



GCSE

Mathematics

93701F Applications of Mathematics

Unit 1: Foundation Tier

Mark scheme

93701F

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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.

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 within the scheme 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.
3.14...	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
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.

Q	Answer	Mark	Comments
1(a)		B2	B1 for 3 seen or 1.5 seen SC1 for 6 circles drawn (doubles Chris's)
1(b)	5 + 6 + 2 + their 3 or 2 × 7 + 1 × 2	M1	
	16 and No	A1ft	ft their 3 from a
2(a)	red (and) blue	B1	
2(b)	'unlikely' circled or indicated	B1	
2(c)	'impossible' circled or indicated	B1	
2(d)	6	B1	
3	681.48	B1	Mark the balance column value
	586.18	B1	Mark the balance column value

Q	Answer	Mark	Comments
4	Alternative method 1		
	18 ÷ 2 or 9	M1	oe
	their 9 ÷ 3	M1	
	their 9 – their 3	M1	
	6	A1	
	Alternative method 2		
	Draws 18 ‘bags’ and crosses out 9	M1	
	crosses out 1/3 of their remaining bags	M1	
	Indication of counting what’s left	M1	
	6	A1	
	Additional Guidance		
	Misreading the question and working out 1/3 of the total can gain M1M0M1A0 for 9 seen or crossed out and 9+6 subtracted from 18 to give answer 3		

Q	Answer	Mark	Comments
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5(a)	16, 15, 13 and 17	M1	Condone one error
	Athletics	A1	SC1 'Athletics' with no working
5(b)	Linear vertical scale starting from zero and labelled 'frequency' or 'number of people'	B1	oe Zero need not be labelled
	Dual or component bar chart with all heights correct	B2	For component bar chart total heights should be 16,15,13 and 17 with division for men and women shown B1 for 2 sports correctly drawn
	Key for shading shown or bars labelled men and women and Bars of same width and correct labelling of horizontal axis	B1	Condone unequal/no gaps between bars

6	Alternative method 1		
	3×3.65 or 10.95	M1	oe
	2×1.95 or 3.90	M1	oe
	their 10.95 + their 3.90	M1	
	14.85 and Yes	A1	
	Alternative method 2		
	3×3.65 or 10.95	M1	or 2×1.95 or 3.90
	$15 -$ their 10.95 or 4.05	M1	$15 -$ their 3.90 or 11.10
	their 4.05 \div 2	M1	their 11.10 \div 3
	2.(025)and Yes	A1	3.7(0) and Yes

Q	Answer	Mark	Comments
7(a)	25 + 40 × 7 or 25 + 280	M1	
	305	A1	
7(b)	(545 – 25) ÷ 40	M1	Condone no brackets for M1
	13	A1	

8	Alternative method 1		
	15 (mins) + 2 hrs 10 mins + 40 mins + 20 mins	M1	oe eh 2h 10 mins can be 130 mins
	3 hrs 25 mins	A1	
	5.00 pm – their 3 hrs 25 mins	M1	
	1.35 (pm)	A1	
	Alternative method 2		
	15 (mins) + 2 hrs 10 mins + 40 mins	M1	oe
	3 hrs 5 mins	A1	
	5.00 pm – their 3 hrs 25 mins – 20 mins	M1	
	1.35 (pm)	A1	
	Alternative method 3		
	5.00 pm – (15 (mins) + 2 hrs 10 mins + 40 mins + 20 mins)	M3	M2 for 5.00 pm – 2 or 3 times from the table or M1 for 5.00 pm – 20 mins and 1 or 2 times from the table M1 for 5.00 pm – 1 correct time from the table or M1 for 5.00 pm – 20 mins
	1.35 (pm)	A1	

Q	Answer	Mark	Comments
9	4 small 2 medium 1 large	B3	B2 for a combination of at least one of each pack with total cost between £4.80 and £5.20 B1 for £2.56 (totalling one of each size) or B1 for £2.44 (remainder after subtracting one of each size)
Additional guidance			Mark
Answers for B2 1 small, 1 medium, 3 large (£4.96) 2 small, 2 medium, 2 large (5.12) 3 small, 1 medium, 2 large (4.84) 1 small, 4 medium, 1 large (5.02)			B2

