GCSE

Mathematics (Linear)

Foundation Tier Paper 1

Mark scheme

43651F
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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.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
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.
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.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
[a, b)	Accept values a ≤ value < b
3.14 …	Accept answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Q	Marks awarded for quality of written communication
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

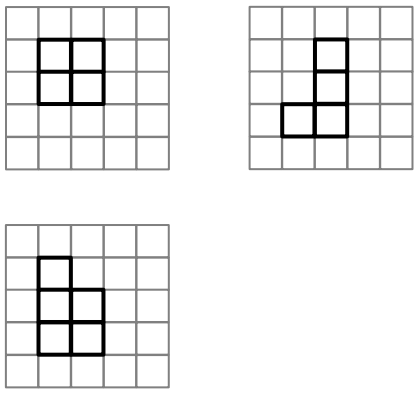
Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Paper 1 Foundation Tier

Q	Answer	Mark	Comments
1a	Evens	B1	
1b	Impossible	B1	
1c	Unlikely	B1	
2	$\frac{3}{2}$ or $\frac{2}{3}$ seen or $\frac{24}{3}$ or 120 ÷ 15 or build up to at least 12 $1\frac{1}{2}$, 3, $4\frac{1}{2}$, 6, $7\frac{1}{2}$, 9, $10\frac{1}{2}$, 12 or correct partitioning of 12 eg $3 + 3 + 3 + 3 = 1\frac{1}{2} + 1\frac{1}{2} + 3 + 3 + 3$	M1	Allow one error in build up Partitioning must get as far as two $1\frac{1}{2}$s
	8	A1	
3	500 – (149 + 55) or 204 or 351 or 445	M1	oe Allow mixed units
	(£)2.96(p)	A1	
4	1.04 1.34 1.4(0) 1.43	B1	
5a	28	B1	

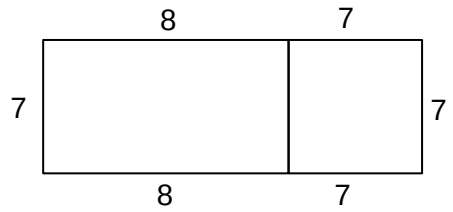
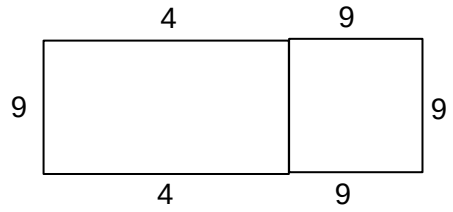
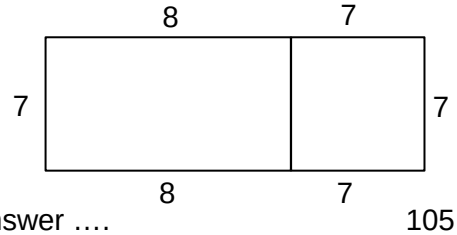
Q	Answer	Mark	Comments
5b	$-2x - 3$ or $-3 - 2x$	B2	B1 (+) $-2x$ or (+) -3 or $-2x + -3$ Do not ignore further work ie B2 response with further work is B1 B1 response with further work is B0
5c	$4 \times 4 + 5 \times 1$ or 4×4 or 16 seen	M1	
	21	A1	
6a	Arrow at 640	B1	Accept any clear indication Must be over halfway between 600 and 650 and less than 650
6b	2.38 or 238 **and** 0.93 or 93	M1	
	(£)1.45	A1	Allow £1.45p
	Additional guidance		
	Allow transcription or misread errors if student clearly selecting 2.38 and 93 and not a different value from the table eg 2.28 – 93 2.38 – 98 2.38 – 1.24 (wrong row)		 M1A0 M1A0 M0A0
	Answer only of (£)1.45(p)		M1A1

