United Learning

AQA GCSE Mathematics 1MA1

Higher Tier

Targeting Grade 7+

Booklet 1 MS

Non-Calculator

Qu 1

8	–3.5 seen	M1	oe
	–9, –8, –7, –6, –5, –4	A1	Any order

Qu 2

9(a)	Ben and valid reason	B1	eg shortest time Took 4.5 minutes
9(b)	Makes 4 correct statements Must refer to all 3 boys	B4	Max B3 for only referring to 2 boys Max B2 for only referring to 1 boy B1 for each valid statement Valid statements could include: Alan started in the lead (Ben 2nd, Carl 3rd) After 2.5 minutes / 500 m Ben slowed down After 3.5 minutes / 600 m Ben increased speed After 4 minutes / 600 m Carl increased speed After 3 minutes / 800 metres Alan stopped (for 0.25 minutes) After 3.25 minutes Alan set off again Alan and Carl both finish in 5 minutes Ben and Carl both finish at the same speed Finishing order: Ben wins, Alan and Carl tie for 2nd

Qu 3

9	The method will **sometimes** give an answer which is a whole number	B1	
	$\sqrt{64} = 8$ or correctly evaluated example where the answer is a whole number	B1	eg $5^2 - 4^2 = 9$ and 9 is a square number or $5^2 - 4^2 = 3^2$ oe
	Correctly evaluated example where the answer is not a whole number	B1	eg $3^2 - 2^2 = 5$ and 5 is not a square number oe
	Additional Guidance		
	1 or 2 marks can be gained for example(s) even if the decision is incorrect		
	$3^2 - 2^2 = 5$ and 5 is between 4 and 9, implies 5 is not square		B0B0B1

Qu 4

10	$(2x + 3y = 15.5)$ $2x + 2y = 12$	$(2x + 3y = 15.5)$ $3x + 3y = 18$	M1	Equates coefficients
	$y = 3.5$ or $x = 2.5$		A1	oe
	$x = 2.5$ and $y = 3.5$		A1	

Qu 5

10(a)	3 0 3	B2	B1 for 1 or 2 correct
	Additional Guidance		

10(b)	4 or 5 of their points plotted correctly	M1	
	Fully correct smooth curve	A1	
	Additional Guidance		

10(c)	(1, –1)	B1	
	Additional Guidance		

Qu 6

11	$\frac{20}{100} \times 50$ or 10	M1	oe
	2	A1	SC1 for 32
	Additional Guidance		

Qu 7

12	**Alternative method 1**		
	$6^2 + 6^2$ or $36 + 36$ or 72	M1	
	$\sqrt{6^2 + 6^2}$ or $\sqrt{72}$	M1dep	oe
	$\sqrt{72} < 10$	A1	oe eg $\sqrt{72}$ is between 8 and 9
	Alternative method 2		
	$3^2 + 3^2$ or $9 + 9$ or 18	M1	
	$\sqrt{3^2 + 3^2}$ or $\sqrt{18}$	M1dep	oe
	$\sqrt{18} < 5$	A1	oe eg $\sqrt{18}$ is between 4 and 5

Qu 8

13(a)	B (0, 2) and D (6, 5) or B (4, 4) and D (–2, 1)	B2	B1 for one correct or for one correct and one incorrect or B and D reversed or correct diagonal drawn of any length
	Additional Guidance		
	eg $B(0,2)$ and $D(-2, 1)$		B1

13(b)	$\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$	B2	B1 for vector of same size or for any perpendicular vector
	Additional Guidance		

Qu 9

14	20 or 100 or 10	M1	
	400 or 300 from correct rounding to 1 sig fig	M1dep	
	700	A1	
	Additional Guidance		
	$19^2 = 361 \rightarrow 400$ (no other working)		M0M0

Qu 10

15(a)	15 or 16	M1	Reading off at 30
	$\frac{45}{60}$ or $\frac{44}{60}$	A1	oe
	Additional Guidance		

15(b)	[69, 70]	B1	
	Additional Guidance		

15(c)	No and comparative reason	B2	eg No and median is 19 so lower No and nobody scored higher than 77 on Quiz 2 but the maximum score on Quiz 1 was 98 B1 for No and partial reason eg No someone scored less than 10 No the top score was only 77
	Additional Guidance		
	The range is lower on Quiz 2		B0

Qu 11

16	**Alternative method 1**		
	1 part = 6 bricks	M1	oe
	36 (yellow, blue and green)	A1	
	12 (red)	B1	
	36 + 12 = 48	B1	
	Alternative method 2		
	12 (red)	B1	
	36 ÷ 6 or 6	M1	
	their 6 × 2	M1dep	
	12 (yellow)	A1	
	Alternative method 3		
	6 parts = 75%	M1	
	8 parts = 100%	A1	
	1 part = 6 bricks	B1	
	8 × 6 = 48	B1	

