

Mark Scheme

AQA Higher Mock Set A Paper 3

For AQA GCSE Mathematics (8300)

Higher tier • Paper 3 (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)	219	191	164	130	96	62	45
This paper alone, rough guide (out of 80)	73	64	55	43	32	21	15

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	3.65 km	M1	$14.6 \times 25\,000$ or 365 000 seen, or $25\,000 \div 100\,000$ or 0.25 (km per cm)
		A1	3.65 oe <i>Additional guidance:</i> Digits 365 with an incorrect place value (e.g. 36.5 or 0.365) and 365 000 seen scores M1A0.
2	$27 - 4n$	B1	$27 - 4n$
3	$46.3 \leq l < 46.4$	B1	46.3 in the left box
		B1	46.4 in the right box <i>Additional guidance:</i> Accept 46.399 for the right-hand value. $46.25 \leq l < 46.35$ scores B0B0.
4	7.83 m (to 3 s.f.)	M1	$2.9^2 - 1.35^2$ or 6.5875 or 6.59
		M1dep	$2 \times (\sqrt{6.5875} + 1.35)$ oe, or 2.56(6 ...) or 2.57 seen
		A1	[7.83, 7.84] <i>Additional guidance:</i> Accept 7.8 with 7.83 ... seen. $2.9^2 + 1.35^2$ ($\sqrt{10.2325} = 3.198 \dots$) scores M0. Width only (2.57) as the answer scores M1M1A0.
5	Medium bag (about £2.33 per kg)	M1	3×1.2 or 3.6 or 3×0.2 or 0.6
		M1	three comparable values, e.g. 2.9(0), 2.33 and 2.38 (£/kg) or 0.344 ..., 0.428 ... and 0.420 ... (kg per £)
		A1	Medium with correct comparable values <i>Additional guidance:</i> Values may be for any common amount, e.g. 18 kg costs £52.20, £42 and £42.84. Comparable values may be truncated or rounded, but must be correct to 2 s.f. and allow a decision. Medium with no working scores M0M0A0. Using 3 kg for medium (2.8) can score M0M1A0.
6	26	M1	12×16 or 192, or 16×0.75 or 12
		M1dep	$(368.50 - 8.50 - 192) \div 12$ oe or 14
		A1	26 <i>Additional guidance:</i> Ignoring the delivery charge gives $(368.50 - 192) \div 12 = 14.7 \dots$: M1M0A0. Answer 14 scores M1M1A0. A trial-and-improvement method reaching £368.50 for 26 shirts scores full marks.

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Q	Answer	Marks	Guidance
7(a)	Monday: 0.8; Tuesday: 0.65, 0.35, 0.65	B1	0.8 on Monday 'Not late' branch
		B1	0.65, 0.35, 0.65 on the Tuesday branches <i>Additional guidance:</i> Accept equivalent fractions or percentages.
7(b)	0.48	M1	$1 - 0.8 \times 0.65$ or $0.2 \times 0.35 + 0.2 \times 0.65 + 0.8 \times 0.35$ oe (ft their tree)
		A1	0.48 oe <i>Additional guidance:</i> $0.2 \times 0.35 + 0.8 \times 0.35$ (= 0.35) or $0.2 + 0.35$ (= 0.55) scores M0.
Total for Question 7: 4 marks			
8	14 cm	M1	$2(3x - 2) + 2(x + 4) = 2x + 5 + 2x + 5 + x + 9$ oe, or $8x + 4 = 5x + 19$ oe
		M1dep	$3x = 15$ or $x = 5$
		A1	14 <i>Additional guidance:</i> Answer 5 scores M1M1A0. Using a perimeter of $4x + 2$ for the rectangle gives $x = -17$: M0.
9	No. Her average speed was $28.8 \div 2.15 = 13.4$ km/h, which is less than 13.5 km/h	M1	$16.8 \div 12$ or 1.4 (hours) or 84 (minutes)
		M1	$45 \div 60$ or 0.75 (hours), or $12 \div 0.75$ or 16 (km/h)
		M1	$(16.8 + 12) \div (1.4 + 0.75)$ oe, or $28.8 \div$ their total time in hours, or $28.8 \div 129 \times 60$
		A1	No with [13.39, 13.4] <i>Additional guidance:</i> Alternative: at 13.5 km/h, 28.8 km takes $28.8 \div 13.5 = 2.13 \dots$ hours (2 h 8 min), but she took 2.15 hours (2 h 9 min), so No: M1M1M1A1. The mean of the two speeds, $(12 + 16) \div 2 = 14$, with Yes scores MOM1MOA0. 0.45 used for 45 minutes ($28.8 \div 1.85 = 15.6$) can score M1MOM1A0. Yes or No with no working scores 0.
10	Angle $Q = 52^\circ$ (alternate), angle $R = 180 - 115 = 65^\circ$ (straight line), $x = 180 - 52 - 65 = 63^\circ$ (triangle)	M1	52 at Q inside the triangle (may be on the diagram)

