

Mark Scheme

Edexcel Higher Mock Set B Paper 2

For Pearson Edexcel GCSE Mathematics (1MA1)

Higher tier • Paper 2 (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)	210	180	150	118	85	53	37
This paper alone, rough guide (out of 80)	70	60	50	39	28	18	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	1.768061185	M1 A1	for 7.867(...) or 4.45 seen, or for 1.768(...) for 1.768061185(...) <i>Additional guidance:</i> Accept 1.76806118(5 ...) (at least the first 9 figures). 4.09 ... + 3.76 ... ÷ 4.45 (= 4.946 ...) scores M0A0.
2(a)	Negative correlation	B1	negative <i>Additional guidance:</i> Accept “weak negative” or “strong negative”. Do not accept a description of the relationship in words only, eg “bigger engines use more fuel”.
2(b)	(2.5, 54)	B1	(2.5, 54) <i>Additional guidance:</i> Do not accept (54, 2.5).
2(c)	4.5 litres is outside the range of the data (the biggest engine is 2.9 litres), so the trend may not continue.	C1	for a correct explanation, eg 4.5 litres is outside the range of the data, or the line of best fit cannot be extended that far, or the trend may not continue <i>Additional guidance:</i> Do not accept “there is an outlier”, “it is only an estimate” or “the correlation is weak” on their own.
Total for Question 2: 3 marks			
3	$x = \frac{11}{8}$ (or 1.375)	M1 M1 A1	for a correct expansion of the bracket, eg $18 - 6x$ for a correct method to isolate the terms in x (ft their expansion), eg $18 - 7 = 2x + 6x$ or $8x = 11$ $\frac{11}{8}$ oe <i>Additional guidance:</i> Accept 1.375 or $1\frac{3}{8}$ $18 - 6x = 2x + 7$ leading to $-4x = -11$ ($x = 2.75$) scores M1M0A0.
4	No. The ticket went up by 12.4% but the popcorn went up by 13.9%.	P1 P1 C1	for a correct process to find the percentage increase for one item, eg $\frac{12.20 - 10.85}{10.85} \times 100$ (= 12.4 ...) or $\frac{6.15}{5.40}$ (= 1.138 ...) for a correct process to find the percentage increase (or multiplier) for both items for ‘No’ with correct figures that can be compared, eg 12.4(...) % and 13.8(...) % or 13.9%, or 1.124(...) and 1.138(...)

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> Accept figures rounded or truncated to at least 3 significant figures. Dividing by the new prices, eg $\frac{1.35}{12.20}$ (= 11.06%) and $\frac{0.75}{6.15}$ (= 12.19%), is not a correct process (POPOC0). 'No' with no supporting figures scores no marks.
5	6 years	P1 P1 A1	for 7500×1.046 (= 7845) for a process to find the value at the end of at least 5 years, eg " 7845×1.0285^4 (= 8778.29 ...), or year-by-year values up to 8778.29 ... 6 cao, supported by 8778.29 ... and 9028.47 ... or 9028.48 <i>Additional guidance:</i> 5 (from $7845 \times 1.0285^5 = 9028.47 \dots$ without counting the first year) scores P1P1A0. Using 4.6% every year ($7500 \times 1.046^4 = 8978.17 \dots$, answer 4) scores P1POA0. An answer of 6 with no supporting working scores no marks.
6(a)	7, -2, 12	B2 (B1	for all three correct: 7, -2, 12 for one or two correct)
6(b)	Smooth curve through (-3, -6), (-2, 7), (-1, 8), (0, 3), (1, -2), (2, -1), (3, 12)	M1 A1	for at least 5 points plotted correctly (ft their table) for a fully correct smooth curve through all 7 correct points <i>Additional guidance:</i> Line segments joining the points score M1A0. Ignore any curve drawn outside $-3 \leq x \leq 3$.
Total for Question 6: 4 marks			
7	2.21×10^{-1} mm	M1 A1	for $3.4 \times 10^{-7} \times 6.5 \times 10^5$ oe or 0.221 seen 2.21×10^{-1} <i>Additional guidance:</i> 0.221 or 22.1×10^{-2} as the answer scores M1A0.
8	16.4	M1 A1	for $(8 - (-5))^2 + (8 - (-2))^2$ oe, eg $13^2 + 10^2$ (= 269) 16.4 to 16.41 <i>Additional guidance:</i> Using differences 3 and 6 ($\sqrt{45} = 6.71$) scores M0A0.

