Pearson Edexcel

Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE
In Mathematics B (4MB1)
Paper 02

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.

  Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - awrt – answer which rounds to
  - eeoo – each error or omission
- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

  If the final answer is wrong always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

  If there is a choice of methods shown, then award the lowest mark, unless the subsequent working makes clear the method that has been used.

  If there is no answer achieved then check the working for any marks appropriate from the mark scheme.

- **Ignoring subsequent work**

  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

Question		Working	Answer	Mark	Notes
1		**For this question we will allow the correct answer in any form(Allow incorrect standard form) in the table or in their working. ISW ie ignore any incorrect rounding if a correct more accurate value is seen.**			
		$\frac{1.23\times10^9}{112000}$		6	M1
			11 000		A1 oe allow 10982. 14… written to at least 2 sf ISW
		$\frac{1.61\times10^{11}}{16500}$			M1 Do **NOT** allow for $16500=\frac{1.61\times10^{11}}{\text{population}}$
			9 800 000		A1 oe allow 9757575.758 written to at least 2 sf ISW
		$7.67\times10^9\times11400$			M1 Do **NOT** allow for $11400=\frac{\text{total GDP}}{7.67\times10^9}$
			8.7×10^{13}		A1 oe allow 8.7×10^{13} written to at least 2 sf ISW
					Total 6 marks

Question		Working	Answer	Mark	Notes
2	(a)(i)		q	3	B1
	(ii)		p, q, r, s, t		B1 condone a letter appearing more than once
	(iii)		p, t		B1 condone a letter appearing more than once
	(b)		$\{r\},\{p, r\},$ $\{r, t\},\{p, r, t\}$	2	B2 for the 4 correct sets and no incorrect extra. B1 for (2 correct sets and no incorrect sets) or (3 or 4 correct sets and no more than 1 incorrect set) Condone missing or incorrect set brackets as long as sets are clearly distinguishable. Allow a letter appearing more than once
	(c)	Indicate only $\{r\}$ gives desired outcome		2	M1ft either indicates just $\{r\}$ or ft their list from (b) ie lists their sets without p, q and t but do not ft if their answer for (b) intersection B is the empty set.
			$\frac{1}{4}$		A1ft their list from (b) $\frac{\text{number of their sets in (b) without } p, q \text{ and } t}{\text{number of sets they have in (b)}}$
					NB correct probability ¼ gains 2/2
					SC B1 for a probability of 0 or which follows from their part (b)
					Total 7 marks

Question		Working	Answer	Mark	Notes
3	(a)	$2^x \times \left(2^2\right)^y = 2^7$		3	M1 for writing both 4 and 128 as powers of 2 with at least one correct. Implied by $2^x \times 2^{2y} = 2^7$
		$2^x \times 2^{2y} = 2^7$			M1 for 2^{2y} or 2^{x+2y} seen
		$2^{x+2y} = 2^7$	$x + 2y = 7$		A1 We must see $2^{x+2y} = 2^7$.
					SC Verification can get M1M1 A0 M1 for $2^{7-2y} \times \left(2^2\right)^y = 2^7$ implied by $2^{7-2y} \times 2^{2y} = 2^7$ M1 for $2^{7-2y} \times 2^{2y} = 2^7$
	(b)	$2^{3x} \div 2^{2y} = 2^5$		2	M1 express as powers of 2 eg $2^{3x} \times 2^{-2y} = 2^5$ or $2^{3x} = 2^{2y} \times 2^5$
		$2^{3x-2y} = 2^5$	$3x - 2y = 5$		A1 We must see $2^{3x-2y} = 2^5$ oe eg $2^{3x} = 2^{2y+5}$
					SC Verification can get M1A0 for $2^{5+2y} \div 2^{2y} = 2^5$
	(c)	$4x = 12$ or $8y = 16$ or $2^x \times 8^x = 128 \times 32$ oe		3	M1 Forming any correct un-simplified equation in one variable eg $2^x \times \frac{8^x}{32} = 128$ or $\left(\frac{128}{4^y}\right)^3 = 32 \times 4^{4y}$ or $3(7-2y) - 2y = 5$ Maybe implied by either correct answer. Allow oe
			$x = 3$		A1
			$y = 2$		A1
					Total 8 marks