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Q	Answer	Marks	Guidance
		M1	180 – 115 or 65 at R inside the triangle (may be on the diagram)
		A1	180 – 52 – 65 = 63 with no errors <i>Additional guidance:</i> Alternative: angle between the upper line and PR on the right of P is 180 – 115 = 65 (co-interior angles) and $x = 180 – 52 – 65$: mark equivalently. Reasons are not required, but working must lead to 63; the answer 63 alone scores MOMOAO.
11(a)	Box plot with whiskers to 12 and 31, box from 17 to 25, median at 21	B2	fully correct box plot (tolerance $\pm \frac{1}{2}$ small square)
		(B1)	three or four of the five values plotted correctly <i>Additional guidance:</i> Ignore a box plot that is drawn in the Brand B position if it is fully correct. The box must be joined to the whiskers.
11(b)	On average Brand B lasts longer (median 23 > 21); Brand B is more consistent (IQR 5 < 8)	B1	compares medians in context, e.g. on average Brand B batteries last longer
		B1	compares IQR or range in context, e.g. Brand B battery lives are more consistent <i>Additional guidance:</i> Values need not be stated, but if given they must be correct (21 and 23; IQR 8 and 5; range 19 and 14). Ignore comparisons of maximum or minimum values. Do not accept 'Brand B is better' without a reason. ft their box plot from part (a).
Total for Question 11: 4 marks			
12(a)	360 000	B1	360 000
12(b)	No. There are 150 000 codes, but half of 360 000 is 180 000	M1	$6 \times 5 \times 10 \times 10 \times 10 \times 5$ oe or 150 000
		A1	No and 150 000 and (180 000 or $360\,000 \div 150\,000 = 2.4$) <i>Additional guidance:</i> ft their answer to part (a) for the A mark. $150\,000 \div 360\,000 = \frac{5}{12}$ with No scores M1A1.
Total for Question 12: 3 marks			
13	No. It takes 75 minutes, so it is full at 12:05 pm	M1	0.35×1000 or 350, or $80 \div 1000$ or 0.08