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Q	Answer	Marks	Guidance
9	69 drops per minute	P1	for a conversion, eg $1.25 \times 1000 (= 1250)$ or $6 \times 60 (= 360)$ or $0.05 \div 1000 (= 0.000\ 05)$
		P1	for a complete process, eg $1250 \div 0.05 \div 360$ oe
		A1	69 cao
			<i>Additional guidance:</i> $1.25 \div 0.05 \div 360 (= 0.069 \dots)$ or $1250 \div 0.05 \div 6 (= 4166.6 \dots)$ score P1POAO. Accept an answer of 69.44 ... if 69 is also seen.
10	$x^3 - x^2 - 34x - 56$	M1	for a correct expansion of two of the brackets, with at least 3 of the 4 terms correct, eg $x^2 - 7x + 4x - 28$
		M1	for a complete method to multiply by the third bracket, with at least half the terms correct (ft their first expansion)
		A1	$x^3 - x^2 - 34x - 56$ cao
11	Yes. The angle is $4.76 \dots^\circ$, which is less than 5° .	M1	for $\tan x = \frac{0.45}{5.4}$ oe, or for finding the length of the ramp ($= 5.418 \dots$) and a correct sin or cos statement
		C1	for 'Yes' (it is safe) with a correct angle, eg $4.76(\dots)$ or 4.8, compared with 5° <i>Additional guidance:</i> Accept a comparison of $\tan x = 0.0833 \dots$ with $\tan 5^\circ = 0.0874 \dots$ for M1C1. $\sin x = \frac{0.45}{5.4}$ ($x = 4.78 \dots$) scores MOC0.
12	$\frac{27}{59}$	P1	for $\frac{3}{5} \times 150 (= 90)$ or for $0.3 \times "90" (= 27)$
		P1	for $150 - "90" - 28 (= 32)$, or a Venn diagram with 27 in the intersection and 28 outside
		P1	for $"27" + "32" (= 59)$, or a correct Venn diagram with 63, 27, 32 and 28
		A1	$\frac{27}{59}$ oe <i>Additional guidance:</i> Accept 0.457(...) or 45.7% $\frac{27}{59}$ scores P1POPOAO. $\frac{27}{90}$ (given the gift shop instead of the café) scores P1POPOAO (P1P1POAO if 32 or a Venn diagram with 27 and 28 is also seen). 30% of 150 ($= 45$) used for the intersection is not a correct process.

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Q	Answer	Marks	Guidance
13(a)	Points at (120, 4), (140, 13), (160, 28), (180, 46), (200, 56), (220, 60) joined	C2	for a fully correct cumulative frequency graph: points plotted at the upper ends of the intervals and joined with a curve or line segments
		(C1	for 4 or 5 points plotted correctly at the ends of the intervals, or for all 6 points plotted consistently within each interval (eg at midpoints) at the correct heights and joined) <i>Additional guidance:</i> Ignore any graph to the left of $d = 100$ or to the right of $d = 220$. Accept a graph not starting at (100, 0).
13(b)	About 162 m (from 160 to 164)	B1	for an answer in the range 160 to 164 (ft their graph)
13(c)	About 36 m (from 32 to 40)	M1	for reading from the graph at cumulative frequencies of 15 and 45 (ft their graph)
		A1	for an answer in the range 32 to 40 (ft their graph) <i>Additional guidance:</i> $45 - 15 = 30$ scores MOA0.
Total for Question 13: 5 marks			
14	£657	P1	for $1460 \div 4 (= 365)$
		P1	for a process to find the total or Tom's first amount, eg $12 \times "365" (= 4380)$ or $3 \times "365" (= 1095)$
		P1	for $0.4 \times "4380" (= 1752)$
		A1	657 cao <i>Additional guidance:</i> Working with Raj's amount is an alternative: $1825 - (4380 - 1460 - 1752) = 1825 - 1168 = 657$. 40% of 1460 ($= 584$) is not a correct process for the third P mark.
15(a)	$F = \frac{128}{d^2}$	M1	for $F = \frac{k}{d^2}$ and substituting, eg $12.5 = \frac{k}{3.2^2}$, or $k = 128$
		A1	$F = \frac{128}{d^2}$ oe <i>Additional guidance:</i> $F = \frac{k}{d^2}$ with no attempt to find k scores MOA0. $F = \frac{40}{d}$ (inverse proportion to d) scores MOA0.
15(b)	41.4%	M1	for a correct method to find the multiplier for d , eg $\sqrt{2} (= 1.414 \dots)$, or for finding two values of d for F and $\frac{1}{2}F$, eg 3.2 and $\sqrt{\frac{128}{6.25}} (= 4.52 \dots)$
		A1	41.4 or 41.42 ...

