GCSE
MATHEMATICS
8300/1F

Foundation Tier Paper 1 Non-Calculator

Mark scheme

November 2023

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23BG8300/1F/MS

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.

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. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values a $\leqslant$ 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(a)	8	B1	accept $2 \times 2 \times 2 = 8$

Q	Answer	Mark	Comments
1(b)	$(3.45 + 2.07 =)$ 5.52 or $(3.45 - 1.3 =)$ 2.15 or $(2.07 - 1.3 =)$ 0.77	B1	implied by correct answer
	4.22	B1ft	ft their $5.52 - 1.3$ correctly evaluated or their $2.15 + 2.07$ correctly evaluated or their $0.77 + 3.45$ correctly evaluated SC1 6.82 or 0.08
	Additional Guidance		
	SC1 arises from correctly adding all three values or from correctly subtracting the final two from the first		

Q	Answer	Mark	Comments
2(a)	[68, 72]	B1	
	Additional Guidance		
	Check diagram for working but answer line takes precedence		

Q	Answer	Mark	Comments
2(b)	[30, 34]	B1	
	Additional Guidance		
	Check diagram for working but answer line takes precedence		

Q	Answer	Mark	Comments
3	any number greater than 3.7	B1	

Q	Answer	Mark	Comments
4(a)	1.25	B1	oe
	Additional Guidance		
	Accept on number line but answer line takes precedence		

Q	Answer	Mark	Comments
4(b)	–3400	B1	
	Additional Guidance		
	Accept on number line but answer line takes precedence		

Q	Answer	Mark	Comments
5	10	B1	

Q	Answer	Mark	Comments
6(a)	$4a$	B1	
	Additional Guidance		
	$a4$ or $4 \times a$		B0

Q	Answer	Mark	Comments
6(b)	$5(a + 2)$	B1	oe
	Additional Guidance		
	$5(1a + 2)$		B1
	Condone missing final bracket and/or multiplication sign between 5 and bracket		
	Ignore an attempt to solve $5(a + 2) = 0$		

Q	Answer	Mark	Comments
6(c)	$40 - 4x$ or $-4x + 40$	B2	B1 40 or $-4x$
	Additional Guidance		
	Condone $40 - 4 \times x$ for B2		
	Do not condone further work for B2		

Q	Answer	Mark	Comments
7(a)	3 h 45 min or $9.15 + 3 + 45$ or $9.15 + 4 - 15$ or $1.15\,(\text{pm}) - 15$ or $9\frac{1}{4} + 3\frac{3}{4}$ or 13(.00 am) or 1 (o'clock) or 1(.00 am)	M1	oe condone mixed units
	13.00 or 1(.00) pm	A1	
	Additional Guidance		
	Condone 13.00 pm		M1A1
	$9.15 + 3\frac{3}{4}$ or $12.15 + \frac{3}{4}$ without valid further working		M0A0

Q	Answer	Mark	Comments
7(b)	**Alternative method 1 – working in minutes**		
	$4 \times 60 + 10$ or 250	M1	oe
	their $250 - 186$	M1	oe their 250 must be > 186
	64	A1	SC2 69 SC1 224
	Alternative method 2 – working in hours		
	$186 \div 60$ or 3 h 6 min	M1	oe implied by 3.1 or 1 h 4 min
	4 h 10 min – their 3 h 6 min or 1 h 4 min	M1	oe their 3 h 6 min must be $<$ 4 h 10 min
	64	A1	SC2 69 SC1 224
	Additional Guidance		
	SC2 comes from incorrect conversion of 3.1 h to 3 h 1 min SC1 comes from use of 100 min in an hour		

Q	Answer	Mark	Comments
8(a)	No and 23 and 25 or No and 2 more	B2	B1 23 or 25 No may be implied by wording
	Additional Guidance		
	Check table for working		
	Ignore incorrect use of inequalities		
	23 is less than 25 so Shamira's wrong (box not ticked)		B2

Q	Answer	Mark	Comments
8(b)	Fully correct bar chart: • Bars or axis labelled with types of vehicle (accept C, B, V, L) • four bars with equal widths • equal gaps or no gaps between the bars • all heights correct for their frequencies	B3ft	correct or ft their frequencies from (a) but not 0 B2 3 criteria met B1 2 criteria met
	Additional Guidance		
	Mark intention throughout		
	Condone a different gap between the vertical axis and the first bar, to the other (equal) gaps		
	Vertical lines can score a maximum of B2 Points can score a maximum of B1		

