

Mark Scheme

AQA Higher Mock Set B Paper 1

For AQA GCSE Mathematics (8300)

Higher tier • Paper 1 (Non-Calculator)

Total 80 marks

Key to the marks

M	Method mark: for a correct method that could lead to the correct answer.
A	Accuracy mark: for a correct value or answer that follows from a correct method. The method may be implied.
B	Independent mark: for a correct answer or statement; no method needs to be seen.
Q	Quality mark: for a clear, complete and correct explanation or conclusion.
ft	Follow through: credit correct work that uses a wrong value from an earlier step.
dep	Dependent: can only be given if the mark before it has been given.
SC	Special case: credit for a common misreading that still has some mathematical worth.
oe	Or equivalent: accept any equal value or form, e.g. 0.5 for $\frac{1}{2}$.
cao	Correct answer only.
$[a, b]$	Accept any value from a to b inclusive.
3.14 ...	Accept any answer that begins 3.14, e.g. 3.14, 3.142, 3.1416.
()	Working in brackets does not need to be seen.

Give credit for any correct method, including ones not listed here. A correct answer with no working scores full marks unless the question asks for working (for example “show that” or “you must show your working”). If a correct answer is followed by further work that does not change it, ignore the further work. Probabilities must be written as fractions, decimals or percentages.

Indicative grade boundaries

Grade	9	8	7	6	5	4	3
Whole set: Papers 1, 2 and 3 (out of 240)	223	195	168	133	99	65	48
This paper alone, rough guide (out of 80)	74	65	56	44	33	22	16

Indicative only. Based on the real AQA boundaries for June 2023 to June 2026 (median), adjusted for how this set compares in difficulty with the real papers. Grades are awarded on the total for all three papers; the single-paper guide is about one third of the set boundaries.

These are estimates to help you judge performance on a practice paper; real boundaries change every year.

Marking guidance

Q	Answer	Marks	Guidance
1	0.06	B1	0.06
2	48	M1	$\frac{8 \times 0.3}{0.05}$ oe, or 8, 0.3 and 0.05 seen
		A1	48
			<i>Additional guidance:</i> 48 from no working or from an exact calculation scores M0A0. $8 \times 0.3 \div 0.05$ followed by 4.8 or 0.12 scores M1A0. Using 0.29 or 0.050 scores M0.
3	£400	M1	$40 \div (7 - 5)$ or 20, or second = 140 or third = 100
		M1dep	their 20×12 or 240, and $240 \div 3 \times 5$ oe, or $\frac{3}{5}$ of the total = 240
		A1	400
			<i>Additional guidance:</i> £240 as the final answer scores M1M0A0. $40 \div 12$ (treating £40 as the total of the two shares) scores M0M0A0. Algebra, e.g. $\frac{3}{5}T \times \frac{2}{12} = 40$, can score full marks. Answer 400 with no working scores 3 marks.
4	70°	M1	$4x - 10 + 2x + 10 + 2x + 20 = 180$ oe, or $2(4x - 10) + 2(2x + 10) + 2(2x + 20) = 360$ oe
		A1	$x = 20$
		A1	70
			<i>Additional guidance:</i> $8x + 20 = 360$ ($x = 42.5$, answer 160) scores M0A0A0. $x = 20$ as the final answer scores M1A1A0. Angles may be seen on the diagram. Answer 70 with no working scores 3 marks.
5(a)	She expanded $6(2x - 3)$ as $12x - 3$ instead of $12x - 18$ (she did not multiply the 3 by 6)	B1	identifies the error in expanding $6(2x - 3)$, e.g. “ 6×-3 should be -18 ” or “it should be $12x - 18$ ”
			<i>Additional guidance:</i> “She expanded the bracket wrong” with no further detail scores B0. Ignore any comments about later lines, but B0 if a correct line is said to be wrong.
5(b)	$x = \frac{5}{8}$ (or 0.625)	M1	$12x - 18 = 4x - 20 + 7$ oe, or $8x = 5$ oe
		A1	$\frac{5}{8}$ oe, e.g. 0.625
			<i>Additional guidance:</i> Allow one error in expanding for M1 if followed by a correct method to collect terms, e.g. $12x - 3 = 4x - 13 \Rightarrow 8x = -10$. $\frac{5}{8}$ with no working scores 2 marks.

