AQA

GCSE
Mathematics
93701F Applications of Mathematics
Unit 1: Foundation Tier
Mark scheme

93701F

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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.

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 candidate intended it to be a decimal point.

Q	Answer	Mark	Comments
1(a)	Tallies correct including use of 5 bar gates	B1	
	Frequencies correct 7, 9, 6, 2 or ft their tallies	B1ft	ft their frequencies or correct

1(b)	1	B1ft	ft their frequencies
	Additional Guidance		
	If their frequencies give two modes they must state both		
	They may use the original data to find the mode so a correct mode of 1 gains B1 even if the table frequencies suggest a different mode		

1(c)	Vertical line graph used	B1	Single vertical line for each number of goals
	Heights correct 7, 9, 6, 2 must be correct horizontal position	B1ft	ft their frequencies
	Additional Guidance		
	A correct bar chart scores B0B1		
	Plots at correct horizontal position with correct height with no vertical lines drawn B0 B1		
	A frequency polygon with correct heights B0 B1		

Q	Answer	Mark	Comments
	Alternative Method 1		
	Crosses off the same value of coins for both	M1	Implied by 14p
	their 14(p) ÷ 2 or attempts to share the 5p and 2p coins	M1dep	
	5(p) and 2(p)	A1	
	Alternative Method 2		
	Jack has 95p or Rosie has 81p	M1	Implied by 14p
	(their 95 - their 81) ÷ 2 or their 14 ÷ 2 or 7(p)	M1dep	
2	5(p) and 2(p)	A1	
	Alternative Method 3		
	Attempts to total all coins and divide by 2 or 88 seen	M1	
	Their total of Jacks coins − their 88 or their 88 – their total of Rosies coins or 7(p)	M1dep	or crosses off 88p from Jacks coins
	5(p) and 2(p)	A1	
	Additional Guidance		
	Check diagram for working 7(p) Implies M1 M1		

Q	Answer	Mark	Comments
3(a)	evens	B1	Circled or indicated
	Additional Guidance		
	If more than one word chosen B0		

Q	Answer	Mark	Comments
3(b)	impossible	B1	Circled or indicated
	Additional Guidance		
	If more than one word chosen B0		

Q	Answer	Mark	Comments
3(c)	Arrow pointing to 3rd mark from zero (3/8)	B1	
	Additional Guidance		
	Accept any clear indication, eg line drawn, eg arrow drawn pointing away from the line (either upwards above or downwards below).		
	Ignore any numbers marked on the line.		
	Award the mark for an intention to place the arrow at the correct position and not elsewhere on the line.		

Q	Answer	Mark	Comments
	16	B1	Accept in words
4(a)	**Additional Guidance**		
	Check the table if answer space blank		

Q	Answer	Mark	Comments
	Alternative Method 1		
	Frequencies: 14 (+) 16 (+) 7 (+) 3	M1	Condone 1 error
	14 + 16 + 7 + 3 = 40	A1	
4(b)	**Alternative Method 2**		
	8 × 4 (+) 2 × 3 (+) 2	M1	oe
	32 + 6 + 2 = 40	A1	
	Additional Guidance		
	Alternate ways of combining could be $\frac{3}{4} + \frac{3}{4} = 1\frac{1}{2}$, $1\frac{1}{2} + \frac{1}{2} = 2$, 10 full circles = 10 × 4 = 40		

Q	Answer	Mark	Comments
4(c)	$\frac{7}{20}$	B2	B1 for $\frac{14}{40}$ or 35% or 0.35

