AQA Qualifications

GCSE

Mathematics

Linked Pair – Applications of Mathematics
Paper Unit 1 Foundation tier
Mark Scheme

93701F
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Version/Stage 1.0 Final

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.

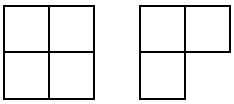
Q	Answer	Mark	Comments
1(a)	5	B1	
1(b)	8	B2	B1 14 or 6 used for range
1(c)	10	B1	
1(d)	(19 – 7) ÷ 2 or 12 ÷ 2 or 6 or (19 + 7) ÷ 2 or 26 ÷ 2 or 13	M1	
	6 (boys) and 13 (girls) seen	A1	May be implied by heights of bar chart
	Bar drawn (and labelled class 5) on chart - total height 19, divided with their boys total on the lower part	B1ft	SC2 For bar height 19 split 13,6 (and labelled) if no working seen SC2 For two separate bars of heights 6 and 13 labelled and shaded correctly SC1 For bar of height 19 split at any point and shaded appropriately

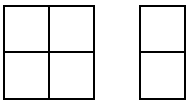
Q	Answer	Mark	Comments
2(a)	**Alternative method 1**		
	12 tiles shaded or labelled B or 8 tiles shaded or labelled G	M1	
	20 tiles shaded	M1	
	4	A1	SC1 For answer of 8 (24 – (12 + $\frac{1}{3}$ of the rest))
	Alternative method 2		
	24 ÷ 2 or 12 or 24 ÷ 3 or 8	M1	
	their 12 + their 8 or 24 – their 12 – their 8	M1dep	Their 12 and their 8 must come from attempt at division of 24 by 2 and 3 respectively
	4	A1	SC1 For answer of 8 (24 – (12 + $\frac{1}{3}$ of the rest))
	Alternative method 3		
	$1 - (\frac{3}{6} + \frac{2}{6})$ or $\frac{1}{6}$	M1	
	their $\frac{1}{6} \times 24$	M1	
	4	A1	

Q	Additional Guidance
2(a)	Diagram may be used but it is not essential

Q	Answer	Mark	Comments
2(b)	**Alternative method 1**		
	8 × 5.5 or 44	M1	
	their 44 × 2.25 or 99	M1	
	99 and Yes	A1	
	Alternative method 2		
	8 × 5.5 or 44	M1	
	100 ÷ 2.25 or 44.4...	M1	
	44 and 44.4... and Yes	A1	
	Alternative method 3		
	8 × 2.25 or 18	M1	
	their 18 × 5.5 or 99	M1	Or 18 × 5 = 90 and 18 ÷ 2 = 9 oe
	99 and Yes	A1	
2(c)	198 ÷10 or 198 × 0.1 or 19.8	M1	
	19.80	Q1	SC1 178.20

Q	Additional Guidance	Mark
2(c)	19.8	M1Q0
	198 – 19.8 =178.2 is incorrect method and incorrect notation	M0Q0

Q	Answer	Mark	Comments
3(a)	14	B1	
3(b)	1	B1	
3(c)		B2	Fully correct B1 For 7 seen or one shape correct

Q	Additional Guidance	Mark
3(c)	Condone squares not exactly same size. Intention to be 4 part square or 3 part square. Example for B1  Two squares of four gains B1 for one correct shape and one incorrect shape. Multiple squares of four gains B0 Allow the ¾ square to be 3 small squares or a half plus a small square if clear	B1

4	**Alternative method 1**		
	2.45 + 1.79 + 1.94 or 6.18	M1	
	10(.00) – their 6.18 or 3.82	M1	10 – 2.45 – 1.79 – 1.94 implies M2
	their 3.82 ÷ 2	M1	
	1.91	A1	
	Alternative method 2		
	10(.00) – 1.94 or 8.06	M1	or 10(.00) – 2.45 – 1.79 or 5.76
	their 8.06 – 2.45 – 1.79 or 3.82	M1	their 5.76 – 1.94
	their 3.82 ÷ 2	M1	
	1.91	A1	