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Q	Answer	Marks	Guidance
Total for Question 5: 3 marks			
6(a)	4, 8, 20	B1	4, 8, 20 and no others (any order)
6(b)	$A \cap B$: 4, 8, 20; A only: 12, 16; B only: 1, 2, 5, 10; outside: 3, 6, 7, 9, 11, 13, 14, 15, 17, 18, 19	B1ft	4, 8, 20 in the intersection, 12 and 16 in A only, 1, 2, 5, 10 in B only (ft their (a) for the intersection)
		B1	3, 6, 7, 9, 11, 13, 14, 15, 17, 18, 19 outside both circles and no other numbers outside <i>Additional guidance:</i> Each number from 1 to 20 must appear exactly once. Condone numbers repeated in a list next to the diagram if the diagram is correct.
6(c)	$\frac{4}{20} = \frac{1}{5}$	B1ft	$\frac{4}{20}$ oe, ft their Venn diagram <i>Additional guidance:</i> Accept 0.2 or 20%. Do not accept 4 out of 20 or 4:20.
Total for Question 6: 4 marks			
7	2400	M1	$\frac{2}{9} \times \frac{3}{4}$ or $\frac{1}{6}$ or $\frac{7}{9} \times \frac{3}{4}$ oe
		M1dep	$\frac{7}{12}$ of the total = 1400 oe, e.g. $1400 \div 7 \times 12$, or $1400 \div \frac{7}{9} = 1800$ and $1800 \div \frac{3}{4}$
		A1	2400 <i>Additional guidance:</i> Treating $\frac{2}{9}$ as a fraction of all the visitors: $1 - \frac{1}{4} - \frac{2}{9} = \frac{19}{36}$, answer 2652.6 ..., scores MOMOA0. Working backwards is acceptable: $1400 \div 7 \times 9 = 1800$ (M1), $1800 \div 3 \times 4$ (M1dep), 2400 (A1). Answer 2400 with no working scores 3 marks.
8	Yes: the train takes $2\frac{1}{4}$ hours (2 h 15 min), so she arrives in London at 12:45 and at the meeting at 12:57	M1	$306 \div 136$ or 2.25 or $2\frac{1}{4}$ or 135 (minutes) oe
		M1dep	12:45 or 12:57, or 2 h 15 min +12 min = 2 h 27 min and 2 h 30 min available oe
		A1	Yes with 12:57, or with 2 h 27 min compared with 2 h 30 min, or with 3 minutes to spare

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> 2.25 hours converted as 2 h 25 min (arrival 12:55, meeting 13:07, No) scores M1MOA0. Alternative: time available on the train = 2 h 30 min – 12 min = 2 h 18 min = 2.3 h (M1), distance in that time = $136 \times 2.3 = 312.8$ km (M1dep), Yes as $312.8 > 306$ (A1). Yes with no working scores 0.
9	$\frac{28}{33}$	M1	$100x = 84.8484 \dots$ and $x = 0.8484 \dots$ oe, or $84.8484 \dots - 0.8484 \dots$
		M1dep	$99x = 84$ or $\frac{84}{99}$
		A1	$\frac{28}{33}$
			<i>Additional guidance:</i> $\frac{84}{99}$ as the final answer scores M1M1A0. Treating the decimal as 0.8444 ... ($\frac{76}{90} = \frac{38}{45}$) scores MOMOA0. $\frac{28}{33}$ with no working scores 3 marks.
10(a)	B has vertices $(-3, -1)$, $(-5, -1)$, $(-5, -2)$, $(-3, -4)$	B2	correct reflection, vertices $(-3, -1)$, $(-5, -1)$, $(-5, -2)$, $(-3, -4)$
		(B1	reflection in $y = x$, vertices $(3, 1)$, $(5, 1)$, $(5, 2)$, $(3, 4)$, or three vertices correct)
			<i>Additional guidance:</i> Ignore the label. Tolerance: vertices must be exact on the grid.
10(b)	Reflection in the y-axis (the line $x = 0$)	B1	reflection
		B1	in the y-axis or in $x = 0$
			<i>Additional guidance:</i> Any mention of a second transformation scores BOB0. “Reflection in $y = 0$ ” or “in the x-axis” scores B1B0. Do not accept “reflected along the y line” for the second B1, but accept “in the line $x = 0$ ”.
Total for Question 10: 4 marks			
11	$x = 4$, $y = -3$	M1	correct method to eliminate one variable, allowing one arithmetic error, e.g. $20x + 15y = 35$ and $18x - 15y = 117$ added, or $12x + 9y = 21$ and $12x - 10y = 78$ subtracted
		A1	$x = 4$ or $y = -3$
		A1	$x = 4$ and $y = -3$