Question		Working	Answer	Mark	Notes
4	(a)		$60 \leqslant t < 120$	1	B1
	(b)	$5\times"5"+7\times"20"+15\times"45"+$ $36\times"90"+19\times"180"+8\times"300"$ $\left[\begin{array}{l}=25\ +\ 140\ +\ 675\ +\ 3240\ +\ 3420\ +\ 2400 \\ =9900\end{array}\right]$		4	M2 for correct calculation (need not be evaluated) If no working shown then figures must be correct Give bod if values in a list and a total given. (M1 for *xf* calculated and added for at least 3 class intervals where *x* is a number in the range (incl end points) **OR** correct mid-points used for at least 3 products but not added)
		$\frac{"9900"}{90}$			M1 dep on at least M1 previously scored. For dividing their sum by 90
			110		A1 cao
	(c)		$w = 2$	3	B1
		Area of bar for $10 \leqslant t < 30 = \frac{9}{15}\times 7$ oe or Freq. densities = 15/30 and 7/20			M1
			h = 2.1		A1
					Total 8 marks

Question	Working		Answer	Mark	Notes
5	(a)	$12.5\times4.05[=50.625]$ $12.5\times3.05[=38.125]$ $4.05\times3.05[=12.3525]$		4	M2 Any 2 valid areas $l\times w$ or $l\times h$ or $w\times h$ calculated using $12 < l \leqslant 12.5$ **and** $4 < w \leqslant 4.05$ **and** $3 < h \leqslant 3.05$ (M1 Any 2 valid areas calculated using $11.5 \leqslant l \leqslant 12.5$ **and** $3.5 \leqslant w \leqslant 4.5$ **and** $2.5 \leqslant h \leqslant 3.5$)
		$(12.5\times4.05+12.5\times3.05+4.05\times3.05)\times2$			M1 Correct expression for total surface area $l\times w + l\times h + w\times h$ using $11.5 \leqslant l \leqslant 12.5$ **and** $3.5 \leqslant w \leqslant 4.5$ **and** $2.5 \leqslant h \leqslant 3.5$
		= 202 .205	No		A1 correct area calculated (awrt 202) **AND** conclusion must be seen Calculation must be seen and use the correct bounds. Allow 12.49…, 3.049…, 4.049…
	(b)	11.5, 12.5, 3.95, 4.05, 2.95, 3.05		4	M1 Any 3 of these values seen in the question (parts (a) and (b)) Allow 12.49…, 3.049…, 4.049…
		$\sqrt{11.5^2+3.95^2+2.95^2}$			M2 use of 3-D Pythagoras using LB $11.5 \leqslant l < 12$ and $3.95 \leqslant w < 4.0$ and $2.95 \leqslant h < 3$ (M1 correct use of 3-D Pythagoras using $11.5 \leqslant l \leqslant 12.5$ and $3.5 \leqslant w \leqslant 4.5$ and $2.5 \leqslant h \leqslant 3.5$)
			12.5 (cm)		A1awrt 12.5 Calculation must be seen and use the correct bounds
					NB if they are not using bounds at all ie use 12, 4 and 3 In (a) they get 192 and in (b) they get 13
					Total 8 marks