Q	Answer	Mark	Comments
5	**Alternative Method 1**		
	$420 \div 4$ or 105	M1	
	$(420 - \text{their } 105) \times \frac{2}{5}$ or 126	M1	
	$420 - \text{their } 105 - \text{their } 126$ or $315 - \text{their } 126$	M1	$420 \times \frac{3}{4} \times \frac{3}{5}$ implies M3
	189	A1	
	Alternative Method 2		
	$420 \div 4$ or 105	M1	
	$\frac{3}{5}$ seen	M1	
	$(420 - \text{their } 105) \times \frac{3}{5}$	M1	$420 \times \frac{3}{4} \times \frac{3}{5}$ implies M3
	189	A1	
	Additional Guidance		
	Some students will find ¼ of £420, and 2/5 of £420 and subtract these values from £420. These are treated as MR $420 \div 4 = 105$, $420 \times 2 \div 5 = 168$, $420 - 105 - 168 = 147$ M1 M1 M1 A0		

Q	Answer	Mark	Comments
6(a)	$1.15 + 0.75 + 0.75 + 0.25$	M1	oe
	(£) 2.90	A1	2.9 or 290 implies M1 Condone (£) 2.90p
	Additional Guidance		
	Penalise incorrect money notation only once		

Q	Answer	Mark	Comments
6(b)	(£) 2.10	B1ft	ft their (a) Do not penalise 2.1 if 2.9 penalised in part (a)

Q	Answer	Mark	Comments
6(c)	**Alternative Method 1**		
	Correct total for 3 items involving any combination of cones **and** tubs	B1	3 cones £3.75 2 cones 1 tub £3.65 1 cone 2 tubs £3.55 3 tubs £3.45
	6.65 − their total	M1	their total must be for 3 items but may include extra scoops
	Remaining money ÷ 75(p)	M1	oe
	4 (extra scoops)	A1	must come from using 2 cones and 1 tub
	Alternative Method 2		
	Correct total for 3 items involving any combination of cones **and** tubs	B1	3 cones £3.75 2 cones 1 tub £3.65 1 cone 2 tubs £3.55 3 tubs £3.45
	Adds on at least 75p to their total	M1	their total must be for 3 items
	Adds on 75p's to get a total of at least £6	M1	
	4 (extra scoops)	A1	must come from using 2 cones and 1 tub
	Additional Guidance		
	Unsupported answer of 4 gets B0 M0 M0 A0		

Q	Answer	Mark	Comments
7(a)	20 + 38 × 3.5	M1	oe
	153	A1	

Q	Answer	Mark	Comments
7(b)	286 – 20 or 266	M1	
	their 266 ÷ 38	M1	
	7	A1	

Q	Answer	Mark	Comments
8	1.5 × 2.26 or 2.26 + 1.13 or 3.39	M1	oe
	2.25 × 2.80 or 2.8(0) + 2.8(0) + 0.7(0) or 6.3(0)	M1	oe
	11.15 – their 3.39 – their 6.3(0) or 1.46	M1	
	their 1.46 ÷ 0.4	M1	oe
	3.65	A1	

Additional Guidance

Examples of equivalent methods

4th M1   146 ÷ 0.4 or 365(p) or 146 ÷ 40 or 1.46 × 2.5 or 1.46 + 1.46 + half 1.46 etc

Accept working in pence throughout but final answer must be in pounds

Additional Guidance

Cost of cherries =(£)1.46 implies 1st three M marks

Q	Answer	Mark	Comments
9(a)	$\frac{12}{72} \times 360$ or 12×5 or $\frac{18}{72} \times 360$ or 18×5 or $\frac{27}{72} \times 360$ or 27×5 or $\frac{15}{72} \times 360$ or 15×5	M1	Correct method to find one angle Implied by one correct angle seen
	60, 90,135 and 75	A1	All 4 correct angles
	Draws all 4 correct angles accurately	A1	$\pm$ 2°
	Labelled in correct proportional size	B1ft	ft if only 4 sectors
	Additional Guidance		
	Correct proportional size means that thriller must be the largest sector, then comedy, sci-fi and romance. Accept letters R, S, C, T for labels		

Q	Answer	Mark	Comments
9(b)	**Alternative method 1**		
	140 seen	B1	
	$\dfrac{\text{their}140}{360} \times 72$ or their $140 \div 5$ or 28	M1	
	their $28 - 12$	M1	Condone their 28 - 15
	16	A1	
	Alternative method 2		
	140 seen	B1	
	their $140 -$ their 60 or 80	M1	
	$\dfrac{\text{their}80}{360} \times 72$ or $80 \div 5$	M1	
	16	A1	
	Additional Guidance		
	Check the diagram for 140		
	In alt 2 their 60 is their angle for Romance from part (a).		
	Must be consistently working with angles or people, not a combination of both. eg in alt 1 their 28 cannot be 140, it must be from an attempt to work with people.		

