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# GCSE MATHEMATICS 8300/1F

Foundation Tier

Paper 1 Non-Calculator

Shadow paper based on November 2023 paper

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**Mark scheme**

November 2023

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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 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.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	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>B</b>	Marks awarded independent of method.
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
<b>[a, b]</b>	Accept values between a and b inclusive.
<b>[a, b)</b>	Accept values $a \leq \text{value} < b$
<b>3.14 ...</b>	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
<b>Use of brackets</b>	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)	49	B1	accept $7 \times 7 = 49$

Q	Answer	Mark	Comments
1(b)	(5.22 + 1.09 =) 6.31 or (5.22 – 2.1 =) 3.12 or (1.09 – 2.1 =) –1.01	B1	implied by correct answer
	4.21	B1ft	ft their 6.31 – 2.1 correctly evaluated or their 3.12 + 1.09 correctly evaluated or their –1.01 + 5.22 correctly evaluated SC1 8.41 or 2.03
	<b>Additional Guidance</b>		
	SC1 arises from correctly adding all three values or from correctly subtracting the final two from the first		

Q	Answer	Mark	Comments
2(a)	[43, 47]	B1	
	<b>Additional Guidance</b>		
	Check diagram for working but answer line takes precedence		

Q	Answer	Mark	Comments
2(b)	[54, 58]	B1	
	<b>Additional Guidance</b>		
	Check diagram for working but answer line takes precedence		

Q	Answer	Mark	Comments
3	any number less than 12.1	B1	

Q	Answer	Mark	Comments
4(a)	3.75	B1	oe
	<b>Additional Guidance</b>		
	Accept on number line but answer line takes precedence		

Q	Answer	Mark	Comments
4(b)	-180	B1	
	<b>Additional Guidance</b>		
	Accept on number line but answer line takes precedence		

Q	Answer	Mark	Comments
5	2	B1	

Q	Answer	Mark	Comments
6(a)	$3b$	B1	
	<b>Additional Guidance</b>		
	$b3$ or $3 \times b$		B0

Q	Answer	Mark	Comments
6(b)	$3(2f + 3)$	B1	oe
	<b>Additional Guidance</b>		
	Condone missing final bracket and/or multiplication sign between 3 and bracket		
	Ignore an attempt to solve $3(2f + 3) = 0$		

Q	Answer	Mark	Comments
6(c)	$21 - 3x$ or $-3x + 21$	B2	B1 $21$ or $-3x$
	<b>Additional Guidance</b>		
	Condone $21 - 3 \times x$ for B2		
	Do not condone further work for B2		

Q	Answer	Mark	Comments
7(a)	4 h 15 min or $10.45 + 4 + 15$ or $10.45 + 5 - 45$ or $3.45(\text{pm}) - 45$ or $10\frac{3}{4} + 4\frac{1}{4}$ or $15(.00\text{pm})$ or 3 (o'clock) or $3(.00\text{pm})$	M1	oe condone mixed units
	15.00 or $3(.00)\text{pm}$	A1	
	<b>Additional Guidance</b>		
	Condone 15.00pm		M1A1
	$9.15 + 4\frac{1}{4}$ or $13.15 + \frac{1}{4}$ without valid further working		M0A0

Q	Answer	Mark	Comments
7(b)	<b>Alternative method 1 – working in minutes</b>		
	$3 \times 60 + 40$ or 220	M1	oe
	their 220 – 117	M1	oe their 220 must be $> 117$
	103	A1	SC2 69 SC1 224
	<b>Alternative method 2 – working in hours</b>		
	$117 \div 60$ or 1 h 57 min	M1	oe implied by 1.95 or 1 h 43 min
	3 h 40 min – their 1 h 57 min or 1 h 43 min	M1	oe their 1 h 57 min must be $< 3\text{ h }40\text{ min}$
	103	A1	SC2 69 SC1 224

Q	Answer	Mark	Comments
8(a)	No and 17 and 20 or No and 3 less	B2	B1 17 or 20  No may be implied by wording
	<b>Additional Guidance</b>		
	Check table for working		
	Ignore incorrect use of inequalities		
	17 is less than 20 so Nikola's wrong (box not ticked)		B2

