

Mark Scheme

Edexcel Higher Mock Set A Paper 1

For Pearson Edexcel GCSE Mathematics (1MA1)

Higher tier • Paper 1 (Non-Calculator)

Total 80 marks

Key to the marks

M	Method mark: for a correct method or a correct part of a method.
P	Process mark: for a correct step in the process of solving a problem.
A	Accuracy mark: for a correct answer or value after a correct method or process.
B	Unconditional accuracy mark: no method needs to be seen.
C	Communication mark: for a fully correct statement or conclusion with no contradiction.
()	A mark in brackets, e.g. (B1), is an alternative partial mark when full marks are not given.
oe	Or equivalent.
cao	Correct answer only.
ft	Follow through from an earlier answer.
isw	Ignore subsequent working once the correct answer is seen.
awrt	Answer which rounds to.
sc	Special case.
dep	Dependent on the mark before it.
“ ”	A value in quotation marks, e.g. “12” $\times$ 5, must come from a correct method, but may contain an arithmetic slip.

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)	209	179	149	116	84	52	36
This paper alone, rough guide (out of 80)	70	60	50	39	28	17	12

Indicative only. Based on the real Pearson Edexcel 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	17	M1	for a complete method to divide, eg $612 \div 36$ or $61.2 \div 3.6$ with a complete written method (long division, short division or a build-up method); condone one arithmetic error
		A1	cao <i>Additional guidance:</i> An answer of 1.7 or 170 from a correct division method scores M1A0.
2	$3\frac{8}{9}$	M1	for writing both mixed numbers as improper fractions, eg $\frac{7}{4}$ and $\frac{20}{9}$
		M1	for a correct method to multiply, eg $\frac{7 \times 20}{4 \times 9} (= \frac{140}{36})$ or $\frac{35}{9}$
		A1	for $3\frac{8}{9}$ cao <i>Additional guidance:</i> $\frac{35}{9}$ or $\frac{140}{36}$ as the final answer scores M1M1A0. Multiplying the whole-number parts and the fraction parts separately scores M0.
3	No. The price before was £48 ($57.60 \div 1.2$), not £46.08	M1	for $57.60 \div 1.2$ oe, or $57.60 \div 120 (= 0.48)$, or $57.60 \div 12 (= 4.8)$, or for 46.08×1.2 oe ($= 55.296$)
		C1	for “No” with 48 (accept 48.00), or “No” with 55.296 (or 55.30) and a comparison with 57.60 <i>Additional guidance:</i> “No” with no correct supporting figures scores M0C0. “No” with only a description of the method, and no figures, scores M0C0.
4	27	P1	for $168 \div 7 \times 3 (= 72)$ or $168 \div 7 \times 4 (= 96)$
		P1	for $168 - “72” (= 96)$, or for $“96” \div (3 + 5) (= 12)$
		P1	for $“12” \times 5 (= 60)$ or $“96” \times \frac{5}{8}$
		P1	for $“60” \times \frac{45}{100}$ oe
		A1	cao <i>Additional guidance:</i> Sharing all 168 members in the ratio 3:5 (giving 105 woodwind) scores P1 only for 72 or 96 seen, but the fourth P1 can be awarded for $“105” \times \frac{45}{100} (= 47.25)$. An answer of 33 (55% of 60) can score P1P1P1P0A0.
5	22.5°	P1	for finding the interior angle of the octagon, eg $180 - 360 \div 8 (= 135)$ or $(8 - 2) \times 180 \div 8 (= 135)$, or the exterior angle $360 \div 8 (= 45)$

(continued)