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Q	Answer	Marks	Guidance
		M1dep	$(350 - 80) \div 3.6$ or 75, or $0.27 \div 0.0036$, or 70×3.6 or 252
		A1	No with 12:05 (pm) or $75 > 70$ (minutes) or $80 + 252 = 332 < 350$ or $252 < 270$ <i>Additional guidance:</i> The time from 10:50 am to 12 noon is 70 minutes. $350 \div 3.6 = 97.2 \dots$ (ignoring the 80 litres) scores M1M0A0. 75 minutes with an incorrect finishing time or the wrong conclusion scores M1M1A0. No with no working scores 0.
14(a)	$(3x - 5)(x + 4) = 3x^2 + 7x - 20$, which is not $3x^2 - 7x - 20$	B1	$(3x - 5)(x + 4)$ expanded to $3x^2 + 7x - 20$ oe, or $3x^2 + 12x - 5x - 20$, or substitutes $x = -4$ (or $x = \frac{5}{3}$) into $3x^2 - 7x - 20$ and shows the result is not 0 (e.g. 56 or $-23.3 \dots$) <i>Additional guidance:</i> Accept 'the middle term should be $-7x$ but Ali's brackets give $+7x$ ' oe. Do not accept 'the signs are the wrong way round' on its own.
14(b)	$x = -\frac{5}{3}$ or $x = 4$	M1	$(3x + 5)(x - 4) (= 0)$, or $\frac{7 \pm \sqrt{(-7)^2 - 4 \times 3 \times (-20)}}{2 \times 3}$ oe, or $\frac{7 \pm \sqrt{289}}{6}$
		A1	$-\frac{5}{3}$ and 4 <i>Additional guidance:</i> Accept $-1\frac{2}{3}$ or $-1.66 \dots$ or -1.67 for $-\frac{5}{3}$. Answers only with no working: both correct scores M1A1, one correct scores M0A0. $\frac{5}{3}$ and -4 (Ali's answers) score M0A0.
Total for Question 14: 3 marks			
15(a)	She multiplied the bases ($5 \times 5 = 25$). The base should stay as 5, so the answer is 5^{-3}	B1	She multiplied the 5s (bases) oe, e.g. 'the base should stay as 5', or 'it should be 5^{-3} ' <i>Additional guidance:</i> Do not accept 'she added the powers' or 'she should have multiplied the powers'. Ignore incorrect evaluation of 5^{-3} if the mistake is identified.
15(b)	$a = 8, b = 3, c = 1$	B2	$a = 8, b = 3$ and $c = 1$
		(B1)	two of $a = 8, b = 3, c = 1$, or 34 560 seen, or $2^8 \times 3^3 \times 5$ seen
Total for Question 15: 3 marks			
16(a)	D	B1	D
16(b)	A	B1	A

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Q	Answer	Marks	Guidance
Total for Question 16: 2 marks			
17	5000 newtons/m ²	M1	25 × 12 or 300 or 0.25 × 0.12 or 0.03
		M1	150 ÷ the area of a face in m ² , e.g. 150 ÷ 0.03, or 150 ÷ 300 × 10 000, or 0.5 (N/cm ²) × 10 000
		A1	5000
			<i>Additional guidance:</i> 150 ÷ 300 = 0.5 as the answer scores M1MOA0. Largest face (0.1 m ² , 1500) scores M0M1A0. Using 1 m ² = 100 cm ² gives 50: M1MOA0.
18	$y = \frac{4}{3}x + 1$	B1	(3, 5)
		M1	$\frac{2-8}{7-(-1)}$ oe or $-\frac{6}{8}$ or $-\frac{3}{4}$
		M1dep	$\frac{4}{3}$ oe used as the gradient of L (ft their gradient of AB)
		A1	$y = \frac{4}{3}x + 1$ oe in the form $y = mx + c$ <i>Additional guidance:</i> Accept $y = 1.33 \dots x + 1$ only if $\frac{4}{3}$ is seen. $y - 5 = \frac{4}{3}(x - 3)$ not rearranged scores B1M1M1A0.
19	$3n^2 - 5n + 7$	M1	$3n^2$ seen (may be in an incorrect expression)
		M1dep	2, -3, -8, -13, -18 oe seen, or $-5n + 7$, or a correct method to find b and c in $3n^2 + bn + c$
		A1	$3n^2 - 5n + 7$ oe
			<i>Additional guidance:</i> Equations method: $a + b + c = 5$, $3a + b = 4$, $2a = 6$ leading to $a = 3$, $b = -5$, $c = 7$. Answer $6n^2 \dots$ scores M0.
20(a)	4.13 m	M1	$4.6^2 + 3.8^2 - 2 \times 4.6 \times 3.8 \times \cos 58$
		M1dep	[17.07, 17.08] or $\sqrt{17.07 \dots}$
		A1	[4.13, 4.132] <i>Additional guidance:</i> Calculator in radians gives $BC^2 = 31.4 \dots$ ($BC = 5.60 \dots$): M1MOA0.
20(b)	No. The area is 7.41 m ² but 3 tins only cover 7.2 m ²	M1	$\frac{1}{2} \times 4.6 \times 3.8 \times \sin 58$ oe
		A1	No with [7.41, 7.412] and 7.2, or No with $[7.41, 7.412] \div 2.4 = [3.08, 3.09]$ <i>Additional guidance:</i> Accept a correct method using their BC and another angle found correctly. Accept 7.4 with 7.41... seen. $\frac{1}{2} \times 4.6 \times 3.8 = 8.74$ scores MOA0. No with no working scores 0.