Qu 12

17(a)	**Alternative method 1**		
	$\frac{-9--5}{4-2}$ or $\frac{-5--9}{2-4}$ or (2, –5) – (4, –9) = (–2, 4) or (4, –9) – (2, –5) = (2, –4) or $\frac{\text{change in } y}{\text{change in } x}$ or $\frac{\Delta y}{\Delta x}$ or triangle drawn with points *A* and *B* and side lengths of 4 and (–)2 identified or correct explanation of pattern of graph **and** $\frac{-4}{2} = -2$ or $\frac{4}{-2} = -2$	B2	oe fraction eg $\frac{-9+5}{4-2}$ or $\frac{-5+9}{2-4}$ B1 for $\frac{-9--5}{4-2}$ or $\frac{-5--9}{2-4}$ or (2, –5) – (4, –9) = (–2, 4) or (4, –9) – (2, –5) = (2, –4) or $\frac{\text{change in } y}{\text{change in } x}$ or $\frac{\Delta y}{\Delta x}$ or triangle drawn with points *A* and *B* and side lengths of 4 and (–)2 identified or correct explanation of pattern of graph or $\frac{-4}{2} = -2$ or $\frac{4}{-2} = -2$

17(a) cont	**Alternative method 2**		
	Gives $y = -2x + c$ and substitutes (2, –5) or (4, –9) to find $c = -1$ or $y - -5 = -2(x - 2)$ or $y + 5 = -2(x - 2)$ or $y - -9 = -2(x - 4)$ or $y + 9 = -2(x - 4)$ **and** gives $y = -2x - 1$ **and** correctly substitutes and evaluates with the other pair of coordinates to check	B2	B1 for (2, –5) or (4, –9) to find $c = -1$ or $y - -5 = -2(x - 2)$ or $y + 5 = -2(x - 2)$ or $y - -9 = -2(x - 4)$ or $y + 9 = -2(x - 4)$ **or** gives $y = -2x - 1$ and correctly substitutes and evaluates with one or both pair(s) of coordinates
	Alternative method 3		
	$-5 = 2m + c$ and $-9 = 4m + c$ and works out $m = -2$ using a correct algebraic method	B2	oe equations B1 for $-5 = 2m + c$ and $-9 = 4m + c$
	Alternative method 4		
	$-5 = -2(2) + c$ and $-9 = -2(4) + c$ and works out $c = -1$ for both	B2	oe equations B1 for $-5 = -2(2) + c$ and $-9 = -2(4) + c$

17(b)	**Alternative method 1** – uses given point with one from (a) to show gradient = –2		
	$\frac{601--9}{-301-4}$ or $\frac{601--5}{-301-2}$	M1	oe eg $\frac{610}{-305}$ or $\frac{606}{-303}$
	–2 and Yes	A1	Must see working for M1
	Alternative method 2 – correct or no equation shown in (a)		
	Correct method to find $y = -2x - 1$	M1	May be seen in part (a)
	$y = -2x - 1$ and shows that $601 = -2(-301) - 1$ and Yes	A1	
	Alternative method 3 – incorrect equation shown in (a)		
	Substitutes –301 and 601 into their equation from (a)	M1	equation must involve x and y
	Correct evaluation and No	A1ft	
	Alternative method 4 – have gained two marks in (a) by any method		
	uses (2, –5) or (4, –9) to work out $c = -1$	M1	
	$601 = -2(-301) + c$ and $c = -1$ and Yes	A1	
	Alternative method 5 – have shown that $c = -1$ for both points in (a)		
	$601 = -2(-301) + c$	M1	
	$601 = -2(-301) + c$ and $c = -1$ and Yes	A1	

Qu 13

18	**Alternative method 1** – price for 8 bottles		
	Any two (including at least one combination) of Single shops Method to work out cost using one shop Shop A 3 × 1 + 5 × 0.5 or 5.5 or 4 × 1 + 4 × 0.5 or 6 or Shop B 4 × 1 + 4 × 0.5 or 6 or 5 × 1 + 3 × 0.5 or 6.5 or Shop C 8 × 0.7 or 5.6 Combinations Method to work out cost using two shops A and B (1 + 2 × 0.5) + (2 × 1 + 3 × 0.5) or 5.5 or B and C (2 × 1 + 3 × 0.5) + (3 × 0.7) or 5.6 or A and C (2 × 1 + 4 × 0.5) + (2 × 0.7) or 5.4 or (1 × 1 + 2 × 0.5) + (5 × 0.7) or 5.5	M2	oe Values may be in £ throughout M1 for any one single shop or combination
	6 bottles from A and 2 bottles from C with M2 awarded	A1	Condone 2 from A and 2 from C with M2 awarded SC2 6 bottles from A and 2 bottles from C with M1M0 awarded SC1 6 bottles from A and 2 bottles from C with M0M0 awarded