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Q	Answer	Marks	Guidance
			<i>Additional guidance:</i> 100% (doubling d) or 29.3% (from $1 - \frac{1}{\sqrt{2}}$) scores MOA0. ft their formula of the form $F = \frac{k}{d^2}$ for M1.
Total for Question 15: 4 marks			
16(a)	$x^3 + 6x = 13$, so $x(x^2 + 6) = 13$, so $x = \frac{13}{x^2 + 6}$	C1	for a complete chain of reasoning, eg $x^3 + 6x = 13$ and $x(x^2 + 6) = 13$ leading to $x = \frac{13}{x^2 + 6}$ <i>Additional guidance:</i> Working backwards from $x = \frac{13}{x^2 + 6}$ to $x^3 + 6x - 13 = 0$ is acceptable if complete.
16(b)	1.5572	M1 M1 A1	for $x_1 = 1.57(5 \dots)$ or $\frac{52}{33}$ for $x_2 = 1.53(2 \dots)$ and x_3 found using x_2 1.5572 (or 1.557(17 \dots)) <i>Additional guidance:</i> Accept awrt 1.5572 for A1. Using $x_0 = 1.5$ in every step scores M1MOA0.
Total for Question 16: 4 marks			
17	$\frac{3}{x-3}$	M1 M1 A1	for $x^2 + 2x - 15 = (x+5)(x-3)$ or for a correct method to write as a single fraction, eg $\frac{4(x-3) - (x-27)}{(x+5)(x-3)}$ or $\frac{4(x^2 + 2x - 15) - (x-27)(x+5)}{(x+5)(x^2 + 2x - 15)}$ for a correct single fraction with the numerator simplified, eg $\frac{3x+15}{(x+5)(x-3)}$ for $\frac{3}{x-3}$ from fully correct working, with the factor $x+5$ cancelled <i>Additional guidance:</i> Accept $\frac{3}{x-3}$ with the values of a and b not stated. $4x - 12 - x - 27 = 3x - 39$ (sign error) can score M1MOA0. Using the denominator $(x+5)(x^2 + 2x - 15)$ is a correct method; the numerator $3x^2 + 30x + 75 = 3(x+5)^2$ must then be factorised and cancelled for A1.
18	8.16 cm	P1 P1	for angle $R = 180 - 48 - 71 (= 61)$ for $\frac{QR}{\sin 48} = \frac{9.6}{\sin 61}$ oe