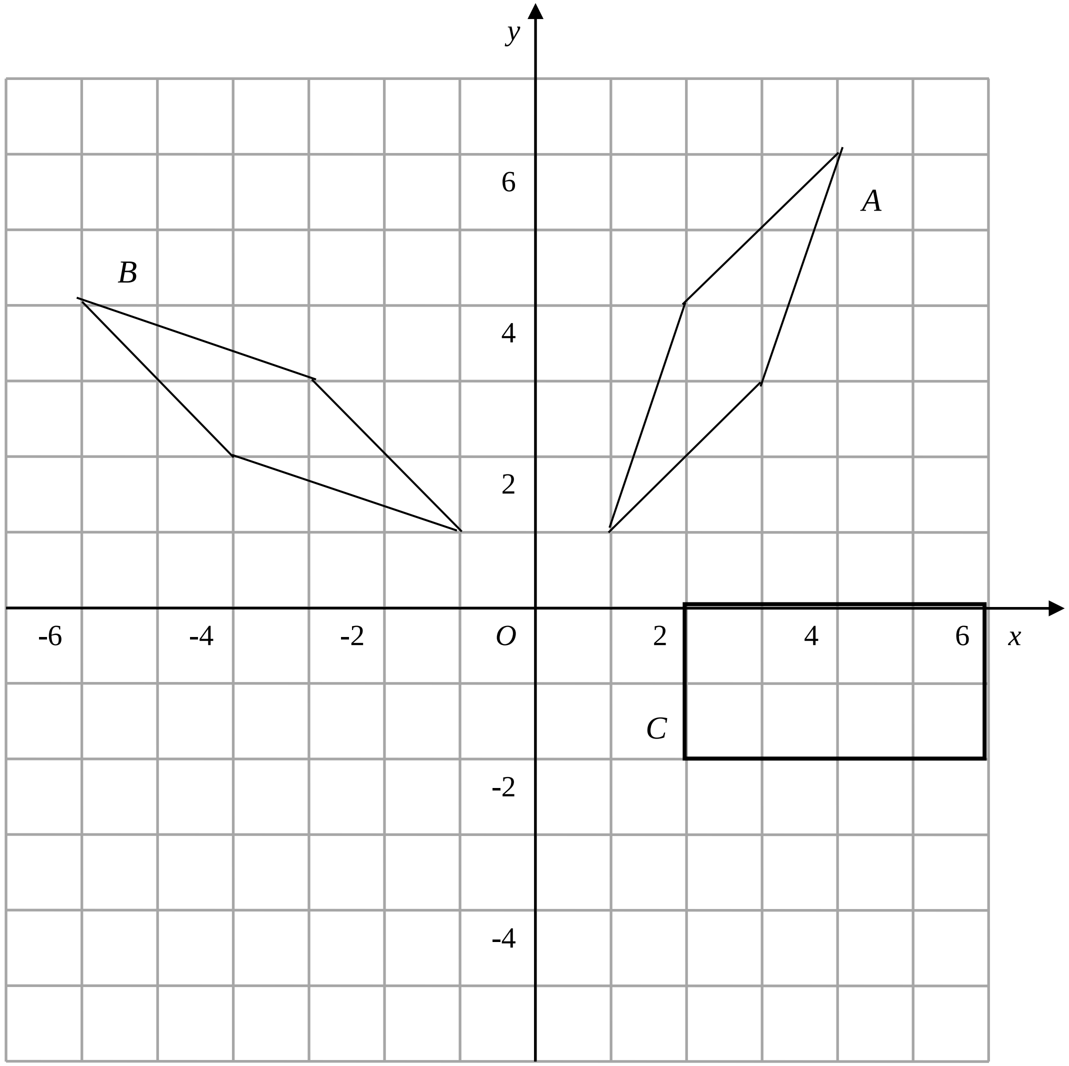
Question		Working	Answer	Mark	Notes
6	(a)	$\tan 16.9 = \dfrac{QP}{1000}$ or oe		2	M1 suitable equation for height, eg $\tan 16.9 = QP$ or $\dfrac{QP}{\sin 16.9} = \dfrac{1}{\sin 73.1}$ or $\cos 16.9 = \dfrac{1}{\sqrt{QP^2+1}}$ Allow with 1 instead of 1000 eg $\tan 16.9 = \dfrac{QP}{1}$ Allow any letter for QP Allow other correct methods
		$1000 \times \tan 16.9$ or awrt 303.8	304		A1 answer given so M1 must be awarded. Must be using 1000 or multiplying by 1000 at some point. For rearranging to find a correct expression followed by 304 or an awrt 304 eg $\dfrac{1000\sin 16.9}{\sin 73.1}$ = 304 or $\sqrt{\left(\dfrac{1}{\cos 16.9}\right)^2 - 1} \times 1000 = 303.8...$ oe
					NB Could get answer from incorrect working so need to award the M1 to gain the A mark ie You must see a correct trigonometric. equation
	(b)	$2000 \times \tan 8.2\left[= 288.20...\right]$ or $2 \times \tan 8.2\left[= 0.28820...\right]$		5	M1 Allow awrt 288 or 0.288 Allow other correct methods eg $\sqrt{\left(\dfrac{2000}{\cos 8.2}\right)^2 - 2000^2}$ or $\dfrac{2000\sin 8.2}{\sin 81.8}$
		[CB =] $304 - "288"\left[= 15.79...\right]$ or $0.304 - "0.288"\left[= 0.01579...\right]$			M1 dep on 1st M1 being awarded. Allow awrt 16 or 0.016
		[AB=] $\sqrt{1000^2 + 2000^2}\left[= 2236.06...\right]$ or $\sqrt{1+2^2}\left[= 2.236...\right]$			M1 For using Pythagoras to find AB Allow awrt 2240 or 2.24
		$\tan\theta = \dfrac{"15.79..."}{"2236.06..."}$ oe			M1 dep on 2nd and 3rd M1 being awarded
			0.4		A1 awrt 0.4
					Total 7 marks

