AQA Qualifications

GCSE

Mathematics

Linked Pair – Applications of Mathematics
Paper Unit 2 Foundation tier
Mark Scheme

93702F
November 2014

Version/Stage V1.1 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)	8 mm	B1	
1(b)	57 g	B1	
1(c)	650 cm^2	B1	
1(d)	100 cm	B1	

Q	Answer	Mark	Comments
2(a)	2	B1	
2(b)	4	B1	
2(c)	12 seen or implied	B1	
	their 12 × 1.78 (+ 2.5(0)) or 21.36	M1	
	23.86	A1ft	ft if B0 M1 and 2.5(0) added SC2 27.42
Additional Guidance			
1st M1 their 12 cannot be 1 **Example** 10 B0 10 × 1.78 + 2.50 M1 20.30 A1ft			

Q	Answer	Mark	Comments
3(a)	Circle radius 4 cm (±2 mm) drawn with correct centre	B1	
3(b)	Diameter, parallel to horizontal sides of their circle drawn	B2ft	B1 Diameter not parallel to horizontal sides or Line parallel to horizontal sides that is not a diameter Allow diameters extended beyond circumference for B1 only ft their circle from (a)
Additional Guidance			
In (b) ignore any radius drawn with diameter			

Q		Answer	Mark	
4	Shirt Shop A → £12 or Shop B → 12 – 2 or £10 or Jacket Shop A → 18 – 5 or £13 or Shop B → 18 – 2 or £16 or 30 – 5 or £25 or 30 – 4 or £26	B1		
	Shirt Shop A → £12 and Shop B → 12 – 2 or £10 and Jacket Shop A → 18 – 5 or £13 and Shop B → 18 – 2 or £16 or Jacket and shirt Shop B → £26 or Shop A → £25 or Shirt Shop A and Jacket Shop B and £28	B1		
	Shirt Shop B and Jacket Shop A and £23	Q1	Strand (ii) Cheapest way with correct total cost SC2 Shirt Shop A and Jacket Shop B and £23 Shirt Shop B and Jacket Shop A and £7	
Additional Guidance				
Q1 implies B2 **Example** 30 – 4 = 26 and B scores B2				

Q	Answer	Mark	Comments
5(a)	40.46	B1	Allow 4046p
5(b)	18.72	B2	Allow 1872p B1 39.57 or 20.85 oe eg 3957 or 2085 or 1872
5(c)	5 × 16.27 or 81.35 or 5 × 1.5 or 7.5 or 24.68	M1	oe eg 5 × 1627
	their 81.35 – their 24.68	M1	oe eg 8135 – 2468
	56.67	A1	oe eg 5667
	their 56.67 and Yes	Q1ft	oe eg 5667 and 5000 and Yes Strand (iii) ft from M2 ie their 81.35 – their 24.68 evaluated correctly and correct ft decision SC2 81.35 and 24.68

Additional Guidance

For misreads allow up to M1M1A0Q1ft

Examples

1 Using before 9 am

5 × 36.45 and 42,50	M1
182.25 – 42.50	M1
139.75	A0
139.75 and Yes	Q1ft

2 Using before 10 am

5 × 27.32 and 33.50	M1
136.6(0) – 33.50	M1
103.10	A0
103.10 and Yes	Q1ft

3

5 × 20.85 and 24.68	M1 (Wrong value used from column 3)
104.25 – 24.68	M1
99.57	A0
99.57 and Yes	Q1ft

Q	Answer	Mark	Comments
6(a)	[95, 97]	B1	
6(b)	Builds up to \$240 using any suitable conversion(s) of \$ to £	M1	Examples 1 80\$ → [£49, £51] and [£49, £51] × 3 2 40\$ → [£24, £26] and [£24, £26] × 6 3 100\$ → [£62, £ 63] and 40\$ → [£24, £26] and [£62, £ 63] × 2 + [£24, £26] Allow extended limits if intention is clear e.g. [£60, £ 65] × 2 + [£24, £26]
	[148, 152]	A1	SC1 [145, 155]
6(c)	25(€) → [33(\$), 35(\$)]	M1	
	[20, 22]	A1	SC1 Correct conversion of their [33(\$), 35(\$)] to £ (must have attempted a conversion of € to \$)
7(a)	At least two of 35 70 105 140 with no factors	M1	
	35 70 105 140 with no other numbers	A1	
7(b)	13 17 29 circled with no other numbers circled	B2	B1 Exactly two of 13 17 29 circled with no other numbers circled