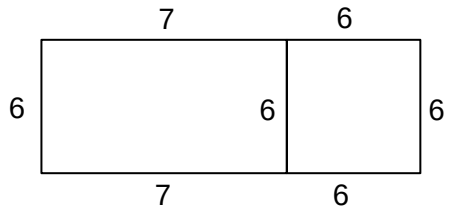
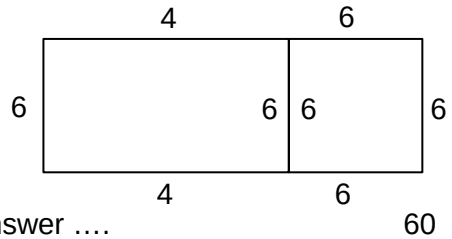
Q	Answer	Mark	Comments
6c	Repeated addition 1.24 + 1.24 + 1.24 (+ ...) or build up 1.24, 2.48, 3.72, ... or repeated subtraction from 10 10 – 1.24 – 1.24 – 1.24 (– ...) or build down 10, 8.76, 7.52, 6.28, ... or 3.72 or 4.96 or 6.20 or 7.44 or 8.68 or 9.92 or 11.16 seen or 12.40 – 1.24 or 8 × 1.24 or 9 × 1.24	M1	Repeated addition/ subtraction or build up/ down must use at least three 1.24s Allow mixed units Allow 1.25 used
	8	A1	With no arithmetic errors seen
7	Parallelogram joined to 'no lines of symmetry' Rectangle joined to 'all angles equal' Rhombus joined to 'all sides equal'	B2	B1 one correct
8a	2.5	B1	oe eg $\frac{10}{4}$ or $\frac{5}{2}$ or $2\frac{1}{2}$ or 2.50
8b	–10	B2	B1 –14
9a	7	B1	
9b	(7 + 11 + 8 + 12 + 7) ÷ 5 or 45 ÷ 5	M1	Condone missing brackets
	9	A1	

Q	Answer	Mark	Comments
10a	0.45 and 30%	B1	
10b	20% and $\frac{1}{5}$	B1	
10c	$\frac{1}{3}$	B1	
11		B3	B1 each correct grid Accept shapes with or without internal lines Shapes must be in correct orientation but may be anywhere on the relevant grid
12a	11 and 23	B2	B1 one correct and no more than one incorrect or both correct and no more than one incorrect
12b	Any two primes that add to a cube eg (3, 5), (3, 61), (5, 59), (11, 53), (17, 47), (23, 41) etc	B2	B1 one prime and any other number that add to a cube number eg (1, 7), (2, 6), (2, 25), (7, 57)

Q	Answer	Mark	Comments
13	180 – 81 or 99	M1	Angle may be shown on diagram
	360 – (their 99 + 74 + 32) or 360 – 205	M1 dep	
	155	A1	
	Additional Guidance		
	155 must not come from 81 + 74		M0M0A0
	99 seen for interior angle at D even if other working seen		M1

Q	Answer	Mark	Comments
14	150 + 60 × 6 or 510	M1	oe
	0.2 × 600 or 120 or 0.8 × 600 or 480	M1	oe If a 'build up' method used to work out 20% or 80%, must be a fully correct method
	720 ÷ 4 or 180 or 720 ÷ 4 × 3 or 540	M1	oe If a 'build up' method used to work out 25% or 75%, must be a fully correct method
	510 **and** 480 **and** 540	A1	
	Correct conclusion based on their three values with at least two of 510, 480 or 540 correct	Q1ft	Strand (iii)
	Additional Guidance		
	150 + 360 = 510 0.2 × 600 = £120 720 ÷ 4 × 3 = £540 Shop B		M1 M1 M1 A0 Q1
	150 + 360 = 410 0.8 × 600 = £480 720 ÷ 4 = £180 Shop C		M1 M1 M1 A0 Q0
	150 + 60 = £210 0.8 × 600 = £480 720 ÷ 4 × 3 = £540 Shop A		M0 M1 M1 A0 Q1
	Examples of build up		
	10% = 60, 2 × 60 = £120		M1
	10% = 600 ÷ 10 = 6, 2 × 6 = £12		M1
	10% = 7.2, 20% = 14.4, 5% = 3.6, 25% = 18		M0

Q	Answer	Mark	Comments
15	Side of square stated or shown as $\sqrt{36}$ or 6 or 6 × 6 = 36	M1	
	(44 – (2 × their 6)) ÷ 2 or (44 ÷ 2) – their 6 or 16 or (44 – 4 × their 6) ÷ 2 or (44 ÷ 2) – 2 × their 6 or 10	M1dep	16 is their total length 10 is their length of R
	their 6 × their 16 or 36 + their 6 × their 10	M1dep	
	96	A1	SC1 correct calculation of area for any large rectangle with perimeter of 44
	Additional Guidance		
	$\sqrt{36}$ = 7  Answer …. 105		M1 M1dep M1dep A0
	36 ÷ 4 = 9  Answer = 117		SC1
	 Answer …. 105		SC1
see over for further additional guidance			