5(a)	6 6 7 6 7 8	B1	
5(b)	5	B1ft	ft their table
5(c)	2 **and** 8 or 3 **and** 7 or 4 **and** 6	B1ft	ft their table

Q	Answer	Mark	Comments
6	£1, £1, 50p and 50p used or indicated or £3 seen	M1	
	Their change = 2 × 5p	M1	ft their amount used – £2.90 2 × 5p or 10p change implies first M1
	50p, 20p,10p, 5p, 5p, 5p	A1	If no working seen then award SC2 For 50, 20,10,10, 5 or SC2 For 50, 20, 10, 5, + any coins totalling 10

Q	Additional Guidance
6	Indication of coins used may be from crossing off the diagrams. Condone missing p if clearly all in pence

7(a)	4.2(0) + 3.95 + 6.3(0) + 2.8(0) + 3.5(0) + 4.(00) + 3.75 + 4.9(0) + 5.1(0) + 4.3(0) or 42.8	M1	
	their 42.8 ÷ 10	M1	
	4.28	A1	SC2 For 38.93

Q	Additional Guidance	Mark
7(a)	38.93 is from omission of brackets before division	M2A0

7(b)	Yes as his average spend is less now or Less as he only spends a maximum of £40	B1ft	ft their mean value from (a)

Q	Additional Guidance	Mark
7(b)	Do not follow through if they compare a mean value and a total spend eg comparing £42.80 in(a) with £4	B0

Q	Answer	Mark	Comments
8	Fully correct 48 seater = 2 and 72 seater = 1 and 1110	B4	B3 For answer of 48 seater = 2 and 72 seater = 1 with incorrect total or no total **or** B3 For any other two correct combinations with correct costs from 72 seater = 3 **and** 1380 48 seater = 4 **and** 1300 48 seater = 1 and 72 seater = 2 **and** 1245 **or** B2 One correct combination and cost from above or two correct combinations with incorrect cost **or** B1 For any combination of coaches with at least 160 seats but less than 220

Q	Additional Guidance	Mark
8	Incorrect arithmetic may lead to an incorrect choice of the cheapest combination. eg 48 seater = 2 and 72 seater = 1 calculated as 1210 and 48 seater = 4 calculated as 1200 and given as answer in correct form. This scores B2 for two correct combinations with incorrect cost The answer must follow their working otherwise penalise by one mark Eg. 3 × 72 seater costs 1380 for 216 people 4 × 48 seater costs 1300 for 192 people Then answer 192 and 216 and 1300 **Check the working** An arithmetical error seen must be penalised even if the correct answer is given	B2 B2

Q	Answer	Mark	Comments
9(a)	25	B1	
9(b)	$\frac{1}{3}$	B1	oe
9(c)	**Alternative method 1**		
	60 or 45	B1	May be on diagram
	their $\frac{60}{360} \times 240$ or 40 or their $\frac{45}{360} \times 240$ or 30	M1	
	40 and 30	A1	
	their 40 – their 30	M1dep	
	10	A1ft	
	Alternative method 2		
	60 or 45	B1	May be on diagram
	their 60 – their 45	M1	
	15	A1	
	their $\frac{15}{360} \times 240$	M1dep	
	10	A1ft	
9(c)	**Alternative method 3**		
	92 + 48 + 60 or 200 or 92 + 38 + 80 or 210	B1	Totalling the numbers for the other 3 colours for either pie chart
	240 – 200 or 40 or 240 – 210 or 30	M1	
	40 and 30	A1	
	their 40 – their 30	M1dep	
	10	A1ft	

Q	Answer	Mark	Comments
9(c)	**Alternative method 4**		
	60 or 45	B1	May be on diagram
	$\frac{60}{360} - \frac{45}{360}$ or $\frac{1}{6} - \frac{1}{8}$	M1	
	$\frac{15}{360}$ or $\frac{1}{24}$	A1	
	their $\frac{1}{24} \times 240$	M1dep	oe
	10	A1ft	
10(a)	All 7 points plotted and joined with lines at correct height and consistent position	B2	B1 For 5 or 6 points correct and joined Or B1 for 7 correct points not joined or joined with curve Lines may be dotted
	Linear vertical scale shown and months on horizontal scale	B1	