Q	Answer	Mark	Comments
8(b)	Fully correct bar chart: <ul style="list-style-type: none"> <li>• Bars or axis labelled with types of vehicle (accept O, L, S, B)</li> <li>• four bars with equal widths</li> <li>• equal gaps or no gaps between the bars</li> <li>• all heights correct for their frequencies</li> </ul>	B3ft	correct or ft their frequencies from (a) but not 0 B2 3 criteria met B1 2 criteria met
	<b>Additional Guidance</b>		
	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		

Q	Answer	Mark	Comments
<b>9</b>	Fully correct: <ul style="list-style-type: none"> <li>• 4 correct sums</li> <li>• only uses integers 1-12</li> <li>• no repeated numbers</li> </ul> $1 + 2 + 3 = 6$ $10 + 11 + 12 = 33$ <p>AND</p> $4 + 6 + 9 = 19$ $5 + 7 + 8 = 20$ <p>OR</p> $4 + 7 + 8 = 19$ $5 + 6 + 9 = 20$	<b>B3</b>	each set of 3 in any order  B2 4 mathematically correct sums with one of: <ul style="list-style-type: none"> <li>• only uses integers 1-12</li> <li>• no repeated numbers</li> </ul> or 2 or 3 mathematically correct sums and both of: <ul style="list-style-type: none"> <li>• only uses integers 1-12</li> <li>• no repeated numbers</li> </ul> B1 2 or 3 mathematically correct sums with one of: <ul style="list-style-type: none"> <li>• only uses integers 1-12</li> <li>• no repeated numbers</li> </ul> or only 4 mathematically correct sums
	<b>Additional Guidance</b>		
	Allow negative or decimal numbers for up to B2		
	For a row to be mathematically correct, there must be three numbers Blank boxes should not be treated as zeros		
	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		
	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		

Q	Answer	Mark	Comments
<b>10</b>	180 ÷ 6 or 30 or 150 or 90 or 270 or 300	M1	may be on diagram
	their 30 × 8 or their 150 + their 90 or 300 – their 30 × 2	M1dep	oe
	240	A1	
	<b>Additional Guidance</b>		
	Units must be stated for working in centimetres		
	Lengths from measuring		M0

Q	Answer	Mark	Comments
11(a)	<b>Alternative method 1</b>		
	72 ÷ 9 or 8	M1	oe
	their 8 × 12	M1dep	oe
	96(.00)	A1	
	<b>Alternative method 2</b>		
	12 ÷ 9 or $\frac{4}{3}$ or 9 ÷ 12 or $\frac{3}{4}$	M1	oe
	72 × their $\frac{4}{3}$ or 72 ÷ their $\frac{3}{4}$	M1dep	oe
	96(.00)	A1	
	<b>Alternative method 3</b>		
	72 ÷ (9 ÷ (12 – 9)) or 24	M1	oe
	72 + their 24 or their 24 × 4	M1dep	oe
	96(.00)	A1	
	<b>Additional Guidance</b>		
	Allow one error in a build-up method		

Q	Answer	Mark	Comments
11(b)	<b>Alternative method 1: works out extra from hourly increase or totals (and compares to tax)</b>		
	$12 \times (0.)50$ or $12 \div 2$ or $12 \times (\text{their } 8 + 0.5) - 12 \times \text{their } 8$ or $102(.00) - \text{their } 96$ or $6(.00)$	M1	oe may be working in pence or pounds
	It is more than she expected and $6(.00)$	A1ft	correct or ft their hourly rate and/or their answer in (a)
	<b>Alternative method 2: works out actual amount (and compares to expected amount)</b>		
	$12 \times (\text{their } 8 + 0.5) - 5.7(0)$ or $102(.00) - 5.7(0)$ or $96.3(0)$	M1	oe may be working in pence or pounds
	Correct box ticked for comparison with their (a) and $96.3(0)$	A1ft	correct or ft their hourly rate and/or their answer in (a)
	<b>Additional Guidance</b>		
	It's 0.30 more with 96 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 10	B1	do not allow a bimodal list	
	Middle two numbers (in numerical order) add to 24	B1		
	Range = 9	B1		
	<b>Additional Guidance</b>			
	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	pentagon	B1	