15 cont	**Additional Guidance cont**	
	 Answer ….. 78	M1 M0 M0 A0
	 Answer …. 60	M1 M0 M0 A0
	$7 \times 7 = 36$ $4 \times 7 = 26$ $44 – 26 = 22$ $22 \div 2 = 14$, $14 + 7 = 19$ $7 \times 19 = 79$	M1 M1dep M1dep, A0

Q	Answer	Mark	Comments
16a	$\frac{9}{12}$ and $\frac{4}{12}$	M1	oe fractions with matching denominators eg $\frac{18}{24}$ and $\frac{8}{24}$
	$\frac{5}{12}$	A1	oe fraction eg $\frac{10}{24}$ Accept full decimal answer ie $0.41\dot{6}$ or 0.416r
16b	**Alternative method 1**		
	One pair of fractions multiplied correctly eg $\frac{5}{18}$ ($\times \frac{9}{10}$) oe or $\frac{45}{3\times6\times10}$ or $\frac{1\times5\times9}{180}$	M1	
	$\frac{45}{180}$ oe	A1	May be implied by answer $\frac{1}{4}$
	$\frac{1}{4}$	A1ft	ft their fraction fully simplified if M1A0 awarded and all three fractions multiplied
	Alternative method 2		
	One numerator and one denominator cancelled correctly	M1	eg $\frac{1}{\cancel{3}}\times\frac{5}{6}\times\frac{\cancel{9}^{3}}{10}$
	Complete correct cancelling shown $\frac{1}{\cancel{3}}\times\frac{\cancel{5}}{\cancel{6}_{2}}\times\frac{\cancel{9}^{\cancel{3}}}{\cancel{10}_{2}}$ or $\frac{3}{12}$ or $\frac{5}{20}$ or $\frac{9}{36}$ or $\frac{15}{60}$	A1	Ignore further incorrect cancelling once M1A1 awarded
	$\frac{1}{4}$	A1	

Q	Answer	Mark	Comments
17a	$\frac{1}{2} \times 8 \times 4.5$ (= 18) or $8 \times 4.5 = 36$ and $36 \div 2$ (= 18)	B1	Must see 8 and 4.5 used ie only 4×4.5 is B0
17b	**Alternative method 1**		
	9 ÷ 4.5 and 24 ÷ 8 oe	M1	May show sides of rectangle divided into 2 and 3 or 2×3
	their 2 × their 3 × 2 or their 2 × 6 or their 3 × 4	M1dep	Rectangle divided into 12 triangles
	12	A1	
	Alternative method 2		
	9 × 24 or 216	M1	
	their 216 ÷ 18	M1dep	
	12	A1	
18	A point that lies on the circumference, eg (4, 5), (10, 5), (7, 2), (7, 8)	B2	B1 (4, y) or (10, y) or (x, 2) or (x, 8) B1 for 4 or 10 **clearly** shown as min or max horizontal value B1 for 2 or 8 **clearly** shown as min or max vertical value
	Additional Guidance		
	NB circle measurement is 2.6 cm so if subtracted or added then rounded can lead to correct answer, but allow as 2.6 rounds to 3, so mark answer line, ignore any other working		

Q	Answer	Mark	Comments
19	270 ÷ (3 + 2 + 1)	M1	
	45	A1	No wrong working seen
	135, 90, 45	A1ft	ft their 45 if all values correctly evaluated Values must be written in order Correct answer only full marks Incorrect answer only with 45 as a part ratio is not M1, A1 **NB** Build up method must be fully correct
	Additional Guidance		
	Be careful of correct answers from wrong work		
	eg 270 ÷ 3 = 90, 270 ÷ 2 = 135, 270 ÷ 1 = 270 135 : 90 : 270		M0
	eg 270 ÷ 3 = 90, 270 ÷ 2 = 135, 90 ÷ 2 = 45, 135 : 90 : 45		M0
	270 ÷ 6 = 35 105 : 70 : 35		M1, A0 A1ft
	270 ÷ 6 = 45 145 : 90 : 45		M1, A1 A0
	270 ÷ 6 = 45 45 : 135 : 90		M1, A1 A0
	270 ÷ 6 = 41.2 123.2 : 82.4 : 41.2		M1, A0 A0ft
	270 ÷ 6 = 41.2 123.6 : 82.4 : 41.2 124 : 82 : 41 Ignore rounding after correct ft		M1, A0 A1ft
	270 ÷ 6 = 41.2 124 : 82 : 41 Answers do not ft. No intermediate values		M1, A0 A0ft
	135 : 45 : 90 No working, not in order		M0
	145 : 90 : 45 No working, not correct		M0
see over for further additional guidance			