Q	Additional Guidance
10(a)	Linear scale must start at 0 (but may not be labelled) and go up to at least 30 If scale is not linear ft their heights if possible Condone labelling of month across whole cm if vertical positions of points are consistently spaced eg all at the end of the cm, all in the middle. Lines must be 'straight' – clearly not curves. Ignore ends. Accept abbreviations for months if clearly in correct order A bar chart can gain only the B1 for scale/labelling

10(b)	Sales increase up to July then decrease or Sales increase in the summer months	B1	oe

Q	Answer	Mark	Comments
11(a)	0.2 circled or indicated	B1	
11(b)	Box 1 $I = A \times 5 \div 100$ or $I = A \times 0.05$	B2	oe B1 For $(A) \times 5 \div 100$ or $(A) \times 0.05$
	Box 2 Output interest or Output £I or Write down the interest	B1	
12(a)	= A6*B6	B1	Condone missing equals sign here Condone C6=A6*B6
12(b)	= Sum (C2 : C6) or = C2 + C3 + C4 + C5 + C6 or = Sum (C2 + C3 + C4 + C5 + C6) or = Sum (C2 , C3 , C4 , C5 , C6)	B2	B1 For formula without equals sign or B1 For one cell reference error eg = Sum(C1 : C6) or = (C2 + C3 + C5 + C6) Condone missing brackets
12(c)	Mean circled or indicated	B1	
13(a)	Line from 15 to 22	B1	
	Open circles on both ends	Q1	QWC strand i correct mathematical notation
13(b)	$22 < x \leqslant 25$ or $22 < x$ and $x \leqslant 25$	B2	B1 22 and 25 used but one incorrect symbol or B1 For $22 < x$ or $x \leqslant 25$ oe

Q	Answer	Mark	Comments

Q	Additional Guidance	Mark
13(b)	$22 \leqslant x \leqslant 25$ (one incorrect symbol)	B1
	$22 < x < 25$ (one incorrect symbol)	B1
	$22 > x > 25$ (two incorrect symbols)	B0

14	**Alternative method 1**		
	180 ÷ 3 **and** 245 ÷ 4 (compares 150g) or 180 ÷ 9 **and** 245 ÷ 12 (compares 50g) or 180 ÷ 450 **and** 245 ÷ 600 (compares 1g)	M1	Oe Compares any number of grams consistently. Can be in pence or pounds
	60 **and** 61 or [61.2, 62.3] or 20 **and** 20(.4...) or 0.4(0) **and** [0.408, 0.41]	A1	Comparing same number of grams Can be in pence or pounds
	Regular	Q1ft	Strand (iii) ft Conclusion based on their 2 values if M1 awarded
	Alternative method 2		
	450 ÷ 180 **and** 600 ÷ 245 or 450 ÷ 1.8(0) **and** 600 ÷ 2.45	M1	Compares grams per penny or grams per pound
	2.5 **and** [2.4, 2.45] or 250 **and** [240, 245]	A1	
	Regular	Q1ft	Strand (iii) ft Conclusion based on their 2 values if M1 awarded

Q	Answer	Mark	Comments
14	**Alternative method 3**		
	1.80 ÷ 3 × 4	M1	oe Can be in pence or pounds
	2.40	A1	Must be in pounds unless 245p also seen
	Regular	Q1ft	Strand (iii) ft Conclusion based on their 2 values if M1 awarded
	Alternative method 4		
	2.45 ÷ 4 × 3	M1	oe Can be in pence or pounds
	1.83(...) or 1.84	A1	
	Regular	Q1ft	Strand (iii) ft Conclusion based on their 2 values if M1 awarded
	Alternative method 5		
	450 ÷ 600 **and** 1.80 ÷ 2.45	M1	oe
	450 ÷ 600 **and** 1.80 ÷ 2.45	M1	oe
	Regular	Q1ft	Strand (iii) ft Conclusion based on their 2 values if M1 awarded