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> Substitution is acceptable, e.g. $y = \frac{7-4x}{3}$ substituted into the second equation (M1). Answers with no working, or from trial and improvement: 0 or 3 marks (a fully correct answer scores 3).
12(a)	50	B1	50
12(b)	The 8th term	M1	at least the terms up to 250 correct (may be in a list), or $2 \times (\sqrt{5})^n = 1250$ oe, or $(\sqrt{5})^n = 625$, or $10 \times 5^k = 1250$ with $k = 3$
		A1	8 or 8th <i>Additional guidance:</i> 4 (counting only the whole-number terms 10, 50, 250, 1250) scores M1A0. 9 (from $2 \times (\sqrt{5})^{n-1} = 1250$, treating the first term as 2) scores M1A0.
Total for Question 12: 3 marks			
13(a)	Median 165 cm (accept 163 to 167); inter-quartile range 35 cm (accept 31 to 39)	B1	median in [163, 167]
		B1	inter-quartile range in [31, 39] <i>Additional guidance:</i> Quartiles given without subtracting score B0 for the inter-quartile range. Condone the answers the wrong way round if clearly labelled.
13(b)	On average the sunflowers in compost <i>P</i> were taller (median about 165 cm against 158 cm). The heights in compost <i>Q</i> were more consistent (IQR 22 cm against about 35 cm).	B1ft	compares medians in context, e.g. "compost <i>P</i> sunflowers were taller on average" (ft their median in (a) compared with 158)
		B1ft	compares inter-quartile ranges in context, e.g. "compost <i>Q</i> heights were more consistent" or "less spread out" (ft their inter-quartile range in (a) compared with 22)

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> Each comparison must be in context (heights or sunflowers) and refer to the right compost. Values alone without a comparison score B0. Comparing ranges is not credited, as the range for compost P cannot be found from the graph. "Compost Q is more consistent because the box is smaller" is acceptable for the second B1.
Total for Question 13: 4 marks			
14	$(2n + 5)^2 - (2n - 1)^2 = 24n + 24 = 24(n + 1)$, which is $24\times$ an integer, so it is a multiple of 24	M1	$4n^2 + 20n + 25$ or $4n^2 - 4n + 1$, or $(2n + 5 + 2n - 1)(2n + 5 - 2n + 1)$ (difference of two squares)
		A1	$24n + 24$, or $(4n + 4) \times 6$
		A1	$24(n + 1)$ and a conclusion, e.g. " $24\times$ an integer" or "which is a multiple of 24"
		<i>Additional guidance:</i> Numerical examples only score MOA0A0. $24n + 24$ with "both terms are multiples of 24" is acceptable for the final A1. $(4n + 4) \times 6$ must be followed by $24(n + 1)$ or a correct statement such as " $4(n + 1) \times 6 = 24(n + 1)$ ".	
15	125	M1	$\frac{3k}{2k+40} = \frac{5}{6}$ oe, or $3:2 = 15:10$ and $5:6 = 15:18$
		M1dep	$k = 25$, or 75 red or 50 green, or $18 - 10 = 8$ parts = 40 (one part = 5)
		A1	125
<i>Additional guidance:</i> 75 or 50 as the final answer scores M1M1A0. 165 (the total after the apples are added) scores M1M1A0. Trial and improvement leading to 125 scores 3 marks if a correct check of both ratios is seen. Answer 125 with no working scores 3 marks.			
16(a)	$16 - 3\sqrt{2}$	M1	at least three of 18, $-6\sqrt{2}$, $3\sqrt{2}$, -2 correct, or $18 - 2$ and $-3\sqrt{2}$
		A1	$16 - 3\sqrt{2}$
<i>Additional guidance:</i> $p = 16$ and $q = -3$ is acceptable. $20 - 3\sqrt{2}$ (from $\sqrt{2} \times (-\sqrt{2}) = +2$) scores MOA0 unless the four terms were seen.			
16(b)	$a = 32$	M1	$\sqrt{50} = 5\sqrt{2}$, or $\sqrt{a} = 4\sqrt{2}$, or $(9\sqrt{2})^2 = 162$ oe
		A1	32
<i>Additional guidance:</i> $a = 8$ (from $\sqrt{a} = 4\sqrt{2}$ and 4×2) scores M1A0. $\sqrt{32}$ as the final answer scores M1A0.			