19 cont	**Additional Guidance cont**	
	3 + 2 + 1 = 5 270 ÷ 5 = 54 162 : 108 : 54	M1 A0 A1ft
	270 ÷ 5 = 54 162 : 108 : 54	M0

Q	Answer	Mark	Comments
20a	20 or 20 out of 120 or 20 in 120	B1	NB $\frac{20}{120}$ oe is B0

20b	Yes ticked	B1	If boxes blank, yes may be implied by wording
	Valid reason eg 1 should be (about) 20 (but it is much lower) or 6 should be (about) 20 (but it is higher) or 6 is much higher than 1 or frequencies should be all (about) the same	Q1	oe Strand (i) Only award if Yes ticked or implied
	Additional Guidance		
	There are 4 ways to score the Q mark Comparing frequency of 1 to 20 Comparing frequency of 6 to 20 Referring to significant difference between frequency of 1 and 6 Referring to the fact that all frequencies should be the same		
	Yes ticked and:		B1
	6 has above the average which is 20		Q1
	6 more, 1 a lot less		Q1
	Lands more on 6. It should land on each side about the same number		Q1
	The range of results is too large on specific numbers (1,6) showing there is something making it land on a 6 and not a 1		Q1
	The frequency of landing on 6 is over 7 times the frequency of landing on 1		Q1
	There is a large range of 33 between the highest and lowest frequency		Q1
	Because the frequency is not all the same so it isn`t fair		Q1
	Frequency should be the same for all numbers		Q1
see over for examples of Q0			

20b cont	**Additional Guidance cont**	
	Yes ticked and:	B1
	Lands more on 6	Q0
	6 has appeared as the mode number whereas 1 is the least amount	Q0
	Is heavier on number 6	Q0
	Landed on 6 38 times	Q0
	All number are about average except 1 and 6	Q0
	Answers should be more evenly spaced out	Q0
	Each time the number goes up, the frequency goes up	Q0

Q	Answer	Mark	Comments
21	$2x + 2 + 3x - 1 = 36$	M1	oe
	$5x = 35$ or $x = 35 \div 5$	A1	
	7	A1ft	ft $5x = a$ ($a \neq 36$) or $bx = 35$ ($b \neq 2$ or 3)
	2 × their 7 + 2 **and** 3 × their 7 – 1 **and** 4 × their 7 – 6 **and** 5 × their 7 + 2 If no working shown at least 3 values must be correct for their 7	M1	Their 7 **must** come from the solution (correct or incorrect) of a single equation formed from an expression = 36 If 7 used, three of 16, 20, 22 and 37
	16, 20, 22 and 37 **and** 21 shown as median or all 4 expressions correctly evaluated and median correctly identified	A1ft	SC3 $2x + 2 = 36$, $x = 17$, values 36, 50, 62, 87 and median identified as 56 SC2 $2x + 2 = 36$, $x = 17$, values 36, 50, 62, 87 SC1 $2x + 2 = 36$, $x = 17$ (no other equation seen)
	Additional Guidance		
	NB As x is positive only the first 3 values are needed to find the median. If the 4th value is worked out it must be evaluated correctly		
	NB Range is 21 so 37 – 16 = 21 is A0		
	$2x + 2 + 3x - 1 = 36$ $5x = 37$ $x = 7.4$ 16.8, 21.2, 23.6, 39 22.4		M1 A0 A1ft M1 A1ft
	$2x + 2 = 36$, $x = 17$ and no other equation seen		SC1
	Above and 36, 50, 62, 87		SC2
	Above and 56		SC3
	$3x - 1 = 36$, $x = 12.33$ 26.66, 36, 43.32, 63.65 39.66 (decimals must be to two dp or better)		M0 A0 A0 M1 A1ft
see over for further additional guidance			

21 cont	**Additional Guidance cont**		
	$2x + 2 = 36$ $2x = 38$ $x = 19$ 36, 56, 70, 96 63	Median correct but as last value evaluated wrongly, follow through mark is lost	M0 A0 A0 M1 A0ft
	$2x + 2 + 3x - 1 = 36$ $3x = 39$ $x = 13$ 28, 38, 46, 67 42	Two errors in solving the equation	M1 A0 A0ft M1 A1ft