Q	Answer	Marks	Guidance
		P1	for $360 - 90 - "135"$ (= 135) for angle PBC
		A1	for 22.5 cao
		C1	(dep on P2) for appropriate reasons linked to their method, which must include angles around a point add up to 360° and base angles of an isosceles triangle are equal (or an equivalent statement that $BC = BP$) <i>Additional guidance:</i> Angles may be seen on the diagram. Answers of 67.5 or 45 score P1POAOC0 if 135 is seen. Reasons for the octagon angle (eg sum of exterior angles is 360° , or sum of interior angles is $(n - 2) \times 180^\circ$) are not required for C1, but any reason given must be correct.
6(a)	-1, -2, 2	B2	for all three correct: -1, -2, 2
		(B1)	for one or two correct
6(b)	Smooth curve through (-2, 7), (-1, 2), (0, -1), (1, -2), (2, -1), (3, 2), (4, 7)	M1	(dep on at least B1 in (a)) for at least 5 points plotted correctly from their table
		A1	for a fully correct smooth curve through all 7 correct points <i>Additional guidance:</i> Ignore any curve drawn outside $-2 \leq x \leq 4$. Line segments joining the points score M1A0.
6(c)	$x \approx -1.45$ and $x \approx 3.45$	M1	for drawing the line $y = 4$, or for one correct solution in range, ft their graph
		A1	for answers in the ranges -1.4 to -1.5 and 3.4 to 3.5 <i>Additional guidance:</i> ft their curve if the line $y = 4$ is used correctly. Reading the graph at $y = 0$ (giving -0.4 and 2.4) or at $y = -5$ scores M0A0. Exact values $1 \pm \sqrt{6}$ from algebra score M1A1 only if values in range are also given.
Total for Question 6: 6 marks			
7	4.84 minutes	M1	for use of $f \times x$ with x consistent within intervals (including the end points); allow one error
		M1	(dep) for use of all correct midpoints and $\sum fx \div \sum f$, eg $(7 + 36 + 75 + 70 + 54) \div 50$

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Q	Answer	Marks	Guidance
		A1	for 4.84 oe <i>Additional guidance:</i> 242 seen implies the first M1. Using end points (2, 4, 6, 8, 10 giving 5.84) scores M1M0A0. 242 ÷ 5 (= 48.4) scores M1M0A0.
8	$\frac{49}{4}$	M1	for a correct first step, eg $\frac{343}{8}$ or $\frac{7}{2}$ or $\frac{2}{7}$ or $\frac{4}{49}$ or $\frac{64}{117649}$ seen
		A1	for $\frac{49}{4}$ oe, eg $12\frac{1}{4}$ or 12.25
9	calculator £9, geometry set £4	P1	for forming two correct equations, eg $5c + 2g = 53$ and $3c - 5g = 7$ oe
		P1	for a correct process to eliminate one variable (condone one arithmetic error), eg $25c + 10g = 265$ and $6c - 10g = 14$ added, or $15c + 6g = 159$ and $15c - 25g = 35$ subtracted
		P1	(dep on P2) for substituting their value into one of the equations, or for a correct process to eliminate the other variable
		A1	for calculator £9 and geometry set £4 <i>Additional guidance:</i> Correct answers from trial and improvement with no algebraic method score P0P0P0A0 unless both conditions are checked ($5 \times 9 + 2 \times 4 = 53$ and $3 \times 9 - 5 \times 4 = 7$), when award P1P0P0A1 max 2. Using $3c + 7 = 5g$ can score P0 for the equations but the second P1 for a correct elimination process with their equations.
10(a)	See the completed Venn diagram	B2	for a fully correct Venn diagram
		(B1)	for any three regions correct
10(b)	No. $P(A \cup B) = \frac{11}{18}$, which is less than $\frac{2}{3} = \frac{12}{18}$	M1	for $\frac{11}{18}$ oe, ft their Venn diagram, or for 7 numbers outside $A \cup B \left(\frac{7}{18}\right)$ with a comparison with $\frac{1}{3}$
		C1	for “No” with a correct comparison, eg $\frac{11}{18} < \frac{12}{18}$ or $0.61 < 0.67$ or $\frac{7}{18} > \frac{6}{18}$, ft their Venn diagram <i>Additional guidance:</i> Counting the overlap twice ($\frac{14}{18}$, then “Yes”) scores MOC0. “No” with no supporting probability scores MOC0.
			Total for Question 10: 4 marks

