



GCSE MATHEMATICS 8300/1F

Foundation Tier

Paper 1 Non-Calculator

Shadow paper based on November 2021 paper

Mark scheme

Version: 1.0

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 Examiner.

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.

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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. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
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 student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

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

Questions which do not ask students to show working

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

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student 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.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Mark	Comments
1	6	B1	

Q	Answer	Mark	Comments
2	y	B1	

Q	Answer	Mark	Comments
3	2.6 m	B1	

Q	Answer	Mark	Comments
4	triangle	B1	

Q	Answer	Mark	Comments
5	-42	B1	
	Additional Guidance		
	Do not accept $+-42$		

Q	Answer	Mark	Comments	
6	4×0.55 or 2.20 or 4×55 or 220 or $3.4(0) - 0.55$ or 2.85 or $340 - 55$ or 285	M1	oe ignore mixed units	
	$3.4(0) - \text{their } 2.20$ or 1.20 or $340 - \text{their } 220$ or 120 or their $3.40 - 4 \times 0.55$ or 1.20 or their $340 - 4 \times 55$ or 120	M1dep	oe ignore mixed units	
	their $1.20 \div 3$ or (0).40 or their $120 \div 3$	M1dep	oe ignore mixed units	
	40	A1		
	Additional Guidance			
	Answer (£)(0).40 or £40			M3A0
	40 seen with further work			M3A0

Q	Answer	Mark	Comments
7(a)	$1\frac{3}{4}$ symbols added to Sideboard	B1	mark intention

Q	Answer	Mark	Comments
7(b)	2.5×4 or 10	M1	oe check diagram
	Their 10×45 or 450	M1dep	oe
	7 hours 30 minutes	A1	Allow 7.5 hours oe on answer line

Q	Answer	Mark	Comments
8	Alternative method 1		
	41 × 2 or 82	M1	
	their 82 ÷ 7	M1dep	oe for build up method allow one error, must get as far as 1 speedboat below their total number of passengers
	11. or 11.5 or 11.7... or 11 r (5) or $11\frac{5}{11}$ or build up method reaches 77 (for 11 speedboats) with no errors	A1	may be implied by correct answer oe fraction
	12	A1ft	ft their decimal or remainder value rounded up to the nearest whole number with M2 scored
	Alternative method 2		
	41 ÷ 7 or 5.85... or 5 r 6 or $5\frac{6}{7}$	M1	
	their 5.85... × 2	M1dep	oe fraction
	11.(7...) or 11 r (5) or $11\frac{5}{7}$	A1	may be implied by correct answer oe fraction
	12	A1ft	ft their decimal or remainder value rounded up to the nearest whole number with M2 scored

Additional guidance for this question is on the next page

8 cont	Additional Guidance	
	82 ÷ 7 with no decimal or remainder value and answer 12	M2A2
	82 ÷ 7 = 11 Answer 11	M2A1A0
	12 with no working	M2A2
	For build up method 41 × 2 = 82, 7 × 11 = 77	M2A1A0
	reach 77, without seeing their 82 (don't know what they are building up to)	M0A0
	Build up method reaches 77 (for 11 speedboats) with no errors and no answer, but says "5 more seats needed"	M2A1A0

Q	Answer	Mark	Comments
9	120°	B1	

Q	Answer	Mark	Comments
10	4	B1	

Q	Answer	Mark	Comments
11	Fully correct diagram with rotational symmetry of order 4 and centre of rotation at point A	B2	B1 a correct rotation of the given triangle through 90° or 180° or 270° , centre of rotation at point A
	Additional Guidance		
		B2	
	Mark intention		
	Where there are more than 3 extra triangles drawn on the diagram, award B1 if at least one is correct		
<p>Students may amend original diagram (but still include the given triangle) and then use their new shape to give a diagram with rotational symmetry order 4 and centre of rotation at point A for B2</p> <p>For B1, their new shape must be seen with a correct rotation through 90° or 180° or 270°, centre of rotation at point A</p>			