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Q	Answer	Marks	Guidance
Total for Question 20: 5 marks			
21	Shape with vertices $(-1, -1)$, $(-5, -1)$, $(-3, -3)$, $(-1, -3)$	B2 (B1)	correct shape with vertices $(-1, -1)$, $(-5, -1)$, $(-3, -3)$, $(-1, -3)$ three vertices correct, or correct size and orientation in the wrong position, or scale factor 2 about $(1, 1)$ (vertices $(3, 3)$, $(7, 3)$, $(5, 5)$, $(3, 5)$)
22	56	M1 M1dep M1dep A1	$7x - 8$ and $4x + 4$ oe, e.g. $f - 8$ and $\frac{4}{7}f + 4$ $3(7x - 8) = 4(4x + 4)$ oe $5x = 40$ or $x = 8$ oe 56 <i>Additional guidance:</i> Answer 88 (total books) or 32 (non-fiction) scores M1M1M1A0. Trial of multiples of 7: 4, e.g. $56, 32 \rightarrow 48, 36$ and $48:36 = 4:3$ shown, scores full marks; answer 56 with no working scores 4.
23	$AM = CM$ (midpoint); angle $PAM =$ angle QCM (alternate angles, $AB \parallel DC$); angle $AMP =$ angle CMQ (vertically opposite); so congruent by ASA	B1 B1 B1 Q1	$AM = CM$ with reason (M is the midpoint of AC) angle $PAM =$ angle QCM with reason (alternate angles) angle $AMP =$ angle CMQ with reason (vertically opposite angles) fully correct proof with all reasons and the conclusion ASA (or AAS) <i>Additional guidance:</i> Alternative pair: angle $APM =$ angle CQM (alternate angles) may replace either angle pair. 'Z angles' is not an acceptable reason. Do not award Q1 if SAS, SSS or RHS is given as the condition. Angles may be identified with three letters or clearly marked on the diagram.
24	7.07 (the points are $(-3, 7)$ and $(2, 2)$; $AB = \sqrt{50} = 5\sqrt{2}$)	M1 M1dep	$4 - x = 2x^2 + x - 8$ oe, or $x + 2x^2 + x - 8 = 4$, or $y = 2(4 - y)^2 + (4 - y) - 8$ $x^2 + x - 6 (= 0)$ or $2x^2 + 2x - 12 (= 0)$ oe three-term quadratic

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Q	Answer	Marks	Guidance
		A1	$(-3, 7)$ and $(2, 2)$, or $x = -3, y = 7$ and $x = 2, y = 2$
		M1	$(2 - (-3))^2 + (2 - 7)^2$ oe or $\sqrt{50}$ (ft their two points)
		A1	$[7.07, 7.071]$ or $5\sqrt{2}$ <i>Additional guidance:</i> Correct factorisation $(x + 3)(x - 2)$ or correct use of the quadratic formula implies M1M1. Points from trial and improvement or with no algebraic method score M0M0A0, but the Pythagoras M1 (and then A1) can still be awarded using their two points. x values only, then $AB = 2 - (-3) = 5$, scores M1M1A0M0A0.
25	$2.5 < x < 4.5$	M1	$(x + 3)(2x - 5) < 30$ expanded to $2x^2 + x - 45 (< 0)$ oe, may use $=$ or other sign
		M1dep	$(2x - 9)(x + 5)$ or 4.5 and -5 (from a correct method)
		A1	$-5 < x < 4.5$ or $x < 4.5$ stated as the upper limit
		B1	$2.5 < x < 4.5$ oe, e.g. $\{x: 2.5 < x < 4.5\}$ <i>Additional guidance:</i> The B1 can be awarded for $2x - 5 > 0$ (or $x > 2.5$) used with their upper limit, e.g. $2.5 < x < k$, as long as the final answer is a single interval. Answer $-5 < x < 4.5$ scores M1M1A1B0.