Q	Answer	Mark	Comments
10	**Alternative method 1**		
	4.60 ÷ 1.27	M1	
	3.62(2...)	A1	
	12	A1	
	Alternative method 2		
	4.60 – 3.5 × 1.27	M1	
	0.155 euros	A1	Accept 0.15 or 0.16
	(0.155 ... ÷ 1.27 = 0.122 ...) 12	A1	
	Additional Guidance		
	After correct working answers of 0.12 gains M1 M1 A0 £0.12 gains M1 M1 A1		

Q	Answer	Mark	Comments
11(a)	18	B1	
	Additional Guidance		

	$52 - 28 + 6$ or 52 - 22	M1	
	30	A1	
11(b)	**Additional Guidance**		
	If answer does not appear in 1b check table. 30 in Leeds gains M1A1		
	Calculations can be done in any order or in steps.		
	eg 52 + 6 = 58, 58 – 28 M1		
	eg 52 + 6 = 56, 56 – 28 gains M1		
	Answer 30 with no working gains M1A1		

	Alternative method 1		
	3500 × 1.65 or 5775 or 3500 × 0.65 or 2275	M1	
	their 5775 – (3500 + 750) or (their 2275 +3500) – (3500+750) or their 2275 - 750	M1	oe eg 5775 – 4250
12	1525	A1	
	Additional Guidance		
	To award the 2nd M1 it must be clear that they have attempted to find either 65% or 165% of 3500		
	If they work with 165% they must subtract both 3500 and 750		
	If they work with 65% they must only subtract 750		
	Penalise further working as incorrect method.		
	eg 0.65 × 3500 = 2275 M1		
	2275 – 750 = 1525		
	3500 + 1525 = 5025 M0A0		

Q	Answer	Mark	Comments
13	7, 7, 7, 9, (10)	B2	B1 for finding the mean of any five integers between 7 and 10 inclusive or B1 for finding the median of any five integers between 7 and 10 inclusive or B1 7 (median) and 8 × 5 = 40 or 8 (median) and 9 × 5 = 45
	Additional Guidance		
	The median can be shown by listing their 5 numbers in order and either circling the middle number or crossing off 2 either side to leave the middle number. All numbers used must be integers.		

Q	Answer	Mark	Comments
14	87 in women 40 to 59	B1	
	Under 25 22 men and 11 women	B1	
	Column total values correct 25 to 39 110 **and** 40 to 59 187 **and** 60 or over 250	B1	
	Women's row totals 230	B1ft	Total of the 4 values for women
	350 in men's row total box **and** values total to 350	B1ft	Total of their 4 values

Additional Guidance

	Under 25	25 to 39	40 to 59	60 or over	Total
M	22	75	100	153	350
W	11	(35)	87	97	(230)
T	(33)	110	187	250	(580)

Q	Answer	Mark	Comments
	Alternative Method 1		
	$\dfrac{2}{3} - \dfrac{1}{2}$ or $\dfrac{1}{6}$	M1	oe
	Their $\dfrac{1}{6}$ is 5 or 6×5 or $5 \div$ their $\dfrac{1}{6}$	M1 dep	
	30	A1	
	Alternative Method 2		
	$0.66(\ldots) - 0.5$ or $0.16(\ldots)$ or $66\% - 50\%$ or $16.(\ldots)\%$	M1	
15	$5 \div$ their $0.16(\ldots)$ or $5 \div$ their $16.(..)$ $(\times\ 100)$ or $100 \div$ their $16.(..) \times 5$	M1dep	
	30	A1	
	Alternative Method 3		
	Trial and improvement First trial using both fractions $\dfrac{2}{3}$ and $\dfrac{1}{2}$ of any distance greater than 5 km	M1	
	finds the difference between their two values	M1 dep	(Trying to get a difference of 5)
	30	A1	