Q	Answer	Mark	Comments
12	Method for finding a percentage other than 10% or 3500×0.23 or $3500 \times \frac{23}{100}$ or $3500 \times 23 \div 100$ or 805	M1	eg $(1\% =) 3500 \div 100$ or $(1\% =) 350 \div 10$ or 35 or $(3\% =) 105$ or $(5\% =) 350 \div 2$ or 175 or $(20\% =) 350 \times 2$ or 700 or $(40\% =) 350 \times 4$ or 1400 or $(50\% =) 3500 \div 2$ or $(50\% =) 350 \times 5$ or 1750
	Fully correct method that would lead to the correct answer or $80500 \div 100$		M1dep
	805	A1	SC2 2695 SC1 digits 805 (with M0 scored)
	Additional Guidance		
Ignore a % sign after 805 eg 805 %			M2A1

Q	Answer	Mark	Comments
13	There is an overlap	B1	oe eg 20 can go in two rows
	There is no category above 60	B1	oe eg 63 can't go into the table
	Additional Guidance		
	Criticism of overlapping categories, eg 10 (or 20, 30, 40 or 50) can go in two places		B1
	20 (or 10 or 30 or 40 or 50) appears twice		B1
	Should be 0-9, 10-19, 20-29 etc (minimal implied criticism)		B1
	0-10; 11-20; 21-30 etc (no criticism)		B0
	It doesn't give a clear number of lorries		B0
	Repeats the same number (could refer to the number of lorries)		B0
	Criticism of missing categories, eg There is no row for the 63 (or 67)		B1
Doesn't go up high enough		B1	
There's not space for all the numbers		B1	
Some lorries are left out		B1	
She only put up to 60		B1	
The last group is not big enough		B1	
There should be another row (minimal implied criticism)		B1	
There is a number over 60		B0	
Lorries go up to 67		B0	
Add another frequency box		B0	
Drawing another row to the table with no explanation		B0	

Q	Answer	Mark	Comments
14	$1 - (0.45 + 0.3)$ or $1 - 0.75$	M1	oe
	0.25	A1	oe fraction or percentage SC1 0.75 or 75% or $\frac{75}{100}$
	Additional Guidance		
	Ignore incorrect simplification or conversion of a correct probability eg 0.25 converted to $\frac{2}{5}$		M1A1
	$1 - (0.3 - 0.45)$		M0A0
	0.25 seen as final answer but nothing in table		M1A1
	Subtraction from 1 may be implied eg $0.45 + 0.3 = 0.75$, answer 0.75		M1A0
	Embedded answer, eg $0.45 + 0.3 = 0.75$ then $0.75 + 0.25 = 1$		M1A0
	0.25 seen but contradictory value in table – table takes precedence		
	Working in percentages without the percentage sign is condoned for M1		

Q	Answer	Mark	Comments
15(a)	53	B1	

Q	Answer	Mark	Comments
15(b)	38.16	B1	

Q	Answer	Mark	Comments
15(c)	$3816 + 53$ or Valid attempt to multiply 53 by 73	M1	from traditional method their 159 + their 3710 or their 219 + their 3650 at least one correct and placeholder of zero correct or implied from grid method their 3500 + their 150 + their 210 + their 9 (at least three correct) from Chinese / Napier's bones method at least three values correct from 3/5, 2/1, 1/5 and (0)/9 and total calculated for each diagonal with at least one carrying figure placed correctly
	3869	A1	

Q	Answer	Mark	Comments
16	5 : 2 : 3	B2	B1 30 : 12 : 18 oe ratio not in its simplest form or their 3-term ratio written in its simplest form
	Additional Guidance		
	30 : 12 : 18 simplified to 10 : 4 : 6		B1
	30 : 12 : 18 simplified to 10 : 4 : 18		B0