Q	Additional Guidance
14	Candidates can work in pounds or pence throughout providing that their final comparison is based on the same units If both of their answers are quoted to 1 sf or are the same (eg 0.4, 0.4) allow Q1 ft for regular. Eg 180 ÷ 450 = 0.4 245 ÷ 600 = 0.4 Regular Award M1 A0 Q1 (Assume more d.p. on calculator)

15(a)	C = 0.21n + 7.25	B2	B1 0.21n SC1 For C = 21n + 7.25 SC1 For C = 21n + 725
15(b)	their (0.21n + 7.25) = 0.19n + 9.95	B1ft	oe
	0.02n = 2.7(0)	M1	Simplifying their linear equation to $an = b$ provided term in n and constant on both sides.
	their 2.7(0) ÷ their 0.02	M1	Simplifying their linear equation to n =
	135	A1ft	ft their (a) if formula is in the form $an + b$ SC3 For 1.35 from an algebraic approach (using 21n + 7.25 = 19n + 9.95) SC2 For 135 from T&I/numerical approach

Q	**Additional Guidance**	**Mark**
15(b)	The middle two method marks are for simplifying their linear equation **Example** 0.21n + 7.25 = 0.19n + 9.95 0.02n = 17.2 n = 17.2 ÷ 0.02 n = 860	B1 M0 M1 A0
	T&I methods are only awarded marks for a correct answer	

Q	Answer	Mark	Comments
16(a)	$\frac{9}{30}$ **or** $\frac{3}{10}$ or 0.3 or 30%	B1	
16(b)	$\frac{63}{100}$ or 0.63 or 63%	B1	
16(c)	Jake because he has done more trials/more trials give a better estimate	B1	oe
16(d)	185 or 177	B1ft	ft The correct relative frequency for their chosen person from (c) multiplied by 500 or 177 from $\frac{46}{130} \times 500$

Q	Additional Guidance	Mark
16(d)	If Ali is chosen in (c) then they should use $\frac{9}{30} \times 500 =$ **150** Allow use of total of Ali and Jake 185 out of 500 $\frac{185}{500}$	B1ft B1 B0

17(a)	Correct polygon	B2	B1 For one error - incorrect horizontal point/incorrect height/no straight lines

Q	Additional Guidance
17(a)	Ignore any lines before or after endpoints. Consistent incorrect horizontal position is one error.

17(b)	Plant B as there are 10 values in the 10-12 group whereas for Plant A there is only one value.	B1	oe Allow 11cm group to indicate 10 – 12 group

Q	Answer	Mark	Comments
18	**Alternative method 1**		
	3×8	3×8	3×8
	$500 \div (16 + 3 \times 8)$	$500 \div (16 + 3 \times 8)$	$500 \div (16 + 3 \times 8)$
	(Small sack =) 12.5 (kg)	(Small sack =) 12.5 (kg)	(Small sack =) 12.5 (kg)
	(Large sack =) 37.5 (kg)	(Large sack =) 37.5 (kg)	(Large sack =) 37.5 (kg)
	Alternative method 2		
	16 ÷ 3 or 5 ⅓	16 ÷ 3 or 5 ⅓	16 ÷ 3 or 5 ⅓
	500 ÷ (8 + 5⅓)	500 ÷ (8 + 5⅓)	500 ÷ (8 + 5⅓)
	Large 37.5	Large 37.5	Large 37.5
	Small 12.5	Small 12.5	Small 12.5
	Alternative method 3		
	Any trial using two values that satisfy $16x$ and $24x$	M1	
	An improved trial using two values that satisfy $16x$ and $24x$	M1	Totals must be seen
	(Small sack =) 12.5 (kg)	A1	
	(Large sack =) 37.5 (kg)	B1ft	ft their small sack × 3 SC3 Small = 200, large = 300

Q	Additional Guidance
18	Alternative method 1 24 seen does not imply M1 as it may have come from 8 + 16 16 + 24 implies the first M1 500 ÷ 40 is M2
	Alternative method 3 eg Trying $x = 4 \rightarrow 64 + 94 = 158$kg gains M1 then trying $x = 8 \rightarrow 128 + 192 = 320$ gains 2nd M1 (closer to total of 500)

SP/03/14