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Q	Answer	Marks	Guidance
11	$990x = 243$, so $x = \frac{243}{990} = \frac{27}{110}$	M1	for two recurring decimals that, when subtracted, give a terminating decimal, eg $1000x = 245.4545 \dots$ and $10x = 2.4545 \dots$
		M1	for a correct subtraction leading to a fraction, eg $990x = 243$ or $\frac{243}{990}$, or $\frac{24.3}{99}$
		A1	for completing the proof, eg $\frac{243}{990} = \frac{27}{110}$ <i>Additional guidance:</i> Using $100x$ and x (giving $99x = 24.3$) can score full marks if correctly completed. Answers that just show $27 \div 110 = 0.24545 \dots$ score 0.
12	$(30 + 4\pi)$ cm	P1	for a process to find the arc length, eg $\frac{60}{360} \times 2 \times \pi \times 12 (= 4\pi)$
		P1	for a process to find OC , eg $\sqrt{12^2 + 5^2} (= 13)$
		A1	for $30 + 4\pi$ cao <i>Additional guidance:</i> Including OB (giving $42 + 4\pi$) scores P1P1A0. Accept $a = 30$, $b = 4$.
13(a)	about 0.6 (accept 0.5 to 0.7)	M1	for a tangent drawn at $t = 8$
		M1	(dep) for a method to find the gradient of their tangent, eg $\frac{\text{difference in } v}{\text{difference in } t}$
		A1	for an answer in the range 0.5 to 0.7 <i>Additional guidance:</i> $6.4 \div 8 (= 0.8)$ or a chord from $(0, 0)$ scores M0M0A0.
13(b)	No. The graph is less steep at $t = 16$ than at $t = 8$, and the gradient is the acceleration, so her acceleration is less at 16 seconds.	C1	for “No” with a correct reason, eg “the gradient (of the curve) is smaller at 16 seconds”, “the graph is less steep at $t = 16$ ”, or a tangent at $t = 16$ with gradient in the range 0.1 to 0.3 compared with their (a) <i>Additional guidance:</i> “No, because her velocity is higher” scores C0. Do not accept “No” with no reason.
Total for Question 13: 4 marks			
14	$m = 500$	M1	for $m = kr^3$ or $108 = k \times 3^3$ oe
		M1	for $k = 4$ or $m = 4r^3$
		A1	cao

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> Alternative method: M1 for $\left(\frac{5}{3}\right)^3$ or $\frac{125}{27}$, M1 for $108 \times \frac{125}{27}$, A1 500. Using $m = kr$ or $m = kr^2$ scores M0.
15	$x = \frac{2y+3}{y-4}$	M1 M1 M1 A1	for multiplying both sides by $(x-2)$, eg $y(x-2) = 4x+3$ for isolating the terms in x on one side, eg $xy-4x = 2y+3$ oe for factorising, eg $x(y-4) = 2y+3$ oe for $x = \frac{2y+3}{y-4}$ oe, eg $\frac{-2y-3}{4-y}$ <i>Additional guidance:</i> Condone one sign error in the second M1 only. The final answer must start “ $x =$ ” (or x on the answer line).
16	8	P1 P1 P1 A1	for $\frac{n}{n+3} \times \frac{n-1}{n+2}$ oe for forming an equation and removing the fractions, eg $14n(n-1) = 5(n+3)(n+2)$ for reducing to a correct quadratic, eg $9n^2 - 39n - 30 = 0$ or $3n^2 - 13n - 10 = 0$, and a correct method to solve it, eg $(3n+2)(n-5)$ for 8 cao <i>Additional guidance:</i> An answer of 5 (the value of n) can score P1P1P1A0. Trials (eg $\frac{5}{8} \times \frac{4}{7} = \frac{5}{14}$) leading to 8 with no algebraic method score P1 only.
17(a)	$7\sqrt{5}$	B1	for $7\sqrt{5}$ cao
17(b)	$5\sqrt{3}$	M1 A1	for multiplying the numerator and denominator by $\sqrt{12}$ or $\sqrt{3}$, eg $\frac{30\sqrt{12}}{12}$ or $\frac{15\sqrt{3}}{3}$, or for $\sqrt{12} = 2\sqrt{3}$ used in the denominator for $5\sqrt{3}$ cao
Total for Question 17: 3 marks			
18	48°	M1 M1 A1	for angle $ABC = 63$ or angle $BOC = 138$ or angle $OAC = 27$ (may be on the diagram) for angle $BAC = 69$, or angle $OCA = 27$ with angle $OCB = 21$ for 48 cao