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

Q	Answer	Mark	Comments
15	$\left(\frac{7}{10} = \right) \frac{21}{30}$ or $\left(\frac{13}{15} = \right) \frac{26}{30}$ or Converts both fractions to a common denominator with at least one numerator correct	M1	
	$\frac{47}{30}$	A1	oe improper fraction
	$1\frac{17}{30}$	B1ft	oe mixed number ft correct conversion of their improper fraction to a mixed number
	<b>Additional Guidance</b>		
	Ignore incorrect simplification after B1 or B1ft awarded		

Q	Answer	Mark	Comments
16(a)	(11, 3)	B1	
	<b>Additional Guidance</b>		
	Check diagram if answer line blank		

Q	Answer	Mark	Comments
16(b)	$x = 6.5$	B1	oe
	<b>Additional Guidance</b>		
	Check diagram if answer line blank		

Q	Answer	Mark	Comments	
17	$60 \times \frac{1}{5} (\times 4)$ or 12 or 48	M1	oe	
	their $48 \times \frac{1}{3} (\times 2)$ or 16 or 32	M1dep	oe	
	60 – their 32 or their 16 + their 12 or 28 or $\frac{28}{60}$	M1dep	oe dep on M2	
	$\frac{7}{15}$	A1	SC3 $\frac{4}{15}$	
	<b>Additional Guidance</b>			
	SC3 is for omitting the initial $\frac{4}{15}$			

Q	Answer	Mark	Comments	
18	$(3^2 + 1 =) 10$ or $5 \times 3^2 + 5 \times 1$ or $-5 \times 3^2 + -5 \times 1$ or $(- )50$	M1	oe	
	86 – their 50 or 36	M1dep	oe	
	6	A1	accept $\pm 6$	
	<b>Additional Guidance</b>			
	86 – $5 \times 9 + 5 \times 1$ or 86 – 45 + 5 not recovered			M0M0A0

Q	Answer	Mark	Comments
19	A and B	B1	

Q	Answer	Mark	Comments	
20	First graph is a straight line from (0, 0) to (50, 50) and second graph is a straight line from (0, 0) to (50, 100)	B2	B1 first graph is a straight line from (0, 0) to (50, 50) or second graph is a straight line from (0, 0) to (50, 100) or both graphs correct, but one or both does not reach to 0 or 50 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 50 on the horizontal axis, and second graph is a correct ft graph to 50 on the horizontal axis (must be joined)	
	<b>Additional Guidance</b>			
	Ignore graphs to the right of 50 on the horizontal axes			
	B1ft can only be awarded if the graph fits onto the grid up to (50, 100)			

Q	Answer	Mark	Comments
21	$\sqrt{3}$	B1	

Q	Answer	Mark	Comment
22	$(2^3 \times 2^4 \Rightarrow) 2^7$ or $(2^{10} \div 2 \Rightarrow) 2^9$ or 128 or 512 or $2^3 \times 2^4 \div 2^{10} \times 2$	M1	
	$(2^7$ or $128) \div (2^9$ or $512)$ or $2^{(3+4-10+1)}$ or $2^7 \times 2^{-9}$ or $2^{-2}$ or $\frac{1}{4}$	M1dep	oe in the form $2^n \div 2^{(n+2)}$ oe where index sums to $-2$ oe in the form $2^n \times 2^{(-n-2)}$ oe fraction
	(0).25	A1	
	<b>Additional Guidance</b>		
	(0).25 and either $2^{-2}$ or $\frac{1}{4}$ on the answer line		M1M1A1
	(0).25 in working and $2^{-2}$ 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	$c \neq 5$