Q	Answer	Mark	Comments
8	1.76	B1	
	138 ÷ 2.2 or [62.7, 62.73] or 62	M1	
	63	A1	
	21	B1	
9(a)	75 + 15 = 90 or 90 – 15 = 75 or 90 – 75 = 15	B1	Allow (because the angles) add up to 90 Must see 90
9(b)	**Alternative method 1**		
	180 – 75 or 180 – 62	M1	
	(c =) 105	A1	
	(b =) 118	A1ft	ft 360 – 62 – 75 – their (c)
	Alternative method 2		
	180 – 75 or 180 – 62	M1	
	(b =) 118	A1	
	(c =) 105	A1ft	ft 360 – 62 – 75 – their (b)
Additional Guidance			
Only ft if b or c are incorrect and 62 is used correctly			

Q	Answer	Mark	Comments
10(a)	$4x$ or $4 \times x$ or $x \times 4$	B1	**not** $x4$
10(b)	**Alternative method 1**		
	$x + 3x +$ their $4x = 48$ or $8x = 48$	M1	ft their (a)
	6	A1ft	ft their (a)
	Linear equation set up and correctly solved algebraically	Q1ft	Strand (ii) Allow answers to 1 d.p. or better
	Alternative method 2		
	48 ÷ their 8	M1	ft their (a)
	6	A1ft	ft their (a)
11(a)	**Alternative method 1** (working in cm)		
	$950 \times 5 \times 5$ or digits 2375	M1	
	23750	A1	
	cm^3 or cubic centimetres	B1	oe
	Alternative method 2 (working in m)		
	$9.5 \times 0.05 \times 0.05$ or digits 2375	M1	
	0.02375	A1	
	m^3 or cubic metres	B1	oe
11(b)	$3 \times 3 \times 3$ or 27	M1	
	their 23 750 ÷ their 27 or [879.6, 880]	M1dep	their 27 must be a volume their 23 750 is their (a)
	879	A1	

Q	Answer	Mark	Comments
12(a)	14.4 ÷ 2 or 7.2	M1	
	7.2 + 14.4	A1	oe eg 7.2 × 3
Additional Guidance			
14.4 × 1.5 oe M1 A1			

Q	Answer	Mark	Comments
12(b)	220 ÷ 21.6 or [10.1, 10.2] or 10 or 60 ÷ 14.4 or [4.1, 4.2] or 4 or 55 ÷ 10.7 or [5.1, 5.1402] or 5 or 60 ÷ 10.7 or [5.6, 5.61] or 5 or 55 ÷ 14.4 or [3.8, 3.82] or 3 or 220 ÷ 14.4 or [15.2, 15.3] or 15 or 60 ÷ 21.6 or [2.7, 2.8] or 2	M1	
	220 ÷ 21.6 or [10.1, 10.2] or 10 and 60 ÷ 14.4 or [4.1, 4.2] or 4 and 55 ÷ 10.7 or [5.1, 5.1402] or 5 or 220 ÷ 21.6 or [10.1, 10.2] or 10 and 60 ÷ 10.7 or [5.6, 5.61] or 5 and 55 ÷ 14.4 or [3.8, 3.82] or 3	M1	
	their 10 and their 4 and their 5 or their 10 and their 4 and their 3	M1	Rounding down their three values
	their 10 × their 4 × their 5 or their 15 × their 2 × their 5 or 150	M1	Must be product of 3 numbers (may be non-integers)
	200	A1	SC2 218 SC1 [218.1, 218.141]
Additional Guidance			
2nd M1 implies the first M1 2nd and 3rd M1 must be one of the specific sets of three given 150 with no working implies M4 A0			

Q	Answer	Mark	Comments
13(a)	Parallelogram or Kite	B1	
13(b)	$3.75^2 + 2^2$	M1	oe eg 14.0625 + 4
	$\sqrt{3.75^2 + 2^2}$	M1dep	oe
	4.25	A1	
14(a)	036	B1	36 is B0
14(b)	180 ± their 36 or their 144	M1	
	216	A1ft	ft 360 – their 144 or 180 + their 36 SC1 144