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="5">9</td><td>Fully correct:
• 4 correct sums
• only uses integers 1-12
• no repeated numbers

1 + 2 + 4 = 7
9 + 11 + 12 = 32
3 + 5 + 7 = 15
6 + 8 + 10 = 24</td><td>B3</td><td>each set of 3 in any order

B2
4 mathematically correct sums with one of:
• only uses integers 1-12
• no repeated numbers
or
2 or 3 mathematically correct sums and both of:
• only uses integers 1-12
• no repeated numbers

B1
2 or 3 mathematically correct sums with one of:
• only uses integers 1-12
• no repeated numbers
or
only 4 mathematically correct sums</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Allow negative or decimal numbers for up to B2</td><td></td></tr>
<tr><td colspan="2">For a row to be mathematically correct, there must be three numbers
Blank boxes should not be treated as zeros</td><td></td></tr>
<tr><td colspan="2">Any box that is not crossed out must be considered when checking the conditions regarding integers 1-12 and repeated numbers
If a number is crossed out, but still legible, judge in favour of the student to give the best mark</td><td></td></tr>
<tr><td colspan="2">A completed row takes precedence over working space
If a row is blank, check working space for that calculation and award a mark based on the work that benefits the student most
Working outside of boxes must be evaluated</td><td></td></tr>
</table>

Q	Answer	Mark	Comments
10	100 ÷ 5 or 20 or 80 or 60 or 160 or 180	M1	may be on diagram
	their 20 × 7 or their 80 + their 60 or 180 − their 20 × 2	M1dep	oe
	140	A1	
	Additional Guidance		
	Units must be stated for working in centimetres		
	Lengths from measuring		M0

Q	Answer	Mark	Comments
11(a)	**Alternative method 1**		
	90 ÷ 10 or 9	M1	oe
	their 9 × 15	M1dep	oe
	135(.00)	A1	
	Alternative method 2		
	15 ÷ 10 or 1.5 or 10 ÷ 15 or $\frac{2}{3}$	M1	oe
	90 × their 1.5 or 90 ÷ their $\frac{2}{3}$	M1dep	oe
	135(.00)	A1	
	Alternative method 3		
	90 ÷ (10 ÷ (15 – 10)) or 45	M1	oe
	90 + their 45 or their 45 × 3	M1dep	oe
	135(.00)	A1	
	Additional Guidance		
	Allow one error in a build-up method		

Q	Answer	Mark	Comments
11(b)	**Alternative method 1: works out extra from hourly increase or totals (and compares to tax)**		
	15 × (0.)50 or 15 ÷ 2 or 15 × (their 9 + 0.5) – 15 × their 9 or 142.5(0) – their 135 or 7.5(0)	M1	oe may be working in pence or pounds
	It is less than he expected and 7.5(0)	A1ft	correct or ft their hourly rate and/or their answer in (a)
	Alternative method 2: works out actual amount (and compares to expected amount)		
	15 × (their 9 + 0.5) – 8.9(0) or 142.5(0) – 8.9(0) or 133.6(0)	M1	oe may be working in pence or pounds
	Correct box ticked for comparison with their (a) and 133.6(0)	A1ft	correct or ft their hourly rate and/or their answer in (a)
	Additional Guidance		
	It's 1.40 less with 135 in (a) (with no box ticked)		M1A1
	Allow one error in a build-up method		
	Ignore further work after correct answer seen		

Q	Answer	Mark	Comments
12	Mode is 9	B1	do not allow a bimodal list
	Middle two numbers (in numerical order) add to 26	B1	
	Range = 11	B1	
	Additional Guidance		
	There must be 6 numbers to award B3, but first and third marks may be awarded for a set of 5 numbers		
	If B3 cannot be awarded for their answer, award the best mark from boxes or in working (including legible, crossed out working) for up to B2		

Q	Answer	Mark	Comments
13	hexagon or octagon	B1	

Q	Answer	Mark	Comments
14	Any two of (–2, –10), (–1, –8), (0, –6), (1, –4), (2, –2), (3, 0), (4, 2), (5, 4)	M1	two correct pairs of coordinates may be in a table implied by points plotted ± 2 mm
	At least two correct points plotted or At least two of their points plotted correctly	M1	implied by correct line of any length ± 2 mm
	Straight line from (–2, –10) to (5, 4)	A1	ignore line outside the domain [–2, 5]
	Additional Guidance		
	Ignore additional points listed or plotted		