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Q	Answer	Marks	Guidance
Total for Question 16: 4 marks			
17(a)	$(x - 7)(x + 4)$	B1	$(x - 7)(x + 4)$
17(b)	$x < -4$ or $x > 7$	M1	-4 and 7 identified as critical values (ft their factorisation in (a)), or a sketch with roots -4 and 7
		A1	$x < -4$ or $x > 7$ oe, e.g. $\{x: x < -4\} \cup \{x: x > 7\}$ <i>Additional guidance:</i> $-4 > x > 7$ scores M1A0. $-4 < x < 7$ scores M1A0. $x < -4$ and $x > 7$ ("and") scores M1A1. Condone $x \leq -4$ or $x \geq 7$ for M1 only.
Total for Question 17: 3 marks			
18(a)	101	B1	101
18(b)	$n = -\frac{3}{2}$ (or -1.5)	M1	$5^{\frac{1}{2}}$ and 5^2 seen, or $5^{\frac{1}{2}} \times 5^{-2}$, or $5^{\frac{1}{2}-2}$
		A1	$-\frac{3}{2}$ oe, e.g. -1.5 <i>Additional guidance:</i> $\frac{5}{2}$ or $-\frac{5}{2}$ (adding the powers) scores M1A0 only if both powers are seen. $\frac{1}{4}$ (from $\frac{1}{2} \div 2$) scores M0A0.
Total for Question 18: 3 marks			
19(a)	$n = 16$	M1	$k = 60$ or $t = \frac{60}{\sqrt{n}}$ oe, or $\frac{15}{10} = \frac{6}{\sqrt{n}}$ oe
		A1	16 <i>Additional guidance:</i> 4 as the final answer scores M1A0. Using $t = \frac{k}{n}$ ($k = 360$, $n = 24$) scores M0A0. 16 with no working scores 2 marks.
19(b)	Yes, because $\sqrt{9} = 3$, so $\sqrt{n}$ is multiplied by 3 and $t = \frac{60}{\sqrt{n}}$ is divided by 3	B1	Yes with a correct reason, e.g. " $\sqrt{9} = 3$ " or a correct numerical example such as $n = 4$, $t = 30$ and $n = 36$, $t = 10$ <i>Additional guidance:</i> Yes with no reason, or with "it is inverse proportion" only, scores B0.
Total for Question 19: 3 marks			
20	$\frac{3x+7}{x+2}$	B1	$(3x+7)(3x-7)$
		B1	$(3x-7)(x+2)$
		B1	$\frac{3x+7}{x+2}$ <i>Additional guidance:</i> The final B1 is for the answer from both correct factorisations. Do not ignore further work, e.g. $\frac{3x+7}{x+2} = \frac{3x}{x} + \frac{7}{2}$ scores B1B1B0.
21	1.4 m	M1	$\frac{0.8}{1.8}$ or $\frac{4}{9}$ or $\frac{1.8}{0.8}$ or $\frac{9}{4}$ or 2.25 oe
		M1dep	$\sqrt{\frac{4}{9}}$ or $\frac{2}{3}$ or $\sqrt{\frac{9}{4}}$ or $\frac{3}{2}$ or 1.5
		A1	1.4