Q	Answer	Mark	Comments
17	$\left(\frac{7}{8} = \right) \frac{14}{16}$ or converts both fractions to a common denominator with at least one correct	M1	eg $\frac{112}{128} (+) \frac{72}{128}$
	$\frac{23}{16}$	A1	oe improper fraction eg $\frac{184}{128}$
	$1\frac{7}{16}$	B1ft	oe mixed number eg $1\frac{56}{128}$ ft correct conversion of an improper fraction to a mixed number
	Additional Guidance		
	$1\frac{56}{128}$	M1A1B1	
	$1\frac{7}{16}$ seen in working with $\frac{23}{16}$ on answer line	M1A1B0	
	$\frac{23}{16} (=) 1\frac{7}{16}$ (final answer is the mixed number)	M1A1B1	
	$1\frac{7}{16} (=) \frac{23}{16}$ (final answer is the improper fraction)	M1A1B0	

Q	Answer	Mark	Comments
18(a)	40	B1	

Q	Answer	Mark	Comments
18(b)	$56 - 40$ or $\frac{72 - 40}{2}$ or $\frac{88 - 40}{3}$ or $\frac{104 - 40}{4}$ or $\frac{120 - 40}{5}$ or correct calculation using any two points, eg $\frac{120 - 88}{2}$ or 2×8	M1	
	16	A1	
	Additional Guidance		
	(120 ÷ 5 =) 24		M0A0
	Misread from graph with correct subtraction from 40 (and division) Eg $58 - 40 (= 18)$		M1A0

Q	Answer	Mark	Comments
18(c)	Alternative method 1		
	their $40 + 7 \times$ their 16	M1	oe
	152	A1ft	correct answer or ft their values in (a) and (b)
	Alternative method 2		
	$120 + 2 \times$ their 16	M1	oe
	152	A1ft	correct answer or ft their values in (b)
	Additional Guidance		
For Alt 2, they may read off any cost for n months (from 1 to 5) and add on $(7 - n) \times$ their (b) for M1. A1 or A1ft may follow from their working			

Q	Answer	Mark	Comments	
19	Puts bolts in order or orders the numbers to at least the sixth number from either end 57, 59, 59, 60, 60, 61 or 67, 65, 65, 65, 64, 61 or gives median of bolts as 61	M1	allow one error or omission on an attempt at a full list	
	Identifies 58 and 60 for washers or gives median of washers as 59	M1	eg circled in list or vertical line between 58 and 60	
	61 for bolts and 59 for washers	A1	with no errors seen	
	Yes for bolts and No for washers	A1ft	correct decision for their values with M1M1 awarded and a single median given for each	
	Additional Guidance			
	Ignore modes or means if medians also given, but modes or means only scores zero			
	Beware of medians coming from only using the distinct values: 57, 59, 60, 61 , 64, 65, 67 56, 57, 58 60, 63, 64			M0
For the A1ft, the median may be a decimal eg 57, 59, 59, 60, 60, 61, 61, 64, 65, 65, 67 median = 60.5 $58 + 60 = 118, 118 \div 2 = 54$ Yes for bolts, No for washers			M1M1A0A1ft	

Q	Answer	Mark	Comments
20	40 or 80 or 20	M1	
	$\frac{40+80}{20}$ or $\frac{120}{20}$ or $\frac{115.95}{20}$ or 5.7975	M1dep	
	6 with 40, 80 and 20 seen	A1	
	Additional Guidance		
	6 with no working		M0M0A0

Q	Answer	Mark	Comments
21	a	B1	

Q	Answer	Mark	Comments
22(a)	No and correct reason	B1	eg it should be $10p$ two minuses make it $+3p$
	Additional Guidance		
	No and $10p - 5q$		B1
	No and $4p$ should be $10p$		B1
	No and two minuses make it plus		B1
	No and it should be $+3p$		B1
	No and $4p$ is wrong		B1
No and $10p + 5q$		B0	

Q	Answer	Mark	Comments
22(b)	Correct for multiply 4 and 7 and Not correct for multiply 3 and 5	B1	
	Additional Guidance		
	Accept any clear indication of their answer		

Q	Answer	Mark	Comments
22(c)	2 or -2	B1	oe fractions eg $2 \times 20 = \frac{80}{2}$
	Additional Guidance		
	Embedded answer eg $20 \times 2 = 80 \div 2$		B0
	2 and -2 or ± 2		B1