Q	Answer	Mark	Comments
15 (cont)	**Alternative Method 4**		
	$\frac{1}{2}x + 5 = \frac{2}{3}x$	M1	
	$1.5x + 15 = 2x$ or $0.5x = 15$ or $3x + 30 = 4x$ or $\frac{1}{6}x = 5$	M1dep	
	30	A1	
	Additional Guidance		
	Allow use of 0.66 or better for $\frac{2}{3}$ for both method marks but must be 30 for A1 (use of 0.66 or 66% gives an answer of 31.25)		

Q	Answer	Mark	Comments
16(a)	0.3 × 30	M1	
	9	A1	
	Additional Guidance		
	Beware of 9 from incorrect method eg 10 × 0.4 + 10 × 0.25 + 10 × 0.3 = 4 + 2.5 +3 = 9.5 answer 9 M0A0 Do not award M1 for 0.3 × 30 if it is added to other values		

Q	Answer	Mark	Comments
	64	B2	B1 0.32 selected SC1 0.31 × 200 = 62
16(b)	**Additional Guidance**		
	0.32 selected must be the only rel.freq. they use eg 0.32 × 4 = 1.28 B1 eg 0.4 + 0.25 +0.3 +0.35 +0.32 B0 Beware use of average relative frequency 1.62 ÷ 5 × 200 = 64.8 which they may round to 64 gains B0B0		

17(a)	C	B1	Circled or indicated

17(b)	A	B1	Circled or indicated

Q		Mark	Comments
	Alternative Method 1		
	19650 − 10110 or 9540	M1	
	their 9540 × 0.2 (÷ 12) or 1908	M1 dep	oe
	159	A1	SC1: 496
18	**Alternative Method 2**		
	19 650 ÷ 12 or 1637.5(0) **and** 10110 ÷ 12 or 842.5(0)	M1	
	0.2 × (their 1637.5(0) − 842.5(0)) or 1908	M1 dep	oe
	159	A1	
	Additional Guidance		
	SC is from 0.2 × (19650+10110)		

Q	Answer	Mark	Comments
19(a)	$158 < h \leq 164$ or $164 \geq h > 158$	Q2	Q1 for $158 \leq h \leq 164$ or for $158 < h < 164$ or $158 < h$ and $h \leq 164$
	Additional Guidance		
	Allow all reversed eg $164 \geq h \geq 158$ Q1 Allow any other letter for h Ignore units		

Q	Answer	Mark	Comments
	$x + 3$ or $x - 2$ seen	B1	
	x + their $(x + 3)$ + their $(x - 2) = 43$	M1	oe must be linear expressions with 3 terms in x
	$3x = 42$ $3x + 1 = 43$	M1	Simplifying their linear equation to $ax = b$ or by collecting like terms on the left
	Sita 14, Teri 17 and Ellen 12	A1	
	Logical algebraic argument with key steps shown including final answers	Q1	QWC strand (iii) Must gain both method marks and give a solution SC3 for 14,17 and 12 from T & I or numerical method

19(b)

Additional Guidance

The B1 for a correct expression cannot be awarded with SC3

Omitting Sita gives the following

their $(x + 3)$ + their $(x - 2) = 43$

$2x = 42$

$x = 21$ Answers 21, 24 and 19   B1M0M1A0Q0

Example of incorrect expression used

Uses $3x$ for Teri

$x + 3x + x - 2 = 43$

$5x - 2 = 43$

$5x = 45$

Answer 9,27,7 or 9,12,7   B1M1M1A0Q1