Q	Answer	Mark	Comments
10	Alternative method 1		
	$6\frac{1}{2} + 5\frac{3}{8} \left(+2\frac{1}{2} \right)$ or $14\frac{3}{8}$ or $11\frac{7}{8}$ or $7\frac{1}{2} + 4\frac{1}{4} \left(+2\frac{1}{2} \right)$ or $14\frac{1}{4}$ or $11\frac{3}{4}$	M1	oe
	$14\frac{3}{8}$ and $14\frac{1}{4}$ or $11\frac{7}{8}$ and $11\frac{3}{4}$	A1	
	$14\frac{1}{4}$	Q1ft	QWC strand (iii) correct method, at least one correct total distance, and chooses their shortest total route Must gain M1
	Alternative method 2		
	$6\frac{1}{2} + 5\frac{3}{8} = 11\frac{7}{8}$ or $7\frac{1}{2} + 4\frac{1}{4} = 11\frac{3}{4}$	M1	oe
	$11\frac{3}{4} + 2\frac{1}{2}$ or indicates $11\frac{3}{4}$ is shorter	Q1ft	QWC strand (iii) correct method, at least one correct addition of fractions above and chooses their shortest route between R and U Must gain M1
	$14\frac{1}{4}$	A1	

Q	Answer	Mark	Comments
10 (cont.)	Alternative method 3		
	$6\frac{1}{2} + 5 = 11\frac{1}{2}$ and $7\frac{1}{2} + 4 = 11\frac{1}{2}$	M1	oe
	$\frac{3}{8} > \frac{1}{4}$	Q1ft	QWC strand (iii) correct method, at least one correct addition of fractions above and compares extra fraction to add between R and U Must gain M1
	$14\frac{1}{4}$	A1	
	Alternative method 4		
	$7\frac{1}{2} - 6\frac{1}{2} \text{ or } 1$ and $4\frac{1}{4} + 1 \text{ or } 5\frac{3}{8} - 1$	M1	oe
	$5\frac{1}{4} > 4\frac{3}{8}$	Q1ft	QWC strand (iii) correct method, at least one correct addition of fractions above and chooses their shortest route between R and U Must gain M1
	$14\frac{1}{4}$	A1	

Q	Answer	Mark	Comments	
11	6500 seen or implied	B1		
	Their 6500×0.2 or 1300	M1	oe 1300 implies B1M1	
	16 500 – their 1300	M1		
	15 200	A1		
	Additional guidance			Mark
	Accept any equivalent method for finding 20% but a build up method must be complete			
12(a)	23	B1		
12(b)	32	B1		
12(c)	On average Year 8 were quicker/Year 8 were quicker because the median is lower or On average Year 7 were slower	B1ft	oe ft their (b)	
	Year 8 were more consistent or Year 7 times were more varied	B1ft	oe ft their (a)	

Q	Answer	Mark	Comments
13(a)	Alternative method 1		
	0.15 × 275 or 41.25	M1	oe
	275 – their 41.25	M1dep	
	233.75	A1	
	Additional guidance		Mark
	For a build up method the complete build up must be seen for M1 Condone 233.75 seen in working followed by 41.25 on answer line		M2A1
	Alternative method 2		
	0.85 seen	M1	
	0.85 × 275	M1dep	
	233.75	A1	
13(b)	0.35	B1	
14(a)	128	B1	
14(b)	2007 (and) 2008	B1	
14(c)	1.44	B1	
	Additional Guidance Allow £1.44p		
14(d)	268 ÷ 134 or 2	M1	£2 per 1% of CPI
	their 2 × 107	M1dep	
	214	A1	
15	A - 2 B - 3 C - 1	B2	B1 for one correct match
	Additional Guidance		
	Do not condone letters used for 1,2 and 3		