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> $2.1 \times \frac{4}{9} = 0.93 \dots$ scores M1MOAO. 140 cm is acceptable with units changed. Answer 1.4 with no working scores 3 marks.
22(a)	(180, -1)	B1	(180, -1)
22(b)	107.46° and 252.54°	B1	107.46 or 252.54
		B1	107.46 and 252.54
			<i>Additional guidance:</i> 287.46 (from $360 - 72.54$, which solves $\cos x = 0.3$) scores B0 for that value. Two correct values and one extra incorrect value scores B1.
Total for Question 22: 3 marks			
23(a)	First: green $\frac{8}{12}$, mint $\frac{4}{12}$; second after green: $\frac{7}{11}$, $\frac{4}{11}$; second after mint: $\frac{8}{11}$, $\frac{3}{11}$	B1	$\frac{8}{12}$ and $\frac{4}{12}$ oe
		B1	$\frac{7}{11}$, $\frac{4}{11}$, $\frac{8}{11}$, $\frac{3}{11}$ in the correct positions
			<i>Additional guidance:</i> Accept equivalent fractions, decimals to 2 d.p. or percentages. Second branches with denominator 12 (with replacement) score B0 for those branches.
23(b)	Yes: $P(\text{same}) = \frac{68}{132} = \frac{17}{33}$ and $P(\text{different})$ $= \frac{64}{132} = \frac{16}{33}$	M1	$\frac{8}{12} \times \frac{7}{11}$ or $\frac{4}{12} \times \frac{3}{11}$ oe, or $\frac{8}{12} \times \frac{4}{11}$ oe (ft their tree)
		M1dep	$\frac{56}{132} + \frac{12}{132}$ or $\frac{68}{132}$ oe, or $2 \times \frac{32}{132}$ or $\frac{64}{132}$ oe
		A1	Yes with $\frac{68}{132}$ and $\frac{64}{132}$ oe, or with $\frac{68}{132} > \frac{1}{2}$ oe, or with $\frac{64}{132} < \frac{1}{2}$ oe
			<i>Additional guidance:</i> Working with replacement: $P(\text{same}) = \frac{80}{144}$ scores MOMOAO (no ft from a with-replacement tree for A1). Decimals must be correct to 2 d.p. (0.515 ... and 0.484 ...). Yes with no working scores 0.
Total for Question 23: 5 marks			
24	$4\sqrt{3}$ cm	M1	$AC = \sqrt{3}BC$ oe, or $BC = \frac{AC}{\sqrt{3}}$ oe, or $AB = 2BC$ and $AC = \sqrt{3}BC$
		M1dep	$\frac{1}{2} \times x \times \sqrt{3}x = 24\sqrt{3}$ oe, or $x^2 = 48$
		A1	$4\sqrt{3}$

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> Alternative: area $= \frac{1}{2} \times AB \times BC \times \sin 60^\circ$ with $AB = 2x$ gives $\frac{\sqrt{3}}{2}x^2$ (M1M1). $\sqrt{48}$ as the final answer scores M1M1A0. Using $\tan 60^\circ = \frac{1}{\sqrt{3}}$ ($x^2 = 144$, $x = 12$) scores M0M0A0. Any decimal working scores at most M1M1A0.
25	$(3 + 2\sqrt{3}, -3 + 2\sqrt{3})$ and $(3 - 2\sqrt{3}, -3 - 2\sqrt{3})$	M1	$x^2 + (x - 6)^2 = 42$ oe, or $(y + 6)^2 + y^2 = 42$ oe
		M1dep	$x^2 - 6x - 3 (= 0)$ or $2x^2 - 12x - 6 (= 0)$ oe, or $y^2 + 6y - 3 (= 0)$ oe
		M1dep	correct method to solve their three-term quadratic, e.g. $(x - 3)^2 = 12$ or $\frac{6 \pm \sqrt{36+12}}{2}$ oe
		A1	$x = 3 \pm 2\sqrt{3}$, or $y = -3 \pm 2\sqrt{3}$
		A1	$(3 + 2\sqrt{3}, -3 + 2\sqrt{3})$ and $(3 - 2\sqrt{3}, -3 - 2\sqrt{3})$, correctly paired
			<i>Additional guidance:</i> Unsimplified surds, e.g. $x = 3 \pm \sqrt{12}$ or $\frac{6 \pm \sqrt{48}}{2}$, score the third M1 but A0A0 unless simplified later. $(x - 6)^2 = x^2 + 36$ leading to $x = \pm\sqrt{3}$ scores M1M0M0A0A0. Decimal answers only (e.g. 6.46, 0.46) score at most M1M1M1A0A0.