18 cont	**Alternative method 2** – best average cost per bottle		
	A is $\frac{2}{3}$ or B is 0.7 or C is 0.7	M1	Accept 0.66 or 66(p) or better truncation or rounding or 0.67 or 67(p)
	A is $\frac{2}{3}$ and B is 0.7 and C is 0.7	M1	
	6 bottles from A and 2 bottles from C with M2 awarded	A1	Condone 2 from A and 2 from C with M2 awarded SC2 6 bottles from A and 2 bottles from C with M1M0 awarded SC1 6 bottles from A and 2 bottles from C with M0M0 awarded

Qu 14

19	$a + 65 + 115 + c = 360$ or $b + c = 180$	M1	oe oe
	$a + c = 180$ and $b + c = 180$ and $a = b$	A1	oe eg $c = 180 - a$ $b = 180 - (180 - a)$ $= a$
	angles at a point and (co)interior angles	A1	
	Additional Guidance		
	Accept angles round a point for angles at a point		
	Accept allied angles for interior angles		

Qu 15

20	Median ticked and a valid reason for not using mode (eg there is no mode) and a valid reason for not using mean (eg 82 will affect the mean disproportionately)	B2	B1 median ticked or valid reason to reject mean or valid reason to reject mode with any box or no box ticked
	Additional Guidance		
	Accept any indication in place of a tick		
	Ignore non-contradictory statements alongside a correct reason		
	Median ticked with reasons "There is no mode" and "82 would skew the mean"		B2
	No box or mode ticked with reason "Not mean, because of the 82"		B1
	No box or mean ticked with reason "Not mode, all the numbers are different"		B1
	No box or mode ticked with statement that 82 is very large		B0

Qu 16

21	angle $ABC = x$	M1	
	angle $BAC = x$ and alternate segment theorem	M1	
	angle $ABC = x$ and angle $BAC = x$ and alternate segment theorem and two equal angles so isosceles ($AC = BC$)	A1	

Qu 17

22	Full evaluation referencing that the steps are right but the order is wrong, giving the correct order	B2	oe B1 for a partial explanation eg references incorrect order without being specific

Qu 18

23	26 ÷ 1.3 or 20	M1	oe
	their 20 – 4 or 16	M1dep	Dress cost
	4 × 2 or (£)8	M1	26 – 8 = 18
	$\frac{26 - \text{their } 16 - \text{their } 8}{\text{their } 16}$ (× 100) or $\frac{2}{16}$ or $\frac{1}{8}$	M1	$\frac{18 - \text{their } 8}{\text{their } 16}$ (× 100)
	12.5	A1	

Qu 19

24(a)	$\frac{7}{2}$	B1	oe improper fraction eg $\frac{14}{4}$
	Additional Guidance		
	Condone ± on numerator and/or denominator		

24(b)	(16 =) 2^4 or ($\sqrt[3]{16}$ =) $16^{\frac{1}{3}}$ or $\sqrt[4]{16} = 2$ or $4^{\frac{2}{3}}$ or $2\sqrt[3]{2}$	M1	oe
	$2^{\frac{4}{3}}$ or $2^{1\frac{1}{3}}$ or $2^{1.3}$	A1	
	Additional Guidance		
	$\sqrt[3]{16} = 2^4$ not recovered		M0A0

Qu 20

25	**Alternative method 1**		
	15 × 8 or 120 or 3 × 6 or 18	M1	oe total number of hours needed oe total number of hours worked by the 3 machines
	15 × 8 – 3 × 6 or 102	M1dep	oe total number of hours worked by the other 12 machines
	8.5	A1	
	Alternative method 2		
	3 × (8 – 6) or 3 × 2 or 6	M1	oe total number of hours not worked by the three machines
	their 6 ÷ 12 or 0.5	M1dep	oe that number divided by the other 12 machines
	8.5	A1	
	Alternative method 3		
	15 × 8 or 120 or 15 × 6 or 90	M1	oe total number of hours needed oe total number of hours worked in the first 6 hours
	$\frac{15\times8-15\times6}{12}$ or 2.5	M1dep	oe number of remaining hours divided by the other 12 machines
	8.5	A1	
	Additional Guidance		
	Note that 15 ÷ 6 is not a correct method to get 2.5 (unless simplified from 30 ÷ 12), so does not score		