Q	Answer	Mark	Comments
16	Alternative method 1		
	$\frac{54}{75} (\times 100)$ or $\frac{45}{60} (\times 100)$	M1	oe
	72(%) and 75(%) or (Paper 1 75% of 75) = 56.25 or (Paper 2 72% of 60) = 43.2	A1	
	(Paper) 2	Q1ft	ft their percentages or decimals if M1 gained and at least one value is correct
	Alternative method 2		
	Changes to decimals or equivalent fractions 0.72 or 0.75 or $\frac{216}{300}$ or $\frac{225}{300}$	M1	oe
	0.72 and 0.75 or $\frac{216}{300}$ and $\frac{225}{300}$	A1	Allow any equivalent fractions

	(Paper) 2	Q1ft	ft their percentages or decimals if M1 gained and at least one value is correct
	Additional guidance		Mark
	For Q1 their values must be compared in the same format with at least one correct. Any equivalent fractions are acceptable eg $\frac{432}{600}$ and $\frac{450}{600}$ and Paper 2		M1A1Q1
Q	Answer	Mark	Comments

17(a)	Its cheaper/quicker (than testing the population) Too expensive to test them all or too time consuming to test them all	B1	oe
	Additional guidance		Mark
	Accept any equivalent comment that recognises a sample is better than a population If referring to it being too long or too expensive they must state 'to test the population' Because it would take too long and would be too expensive Because testing the population would take too long		B0 B1
17(b)	Sample size is too small	B1	
	Only one day/ time of day or only test one week or not random	B1	
	Additional guidance		Mark
	Both comments may be seen and marked under criticism 1 or 2		

Q	Answer	Mark	Comments
18	Women rail $112 \div 4$ or 28	B1	
	0.3×200 or 60	M1	oe
	their $60 \div 4$	M1dep	May be implied by 45 or 15 seen
	Road (Women 45) (men) 15	A1	
	$200 - 112 - 37 - \text{their } 15$ or 36	M1	or $200 - \text{their } 60 - 37 - \text{their } 39$ (women air)
	64	A1ft	Ft their $36 + \text{their } 28$ or ft their 60 and their 39 used
	Additional guidance		
Work may be seen in a two way table or in the space or working lines			

Q	Answer	Mark	Comments	
19(a)	midpoints used correctly	B1	condone one error	
	$(12.5 \times 17) + (17.5 \times 46) + (22.5 \times 22) + (27.5 \times 10) + (32.5 \times 5)$ or $212.5 + 805 + 495 + 275 + 162.5$ or 1950	M1	Attempt at $\sum fx$ using values on or between class boundaries	
	their $1950 \div 100$	M1		
	19.5	A1	SC2 17 or 22	
	Additional guidance			Mark
	For 2 nd method mark allow their 100 if totalling $\sum f$ clearly seen 17 and 22 come from use of lower or upper class boundaries			
19(b)	Yes because the average speed was less than 20 or Yes as 63 cars/ about 2/3 of cars/most cars/over half the cars drive at or below 20 or No, as 37 cars break the speed limit	B1ft	ft their answer to part (a) oe	

Q	Answer	Mark	Comments
20	2(x + 12) or 2x + 24 seen	B1	
	x + their (x + 12) + their 2(x + 12) = 204	M1	Setting up their equation. Must include 3 terms in x
	4x = 168 or $x = \frac{\text{their } 168}{4}$	M1	Rearranging to a single term Ft their collection of like terms.
	42	A1	
	Organised algebraic response	Q1	Must gain 2 nd and 3rd method marks. QWC strand ii SC3 42 from a numerical/T&I approach. SC3 56 from an algebraic approach
Additional Guidance			
<p>4x + 36 = 204 is B1M1</p> <p>The Q mark is for an algebraic method leading to their solution</p> <p>Example</p> <p>Condone one arithmetical slip for the second Method mark-eg 204 – 36 = 176</p> <p>Adding 36 instead of subtracting 36 is not an arithmetical error – it is incorrect method</p> <p>Example</p> <p>4x + 36 = 204</p> <p>204 – 36 = 168</p> <p>168 ÷ 4 = 42</p> <p>B1 (implied) M1M1A1Q1</p> <p>Special cases</p> <p>If SC3 is awarded for 42 from T& I, do not award the B1 even if correct expression seen for Phil</p> <p>Omission of Ben or incorrect use of bracket for Phil may lead to the equation 3x + 36 = 204</p> <p>Solved correctly gives an answer of 56 for SC3</p>			