Q	Answer	Mark	Comments
15	$\left(\frac{5}{8} =\right) \frac{10}{16}$ or Converts both fractions to a common denominator with at least one numerator correct	M1	
	$\frac{23}{16}$	A1	oe improper fraction
	$1\frac{7}{16}$	B1ft	oe mixed number ft correct conversion of their improper fraction to a mixed number
	Additional Guidance		
	Ignore incorrect simplification after B1 or B1ft awarded		

Q	Answer	Mark	Comments
16(a)	(10, 3)	B1	
	Additional Guidance		
	Check diagram if answer line blank		

Q	Answer	Mark	Comments
16(b)	$x = 6$	B1	
	Additional Guidance		
	Check diagram if answer line blank		

Q	Answer	Mark	Comments
17	$80 \times \frac{1}{10}$ (× 9) or 8 or 72	M1	oe
	their $72 \times \frac{1}{3}$ (× 2) or 24 or 48	M1dep	oe
	80 – their 48 or their 24 + their 8 or 32 or $\frac{32}{80}$	M1dep	oe dep on M2
	$\frac{2}{5}$	A1	SC3 $\frac{3}{10}$
	Additional Guidance		
	SC3 is for omitting the initial $\frac{1}{10}$		

Q	Answer	Mark	Comments
18	$(2^2 + 5 =)$ 9 or $4 \times 2^2 + 4 \times 5$ or $-4 \times 2^2 + -4 \times 5$ or (–)36	M1	oe
	100 – their 36 or 64	M1dep	oe
	8	A1	accept ±8
	Additional Guidance		
	$100 - 4 \times 4 + 4 \times 5$ or $100 - 16 + 20$ not recovered		M0M0A0

Q	Answer	Mark	Comments
19	A or B or both	B1	

Q	Answer	Mark	Comments
20	First graph is a straight line from (0, 0) to (100, 200) and second graph is a straight line from (0, 0) to (100, 300)	B2	B1 first graph is a straight line from (0, 0) to (100, 200) or second graph is a straight line from (0, 0) to (100, 300) or both graphs correct, but one or both does not reach to 0 or 100 on the horizontal axis or at least 3 correct points plotted on both graphs or B1ft first graph is an incorrect horizontal or increasing straight line to 100 on the horizontal axis, and second graph is a correct ft graph to 100 on the horizontal axis (must be joined)
	Additional Guidance		
	Ignore graphs to the right of 100 on the horizontal axes		
	B1ft can only be awarded if the graph fits onto the grid up to (100, 500)		

Q	Answer	Mark	Comments
21	0 or zero	B1	

Q	Answer	Mark	Comment
22	$(8^2 \times 8 =)\ 8^3$ or $(8^9 \div 8^5 =)\ 8^4$ or 512 or 4096 or $8^2 \times 8 \div 8^9 \times 8^5$	M1	
	$(8^3$ or 512$) \div (8^4$ or 4096$)$ or $8^{(2+1-9+5)}$ or $8^8 \times 8^{-9}$ or 8^{-1} or $\frac{1}{8}$	M1dep	oe in the form $8^n \div 8^{(n+1)}$ oe where index sums to -1 oe in the form $8^n \times 8^{(-n-1)}$ oe fraction
	(0).125	A1	
	Additional Guidance		
	(0).125 and either 8^{-1} or $\frac{1}{8}$ on the answer line		M1M1A1
	(0).125 in working and 8^{-1} on the answer line		M1M1A0
	If a student attempts numerical and index working award the higher mark		

Q	Answer	Mark	Comments
23	$y = 3x + c$	B1	$c \neq 1$

Q	Answer	Mark	Comment
24(a)	Valid description	B1	eg as downloads increase, so do CD sales downloads are about $\left[1\frac{1}{3},\ 2\right]$ times as many as CDs CDs are about $\left[\frac{1}{2},\ \frac{3}{4}\right]$ as many as downloads
	Additional Guidance		
	Ignore 'Positive correlation'		
	Condone references to causality eg an increase in downloads causes an increase in CDs sold	B1	
	As one goes up the other goes up / Both go up at a similar rate	B1	
	They both go up	B0	
	Downloads are always more than CDs	B0	
	They are in direct proportion	B0	
	The relationship is linear	B0	