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Q	Answer	Marks	Guidance
		A1	8.15 to 8.16 <i>Additional guidance:</i> $\frac{9.6 \sin 48}{\sin 71}$ (= 7.54 ...) scores POPOAO. Treating the triangle as right-angled scores no marks.
19(a)	$(x + 5)^2 + 9$	M1	for $(x + 5)^2$ seen
		A1	$(x + 5)^2 + 9$
19(b)	The minimum point is $(-5, 9)$, which is above the x -axis (since $(x + 5)^2 \geq 0$, $y \geq 9$), so y is never 0.	C1	for a correct explanation, eg the minimum (turning) point is $(-5, 9)$ which is above the x -axis, or $(x + 5)^2 \geq 0$ so $y \geq 9$ (ft their (a) if $q > 0$) <i>Additional guidance:</i> "The discriminant is negative" with $10^2 - 4 \times 34 = -36$ seen also scores C1, but "it has no solutions" alone scores C0.
Total for Question 19: 3 marks			
20	139 cm^2	P1	for $\frac{320}{150}$ (= 2.13 ...) or $\frac{150}{320}$ (= 0.468 ...)
		P1	for $\sqrt[3]{\text{"2.13 ... "}}$ (= 1.287 ...) or $\sqrt[3]{\text{"0.468 ... "}}$ (= 0.776 ...)
		P1	for $230 \div \text{"1.287 ... "}$ or $230 \times \text{"0.776 ... "}$
		A1	138.7 to 139 <i>Additional guidance:</i> Using $\frac{320}{150}$ as the area scale factor gives 107.8 ... and scores P1POPOAO. Using $\left(\frac{320}{150}\right)^2$ or the length scale factor as an area factor scores P1 only. $230 \times 1.657 \dots$ (= 381.1 ...) scores P1P1POAO.
21	$y \geq 1$, $y \leq 2x + 2$, $x + 2y \leq 9$ (or $y \leq -\frac{1}{2}x + 4.5$)	B3	for all three correct inequalities: $y \geq 1$, $y \leq 2x + 2$, $x + 2y \leq 9$ oe
		(B2	for two correct inequalities)
		(B1	for one correct inequality, or the equations of at least two of the lines) <i>Additional guidance:</i> Accept strict inequalities for B2 at most (ie condone $<$ or $>$ throughout for B2). Accept $y \leq 4.5 - 0.5x$ or $2y \leq 9 - x$ oe.
22	$(5, 14)$	P1	for finding the midpoint of AB , $(0, 4)$, or the gradient of AB , $-\frac{1}{2}$
		P1	for using the perpendicular gradient 2 (ft their gradient) with their midpoint, eg $y = 2x + 4$

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Q	Answer	Marks	Guidance
		P1	for a complete process to find C , eg solving $3x - 1 = 2x + 4$
		A1	(5, 14) <i>Additional guidance:</i> Alternative method: P1 for $C = (t, 3t - 1)$ and an expression for CA^2 or CB^2 , eg $(t + 4)^2 + (3t - 7)^2$; P1 for $(t + 4)^2 + (3t - 7)^2 = (t - 4)^2 + (3t - 3)^2$; P1 for simplifying to a linear equation, eg $8t = 40$; A1 (5, 14). $x = 5$ and $y = 14$ not written as coordinates can score full marks.
23	No. The lower bound of the speed is 89.59 ... km/h, which is less than 89.7 km/h, so Victor may not have beaten the lap record.	B1	for one correct bound, eg 3845 or 3855 (or 3.845 or 3.855), or 153.5 or 154.5 (or equivalent in minutes or hours)
		P1	for a process to find the lower bound of the speed, eg $\frac{3845}{154.5}$ (= 24.88 ...)
		P1	for a correct conversion to km/h, eg $\times 3.6$, or $3.845 \div \frac{154.5}{3600}$
		A1	for 89.59 ... (accept 89.5 to 89.6)
		C1	for 'No' with a correct comparison, eg $89.59 \dots < 89.7$ (dep on P2) <i>Additional guidance:</i> The upper bound, $\frac{3855}{153.5} \times 3.6 = 90.41 \dots$, may also be seen; it does not affect the decision. Using 3850 and 154 (= 90 km/h) and saying 'Yes' scores B0P0P1A0C0 if the conversion is correct. Time bounds 2.335 and 2.345 (minutes treated as decimals) are incorrect: B0 for time, but P1 can be awarded for LB distance $\div$ UB time in their units. C1 needs the lower bound of the speed compared with 89.7; a comparison using the upper bound only scores C0.
24	33.8°	P1	for a process to find the height of the cuboid, eg $8.6 \tan 31$ (= 5.16 ...)
		P1	for a process to find AN where N is the midpoint of CD , eg $\sqrt{4.3^2 + 6.4^2}$ (= 7.71 ...)

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Q	Answer	Marks	Guidance
		P1	for a correct trig statement for the required angle, eg $\tan x = \frac{5.16 \dots}{7.71 \dots}$, or finding AM ($= 9.28 \dots$) and using sin or cos
		A1	33.8 to 33.9 <i>Additional guidance:</i> Using $AC = \sqrt{8.6^2 + 6.4^2}$ ($= 10.72 \dots$) instead of AN gives 25.7° and scores P1P0P1A0. Using AF ($= 10.03 \dots$) as the height scores P0 for the first mark.