Question	Answer	Mark	Comments	
23	$\frac{6}{5}$ or $1\frac{1}{5}$	B2	B1 42 and 35 or $3\frac{1}{2}$ and $2\frac{11}{12}$ or mixed numbers or fractions with common denominator or correct unsimplified fraction or mixed number eg $\frac{42}{35}$ or $1\frac{7}{35}$ or correct simplification of a fraction where at least one of the values is 42 or 35 and the other is not 12 SC1 $\frac{5}{6}$	
	Additional Guidance			
	Allow a fractional numerator and/or denominator in a correct fraction eg $\frac{3\frac{1}{2}}{2\frac{11}{12}}$ or $\frac{\frac{42}{12}}{\frac{35}{12}}$		B1	
	$\frac{3.6}{2.11}$ seen		B0	
	Ignore an attempt to convert $\frac{6}{5}$ to an improper fraction eg $\frac{6}{5} = 1\frac{1}{5}$ on the answer line		B2	
6 : 5 with no working worthy of B1	B0			

Q	Answer	Mark	Comments
	No and correct reason	B1	eg it will only take 4.5 hours they could do 48 m ² in that time even though it's three times the area there are twice as many people
Additional Guidance			
24	No and there are two people so it won't take as long (as 9h)	B1	
	No and it'll be quicker (than 9h)	B1	
	No and they'll do 12 m ² each	B1	
	No and it'll be the same area each	B1	
	No and it'll be the same area	B0	
	No and it depends on how fast Jade works	B0	
	No and it'll take 8 hours	B0	
	No and it might take them less time	B0	

Question	Answer	Mark	Comments	
25(a)	$7x - 5x$ or $2x$ or $5x - 7x$ or $-2x$ or $10 - 3$ or 7 or $3 - 10$ or -7	M1	may be seen as an annotation to the given inequality eg -3 written under $+10$	
	$2x > 7$ or $-7 > -2x$ or 3.5 or $\frac{7}{2}$ or $3\frac{1}{2}$	A1	implied by correct answer	
	$x > 3.5$ or $x > \frac{7}{2}$ or $x > 3\frac{1}{2}$	A1ft	ft solution of inequality of the form $2x > k$ where k is a number or $m > -2x$ where m is a number or $ax > 7$ where a is an integer not equal to 1 or $-7 > bx$ where b is an integer not equal to 1	
	Additional Guidance			
	In all cases accept the inequality written correctly in reverse order For example, for $2x > 7$ accept $7 < 2x$			
	$3.5 < x$		M1A1A1	
	$2x > 13, x > 6.5$		M1A0A1ft	
	$12x > 7, x > 1.714\dots$		M1A0A1ft	
	Do not allow a correct answer in working followed by an incorrect answer on the answer line eg $x > \frac{7}{2}$ in working with 3.5 on the answer line			M1A1A0
	Do not allow the correct answer with another answer eg $x > 3.5$ and $x = 3.5$ on the answer line			M1A1A0

Question	Answer	Mark	Comments
25(b)	$1 < x \leq 6$ or $6 \geq x > 1$	B2	any letter B1 $1 < x$ or $x \leq 6$ or $x > 1$ or $6 \geq x$ SC1 $1 \leq x < 6$ or $6 > x \geq 1$
	Additional Guidance		
	$1 < x$ and $x \leq 6$		B1
	$1 < x$ and $x \geq 6$		B1
	$1 < x \geq 6$		B1
	$1 \leq x < 6$		B1
	$1 < x < 6$		B1
	$1 \leq x \leq 6$		B1
	$1 > x \geq 6$		B0
	$1 < 6$		B0

Question	Answer	Mark	Comments
26	(7, 13)	B2	may be on diagram B1 one correct coordinate SC1 (13, 7)
	Additional Guidance		
	B1 may be scored from 7 at the vertex vertically below <i>B</i> or from 13 at the vertex vertically above <i>A</i> if not contradicted by the answer		