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

Q	Answer	Mark	Comment
<b>24(b)</b>	<b>Alternative method 1 – reading from the graph</b>		
	$2 \times 8000$ or 16 000 or [4700, 4900]	M1	oe [4700, 4900] may be 5000
	$2 \times 8000 + 1.5(0) \times [4700, 4900]$ or $16\ 000 + [7050, 7350]$	M1dep	oe 1.5(0) may be 1 or 2 [4700, 4900] may be 5000
	[23 050, 23 350]	A1ft	ft 1 or 2 for 1.5(0) and/or 5000 for [4700, 4900]
	<b>Alternative method 2 – using a multiplier</b>		
	$2 \times 8000$ or 16 000 or $8000 \times [0.5, 0.75]$	M1	oe
	$2 \times 8000 + 1.5 \times 8000 \times [0.5, 0.75]$	M1dep	oe 1.5(0) may be 1 or 2
	[22 000, 25 000] with $8000 \times [0.5, 0.75]$ seen	A1ft	ft 1 or 2 for 1.5(0)
	<b>Additional Guidance</b>		
	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 520% of the number	M1	
	Fully correct method	M1dep	
	390	A1	
	<b>Additional Guidance</b>		
	Up to M2 may be awarded for multiple attempts if no answer chosen		

Q	Answer	Mark	Comment	
26	$(x =) -2$ and $(x =) -6$	B2	B1 $(x =) -2$ or $(x =) -6$ or one or both values identified but not given in correct notation eg $(-2, 0)$ and/or $(-6, 0)$ or $-6 < x < -2$ or $-6$ and/or $-2$ written on the graph or in working	
	<b>Additional Guidance</b>			
	$x =$ can be $x \approx$			
	$-2$ and/or $-6$ with one extra value			B1
	$-2$ and/or $-6$ with more than one extra value			B0
	Answer from use of formula or completing the square			B0

Q	Answer	Mark	Comment	
27	$(\pi \times) \left( \frac{\sqrt{11}}{2} \right)^2$	M1	oe condone missing brackets	
	$\frac{11}{4}\pi$ or $2\frac{3}{4}\pi$ or $2.75\pi$	A1	oe fraction, mixed number or decimal	
	$(\pi \times) 4^2$ or $(\pi \times) 16$ or $\frac{60}{360}$ used	M1	oe	
	$\frac{16}{6}\pi$ or $\frac{8}{3}\pi$ or $2\frac{4}{6}\pi$ or $2\frac{2}{3}\pi$ or $2.6(6\dots)(\pi)$ or $2.67(\pi)$	A1	oe fraction, mixed number or decimal	
	A with values in comparable form or A by $\frac{1}{12}(\pi)$ or A by $0.08(3\dots)(\pi)$	A1	eg values $\frac{33}{12}(\pi)$ and $\frac{32}{12}(\pi)$ $2.75(\pi)$ and $2.6(6\dots)(\pi)$ $2.75(\pi)$ and $2.67(\pi)$ accept 'circle' for A  allow comparison of fraction or decimal parts only if integer parts shown as equal	
	<b>Additional Guidance</b>			
	For the final mark, presence or absence of $\pi$ must be the same for both values			
Accept consistent use of a numerical value of $\pi$ throughout. The value can be 3 or 3.1 or 3.14 or 3.142 or better				

Q	Answer	Mark	Comment
28	$(x - 3)(x - 4)$	B2	either order B1 $(x + a)(x + b)$ where $ab = 12$ or $a + b = -7$
	<b>Additional Guidance</b>		
	Condone a multiplication sign between the brackets		
	Condone missing final bracket		
	Ignore an attempt to solve $(x - 3)(x - 4) = 0$		

Q	Answer	Mark	Comment
29(a)	12000	B1	

Q	Answer	Mark	Comment
29(b)	0.5 or $\frac{1.2 \times 10^4}{2.5 \times 10^{-1}}$ or $\frac{\text{their } 12000}{2.5 \times 10^{-1}}$ or $0.48 \times 10^{4 - (-1)}$ or $0.48 \times 10^5$	M1	oe  their 12000 from part (a)
	48000 or $4.8 \times 10^4$	A1ft	ft $4 \times$ their 12000 in part (a)