord must be correct or B0
10(a)	55°	B1	
10(b)	360 – (150 + 70)	M1	Allow invisible brackets
	140	A1	

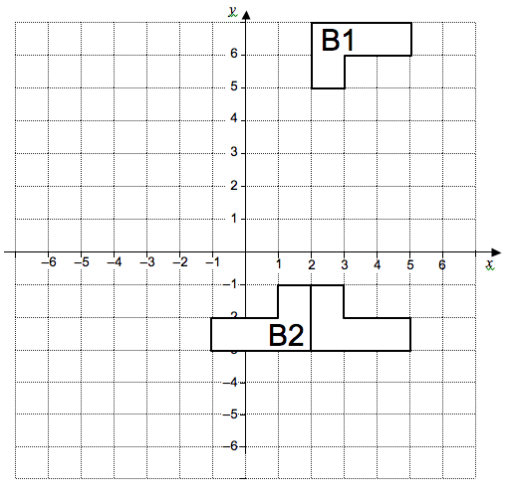
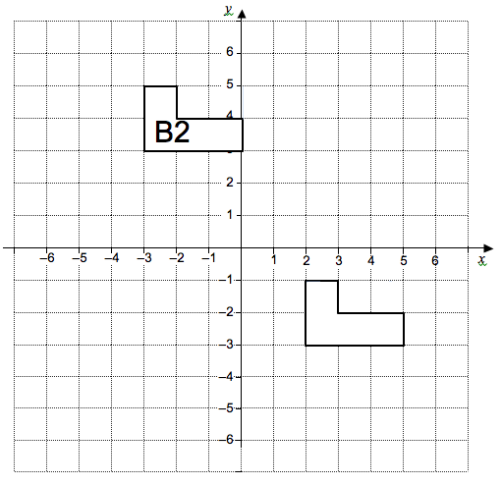
Q	Answer	Mark	Comments
11(a)	3, ×3, 'times 3', '1:3'	B1	Ignore units
11(b)	**Alternative method 1**		
	2 and 18 seen	M1	Can be seen in a subtraction or on diagram
	9	A1	
	Alternative method 2		
	3^2	M1	ft their sf 3 x 3
	9	A1ft	
12	5	B2	B1 for 25 or 5^2 seen or any *value* in range (5, 5.92]
13(a)	$6m$	B1	
13(b)	$6x + 8y$	B2	B1 for either but must have '+' for both marks *or* $6x + 8y$ seen with further incorrect working e.g. $6x + 8y = 14xy$
14	4 × 5 rectangle	B2	B1 for a rectangle with perimeter 18 cm B1 for a rectangle with area 20 cm^2
15(a)	$m = p - 5$	B1	
15(b)	$2c = 16$	M1	
	8	A1	Sc1 for 5 or 9.5

Q	Answer	Mark	Comments
16	$x - 2$	B1	$x - 2 + 6$ implies B1
	$x + 6$	B1	
	$3x + 4$	B1ft	ft if 2 correct expressions out of x, $x - 2$ and $x + 6$ combined with no other or at most 1 other incorrect linear expression and simplified correctly.
17		B3	B2 for 1 correct triangle. B2 for correct angles in both triangles but incorrectly positioned. B1 for a triangle with 74° and 2 other equal angles not totalling 180° ***or*** for a triangle with 2 × 74° and 1 other angle not totalling 180°. NB 74° must be correctly positioned.

Q	Answer	Mark	Comments
18(a)	$6 \times 12 \times 9$	M1	oe
	648	A1	
	cm^3	A1	
18(b)	Finds 3 as the HCF or 3×4, 3×3, 3×2	M1	
	$2 \times 4 \times 3$	M1	*Their* $648 \div 3^3$ or *their* $648 \div 27$
	24	A1	SC2 81 if $2 \times 2 \times 2$ cube used, could be implied by $648 \div 8$

Q	Answer	Mark	Comments
19	**Alternative method 1**		
	23 ÷ 40 (×100)	M1	
	57.5	A1	
	42.5	A1ft	ft 100 – their 57.5 Accept 42 or 43 with working seen.
	Alternative method 2		
	17	B1	
	Their (40 – 23) ÷ 40 (×100)	M1	
	42.5	A1ft	ft their 17 ÷ 40 × 100 Accept 42 or 43 with working seen.
	Alternative method 3		
	Any correct statement that equates a number as a percentage of 40 (but not 40 = 100%) eg 4 = 10%, 20 = 50%	M1	
	A correct set of equivalences that add to 23 or 17, eg 10 = 25%, 7 = 17.5% 20 = 50%, 3 = 7.5%	M1dep	
	42.5	A1	Accept 42 or 43 with working seen.
	Alternative method 4		
	40 + 40 + 20 (= 100) or 40 × 2.5	M1	100 ÷ 40 = 2.5
	23 + 23 + 11.5 or 23 × 2.5 or 17 + 17 + 8.5 or 17 × 2.5	M1	These statements imply the first M1
	42.5	A1	Accept 42 or 43 with working seen.

Q	Answer	Mark	Comments
20	Odd ticked	B1	
	Odd × odd = odd or a^2 = odd Even × even = even or b^2 = even Odd plus even = odd	Q1	Strand (ii). Clear explanation. This is not dependent on the correct box being ticked.
21(a)	20 and 'add 3', 'increases by 3' or $3n + 2$	B2	oe B1 for either answer
21(b)	$6n + 1$	B2	oe B1 for $6n$ or $6 \times n$ or $n \times 6$. Do not accept $n6$ but $n6 + 1$ is B1 Accept other letters
22(a)	C A B	B2	B1 1 correct B1 2 correct if one letter repeated B0 if all rows same letter
22(b)	$y = \frac{1}{2}x - 2$	B1	
23(a)	2.17158…	B1	
23(b)	2.2	B1ft	ft their answer to (a)
24(a)	2×25 or 5×10	M1	oe eg $50 \div 2 = 25$ **or** branches on a prime factor tree **or** any indication eg (2, 25) of a 'product' that equals 50 **or** 2, 5, 5 **or** 2, 5 and 5 shown as the last numbers of a prime factor tree (allow 1s)
	$2 \times 5 \times 5$	A1	$2^{(1)} \times 5^2$
24(b)	List of multiples of 40 and 50 to at least 80, 120 and 100, 150	M1	Venn diagram (ft their prime factors for 50 in (a))
	$2^3 \times 5^2$ or 200	A1	oe SC1 any multiple of 200

Q	Answer	Mark	Comments
25(a)		B2	B1 for line $x = 2$ shown B1 for reflection in $y = 2$ B1 for any reflection in a line of form $x = a$ where a is less than 2.
25(b)		B2	B1 for any translation of form $\begin{pmatrix} p \\ 6 \end{pmatrix}$ or $\begin{pmatrix} -5 \\ q \end{pmatrix}$ B1 for correct shape with top left corner at (–5, 6)

Q	Answer	Mark	Comments
26(a)	6 outside of circles **and** 3 in the intersection	B1	Ignore any numbers written by x and $2x$
26(b)	$2x + 3 + x + 6 = 30$	M1	oe $2x + 3 + x = 24$
	7	A1	
	Sets up an equation using x, $2x$ (or $3x$) and at least one of 3, 6 and/or 30 and solves correctly or sets up a correct equation and solves incorrectly. eg $3x + 3 = 30$, $x = 9$ $2x + 3 + x – 3 + 3 = 33$, $x = 10$	Q1	Strand (iii). NB the 3 or 6 could be implied, eg $3x = 27$, $x = 9$