Question	Answer	Mark	Comments
27(a)	3×10^3 or 6×10^4 or 180 000 000	M1	oe correct value not in standard form eg 18×10^7
	1.8×10^8	A1	SC1 Correctly converts an ordinary number with at least four digits to standard form
	Additional Guidance		
	Condone extra zeros on 1.8 eg $1.80\,000\,000 \times 10^8$		M1A1
	1.8×10^8 from 1 800 000 000		M0A0
	3×10^3 is implied by $(3 \times 6) \times (10^3 \times 10^a)$ 6×10^4 is implied by $(3 \times 6) \times (10^b \times 10^4)$		M1
	1 800 000 000 converted to 1.8×10^9		SC1

Question	Answer	Mark	Comments
27(b)	2100 or 0.03 or ($2.1 \div 3 =$) 0.7 or ($10^3 \div 10^{-2} =$) 10^5 or calculation which would have the outcome 70000 or correct value not given as an ordinary number	M1	eg $210000 \div 3$ eg 7×10^4
	70000	A1	

Question	Answer	Mark	Comments	
28	14×0.5 or 7	M1	oe eg $14 \times 30 \div 60$	
	their $7 - 4$ or 3	M1	their 7 must be > 4	
	their 3×2 or 6	M1dep	dep on 2nd M1	
	13	A1		
	Additional Guidance			
	13 from correct working, but a different answer given			M3A0

Question	Answer	Mark	Comments
29	$y = \frac{1}{x}$	B1	

Question	Answer	Mark	Comments	
30	360 written as a product of factors where at least one factor is prime	M1	eg 3 and 120 or $18 \times 2 \times 10$ or $360 \div 5 = 72$ may be on a factor tree or repeated division allow one strand to be incorrect if a previous value completes the product eg 18×20 followed by $2 \times 3 \times 3$ implies $2 \times 3 \times 3 \times 20$ for M1	
	2 and 2 and 2 and 3 and 3 and 5	A1	may be on a factor tree or repeated division	
	$2^3 \times 3^2 \times 5$	A1		
	Additional Guidance			
		Allow any number of 1s included as factors up to M1A1 only		
		M1 may be awarded for correct work with no or incorrect answer, even if this is seen among multiple attempts		
		$1 \times 2^3 \times 3^2 \times 5$		M1A1A0
		$2^3 \cdot 3^2 \cdot 5$ or $2^3 \cdot 3^2 \cdot 5$ or $2^3 3^2 5$ or $2^3, 3^2, 5$		M1A1A1
		$2 + 2 + 2 + 3 + 3 + 5$		M1A1A0
		$2^3 + 3^2 + 5$		M1A1A0
		$2 \times 2 \times 2 \times 3 \times 3 \times 5$ and $2^3 \times 3^2 \times 5$ on answer line but $2 \times 2 \times 2 \times 3 \times 3 \times 5 = 2^3 \times 3^2 \times 5$ on answer line		M1A1A0 M1M1A1
		$2^3 \times 3^2 \times 5 = 30^6$		M1A1A0
		$2^3 \times 3^2 \times 5 = 360$		M1A1A1
	6×60 with no prime factorisation		M0A0A0	

Question	Answer	Mark	Comments
31	Alternative method 1		
	$\sin 30 \times x = 8$ or $(x =) \frac{8}{\sin 30}$	M1	
	$\sin 30 = 0.5$	M1	oe may be seen in a table $0.5 = \frac{8}{x}$ oe scores M1M1
	16	A1	
	Alternative method 2		
	Correct trigonometric method to show that the length of the missing side is $\frac{\sqrt{3}}{2}x$	M1	oe
	$x^2 - \left(\frac{\sqrt{3}}{2}x\right)^2 = 64, \frac{1}{4}x^2 = 64$	M1dep	oe
	16	A1	
	Additional Guidance		
	Accept use of cos 60 instead of sin 30		

Question	Answer	Mark	Comments
32	$(x + a)(x + b)$	M1	where $a + b = 10$ or $ab = 21$
	$(x + 3)(x + 7)$	A1	
	Additional Guidance		
	Ignore attempts to solve their $(x + a)(x + b) = 0$ for M1A0 or M1A1		
	Condone missing final bracket		
	Ignore a check of a correct solution (multiplying out or similar)		