Q	Answer	Mark	Comment
24(b)	**Alternative method 1 – reading from the graph**		
	2.5(0) × 9000 or 22 500 or [5300, 5500]	M1	oe 2.5(0) may be 2 or 3 [5300, 5500] may be 5000
	2.5(0) × 9000 + 3 × [5300, 5500] or 22 500 + [15 900, 16 500]	M1dep	oe 2.5(0) may be 2 or 3 [5300, 5500] may be 5000
	[38 400, 39 000]	A1ft	ft 2 or 3 for 2.5(0) and/or 5000 for [5300, 5500]
	Alternative method 2 – using a multiplier		
	2.5(0) × 9000 or 22 500 or 9000 × [0.5, 0.75]	M1	oe 2.5(0) may be 2 or 3
	2.5(0) × 9000 + 3 × 9000 × [0.5, 0.75]	M1dep	oe 2.5(0) may be 2 or 3
	[36 000, 42 750] with 9000 × [0.5, 0.75] seen	A1ft	ft 2 or 3 for 2.5(0)
	Additional Guidance		
	Check graph for working		
	Working may be in pence, units not required for up to M2 Final answer in pence must have units to award A1		

Q	Answer	Mark	Comment
25	Correct method to find 1%, 2%, 5%, 10%, 100% or 840% of the number	M1	
	Fully correct method	M1dep	
	600	A1	
	Additional Guidance		
	Up to M2 may be awarded for multiple attempts if no answer chosen		

Q	Answer	Mark	Comment
26	$(x =)$ [2.25, 2.75] and $(x =)$ [9.25, 9.75]	B2	B1 $(x =)$ [2.25, 2.75] or $(x =)$ [9.25, 9.75] or one or both values identified but not given in correct notation eg (2.5, 0) and/or (9.5, 0) or $2.5 < x < 9.5$ or 2.5 and/or 9.5 written on the graph or in working
	Additional Guidance		
	$x =$ can be $x \approx$		
	[2.25, 2.75] and/or [9.25, 9.75] with one extra value		B1
	[2.25, 2.75] and/or [9.25, 9.75] with more than one extra value		B0
	Answer from use of formula or completing the square		B0

Q	Answer	Mark	Comment
27	$(\pi \times) \left(\frac{\sqrt{17}}{2}\right)^2$	M1	oe condone missing brackets
	$\frac{17}{4}(\pi)$ or $4\frac{1}{4}(\pi)$ or $4.25(\pi)$	A1	oe fraction, mixed number or decimal
	$(\pi \times) 5^2$ or $(\pi \times) 25$ or $\frac{60}{360}$ used	M1	oe
	$\frac{25}{6}(\pi)$ or $4\frac{1}{6}(\pi)$ or $4.1(6\ldots)(\pi)$ or $4.17(\pi)$	A1	oe fraction, mixed number or decimal
	A with values in comparable form or A by $\frac{1}{12}(\pi)$ or A by $0.08(3\ldots)(\pi)$	A1	eg values $\frac{51}{12}(\pi)$ and $\frac{50}{12}(\pi)$ $4\frac{1}{4}(\pi)$ and $4\frac{1}{6}(\pi)$ $4.2(5)(\pi)$ and $4.1(6\ldots)(\pi)$ $4.2(5)(\pi)$ and $4.17(\pi)$ accept 'circle' for A allow comparison of fraction or decimal parts only if integer parts shown as equal
	Additional Guidance		
	For the final mark, presence or absence of π must be the same for both values		
	Accept consistent use of a numerical value of π throughout. The value can be 3 or 3.1 or 3.14 or 3.142 or better		

Q	Answer	Mark	Comment
28	$(x + 6)(x - 4)$	B2	either order B1 $(x + a)(x + b)$ where $ab = -24$ or $a + b = 2$
	Additional Guidance		
	Condone a multiplication sign between the brackets		
	Condone missing final bracket		
	Ignore an attempt to solve $(x + 6)(x - 4) = 0$		

Q	Answer	Mark	Comment
29(a)	2000	B1	

Q	Answer	Mark	Comment
29(b)	0.5 or $\frac{2\times10^{3}}{5\times10^{-1}}$ or $\frac{\text{their 2000}}{5\times10^{-1}}$ or $0.4 \times 10^{3-(-1)}$ or 0.4×10^{4}	M1	oe their 2000 from part (a)
	4000 or 4×10^{3}	A1ft	ft 2 × their 2000 in part (a)