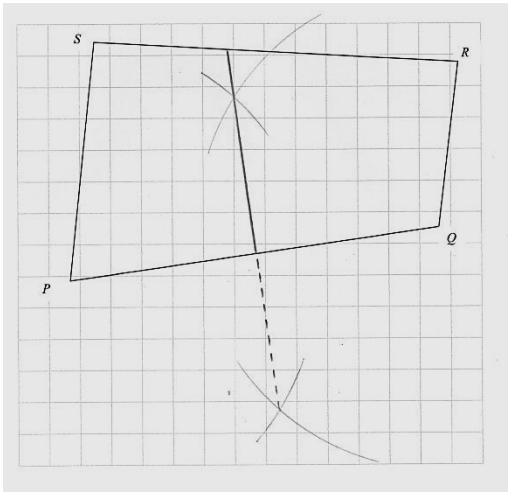
Q	Answer	Mark	Comments
15(a)	**Alternative method 1**		
	6×50 or 300 or 4×50 or 200 or 2×50 or 100	M1	attempt to convert one length on Helen's plan to actual length all lengths $\pm$ 2 mm allow combinations of lengths e.g. 20×50 or 1000
	their $300 \div 7.5$ or their $200 \div 5$ or their $100 \div 2.5$	M1dep	compares with equivalent length on Sidrah's plan all lengths $\pm$ 2 mm e.g. their $1000 \div 25$
	40	A1	
	Alternative method 2		
	$6 \div 7.5$ or 0.8 or $4 \div 5$ or 0.8 or $2 \div 2.5$ or 0.8	$7.5 \div 6$ or 1.25 or $5 \div 4$ or 1.25 or $2.5 \div 2$ or 1.25	M1	attempt to divide corresponding lengths from the two diagrams all lengths $\pm$ 2 mm allow combinations of lengths e.g. $20 \div 25$ or $25 \div 20$
	$50 \times$ their 0.8	50 $\div$ their 1.25	M1dep	Use correctly with 50
	40		A1	

Q	Answer	Mark	Comments

15(b)	**Alternative method 1** (initial area attempt in 'scaled' m^2)			
	2×2 or 4 or 1×1 or 1 or 3×2 or 6	or 3×1 or 3 or 2×1 or 2	M1	converts to lengths in metres and attempts any appropriate area
	their 5×32.75		M1	oe area attempt must be complete e.g. their $(2 \times 2 + 1 \times 1)$ or their $(3 \times 2 - 1 \times 1)$ or their $(3 \times 1 + 2 \times 1)$
	163.75		A1	
	Alternative method 2 (initial area attempt in 'scaled' cm^2)			
	200×200 or 40 000 or 100×100 or 10 000 or 300×200 or 60 000	or 300×100 or 30 000 or 200×100 or 20 000	M1	converts to lengths in centimetres and attempts any appropriate area
	their $50\,000 \times 0.003275$		M1	oe area attempt must be complete
	163.75		A1	
	Alternative method 3 (initial attempt at 'actual' area of scale drawing in cm^2)			
	4×4 or 16 or 2×2 or 4 or 6×4 or 24	or 6×2 or 12 or 4×2 or 8	M1	attempt at any appropriate area
	their $20 \div 4 \times 32.75$ or their $20 \times 50^2 \times 0.003275$		M1	oe uses area scale factor correctly area attempt must be complete
	163.75		A1	

Q	Answer	Mark	Comments
16(a)	2 ÷ 10 (× 60) or 0.2 (× 60)	M1	oe
	12	A1	
Additional Guidance			
Allow incorrect time notation for M1 e.g. 2 ÷ 0.10			

16(b)	Horizontal line from (10:10, 2) to (10:40, 2) and line from (10:40, 2) to (10:55, 0)	B2	B1 Horizontal line from (10:10, 2) to (10:40, 2) or Sloping line (with negative gradient) ending at (10:55, 0)

17	Two pairs of equal intersecting arcs with centres *P* and *Q*	B1	 Strand (ii) SC1 Correct line joining *PQ* and *SR* with no construction arcs
	Correct line joining *PQ* and *SR*	Q1	

Q	Answer	Mark	Comments
18(a)	1100 or 1320 or (10 400 – 6000) × 0.05	M1	oe e.g. 4400 × 0.05
	220	A1	
18(b)	Attempt at gradient or calculation of pay increase per sales increase	M1	Examples 1 100 ÷ 2000 or 0.05 2 50 ÷ 1000 or 0.05 3 100 every 2000
	Uses their gradient correctly or figure correctly	M1dep	Examples 1 800 + 18 000 × their 0.05 2 1400 + 6000 × their 0.05 3 1400 + 3 × 100 4 (12 000 → 1400) 14 000 → 1500 16 000 → 1600 18 000 → 1700
	1700	A1	
Additional Guidance			
1400 + 3 × 100 implies M1M1 14 000 → 1500 16 000 → 1600 18 000 → 1700 implies M1M1A1			

SP/03/14