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Q	Answer	Marks	Guidance
		C1	(dep on M1) for appropriate reasons for their method, including at least one circle theorem, eg “the angle between a tangent and a chord is equal to the angle in the alternate segment” and “the angle at the centre is twice the angle at the circumference”, or “the tangent to a circle is perpendicular to the radius” and “base angles of an isosceles triangle are equal” <i>Additional guidance:</i> Reasons must be linked to the method used. Abbreviations such as “alt seg” are not acceptable.
19(a)	$fg(x) = 2x + 1$	M1	for $\frac{2(3x-2)+7}{3}$ oe
		A1	for $2x + 1$ cao
19(b)	$f^{-1}(x) = \frac{3x-7}{2}$	M1	for a correct first step, eg $y = \frac{2x+7}{3}$ rearranged to $3y = 2x + 7$, or $x = \frac{2y+7}{3}$ written
		A1	for $\frac{3x-7}{2}$ oe, eg $\frac{3}{2}x - \frac{7}{2}$ <i>Additional guidance:</i> Accept $y = \dots$ or $f^{-1}(x) = \dots$ on the answer line. An answer in terms of y scores M1A0.
Total for Question 19: 4 marks			
20	$(3n + 3)^2 - (3n)^2 = 18n + 9 = 9(2n + 1)$, and $2n + 1$ is odd, so it is an odd multiple of 9.	M1	for two consecutive multiples of 3 written algebraically, eg $3n$ and $3n + 3$, or $3n - 3$ and $3n$
		M1	for expanding and simplifying the difference of their squares, eg $18n + 9$ (or $18n - 9$)
		C1	for $9(2n + 1)$ oe with a correct conclusion that $2n + 1$ is odd, so the difference is an odd multiple of 9 <i>Additional guidance:</i> Numerical examples only score 0 marks. Using n and $n + 3$ (not multiples of 3) scores M0.
21	$y = -\frac{2}{3}x + \frac{26}{3}$ (or $2x + 3y = 26$)	P1	for using the gradient of L ($-\frac{2}{3}$) to find the gradient of OP , eg $\frac{3}{2}$ or $y = \frac{3}{2}x$
		P1	for substituting their $y = \frac{3}{2}x$ (or $x = \frac{2}{3}y$) into $x^2 + y^2 = 52$, eg $x^2 + \frac{9}{4}x^2 = 52$
		A1	for $P(4, 6)$
		P1	for a complete process to find the equation of L using their P and gradient $-\frac{2}{3}$, eg $y - 6 = -\frac{2}{3}(x - 4)$ or $6 = -\frac{2}{3} \times 4 + c$

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Q	Answer	Marks	Guidance
		A1	for $y = -\frac{2}{3}x + \frac{26}{3}$ oe, eg $2x + 3y = 26$ or $3y = -2x + 26$ <i>Additional guidance:</i> Using the point $(-4, -6)$ (giving $2x + 3y = -26$) can score P1P1A0P1A0. Alternative method: substituting $y = -\frac{2}{3}x + c$ into $x^2 + y^2 = 52$ and using a repeated root (discriminant = 0) to get $c = \frac{26}{3}$ is a complete method; award marks in the same proportion. Trial of points on the circle (eg $(4, 6)$, $(6, 4)$) with a check that OP is perpendicular to L scores P1P1A1 for $P(4, 6)$.
22	1:3	P1	for $\overrightarrow{DF} = \frac{4}{3}\mathbf{a} + \mathbf{c}$ oe, or $\overrightarrow{OF} = 2\mathbf{a} + \mathbf{c}$ with $\overrightarrow{OD} = \frac{2}{3}\mathbf{a}$
		P1	for an expression for $\overrightarrow{DE}$ (or $\overrightarrow{OE}$) using an unknown, eg $\frac{1}{3}\mathbf{a} + \lambda\mathbf{c}$ or $\mathbf{a} + \lambda\mathbf{c}$
		P1	for a correct statement linking the vectors, eg $\frac{1}{3}\mathbf{a} + \lambda\mathbf{c} = k(\frac{4}{3}\mathbf{a} + \mathbf{c})$, or $\overrightarrow{OE} = \frac{2}{3}\mathbf{a} + k(\frac{4}{3}\mathbf{a} + \mathbf{c})$
		P1	for comparing coefficients to find $k = \frac{1}{4}$ or $\lambda = \frac{1}{4}$
		A1	for 1:3 cao <i>Additional guidance:</i> Alternative method: a correct geometric argument (eg similar triangles giving $DE:DF = 1:4$, because $\overrightarrow{DA} = \frac{1}{3}\mathbf{a}$ and $\overrightarrow{DF} = \frac{4}{3}\mathbf{a} + \mathbf{c}$) leading to $\overrightarrow{AE} = \frac{1}{4}\mathbf{c}$ can score full marks. $\frac{1}{4}:\frac{3}{4}$ not simplified scores P4A0. Answers of 1:4 ($AE:AB$) or 3:1 score P4A0 if $\lambda = \frac{1}{4}$ is seen.