Question		Working	Answer	Mark	Notes
7	(a)	$\overrightarrow{DC} = -\mathbf{b} + \mathbf{a} + \mathbf{b} - \frac{1}{3}\mathbf{a}$		2	M1 Correct method to find $\overrightarrow{DC}$ **or** $\overrightarrow{CD}$ $\left[\overrightarrow{CD} = \right] -\mathbf{b} + \frac{1}{3}\mathbf{a} - \mathbf{a} + \mathbf{b}$
			$\frac{2}{3}\mathbf{a}$ [$\therefore$ parallel to DC]		A1 M1 must be awarded Allow $-\frac{2}{3}\mathbf{a}$
	(b)	$\overrightarrow{BE} = k\,\overrightarrow{BC}$ or $BE = k\left(\mathbf{b} - \frac{1}{3}\mathbf{a}\right)$ $\lambda\mathbf{b} - \mathbf{a} = k\left(\mathbf{b} - \frac{1}{3}\mathbf{a}\right)$ or $AB : DC = 1 : 2/3$ oe		2	M1 allow $\frac{AB}{DC} = \frac{3}{2}$ oe Allow other methods eg $\overrightarrow{CE} = n\,\overrightarrow{BE}$ **and** $\overrightarrow{CE} = \overrightarrow{CB} + \overrightarrow{BE}$
			$\lambda = 3$		A1 Correct answer implies M1
	(c)	$\left(\frac{"2"}{"3"}\right)^2$ or $\left(\frac{"2"}{"3"}\right)^2 x$ oe		3	M1ft for $\left(\frac{"\text{their } \lambda"-1}{"\text{their } \lambda"}\right)^2$ Allow $\left(\frac{"\text{their } \lambda"}{"\text{their } \lambda"-1}\right)^2$ for the SF
		$1-\left(\frac{"2"}{"3"}\right)^2$ or $x-\left(\frac{"2"}{"3"}\right)^2 x$ or $\frac{x-P}{x} = \left(\frac{"2"}{"3"}\right)^2$ oe			M1ft for $1-\left(\frac{"\text{their } \lambda"-1}{"\text{their } \lambda"}\right)^2$ or $x-(n)^2 x$ where $0 < n < 1$
			$x-\left(\frac{"2"}{"3"}\right)^2 x \left[= \frac{5}{9}x\right]$		A1ft (If ft both M marks must be awarded) Allow a correct un-simplified expression eg $x-\left(\frac{2}{3}\right)^2 x$ ISW
					Total 7 marks

Question		Working	Answer	Mark	Notes
8	(a)	$[h=]\sqrt{0.9^2-\left(\frac{2.1-1.2}{2}\right)^2}=\sqrt{0.9^2-0.45^2}\ [=0.7794\ldots]$		3	M1 correct method to find h awrt 0.78Allow other method eg $h=0.9\sin 60$ $h=0.9\cos 30$
		$\frac{1}{2}\times(2.1+1.2)\times"0.78"$			M1 dep on 1st M1 being awarded ft their value of $h\neq 0.9$ Correct method to find the area eg $1.2\times"0.78"+2\times 0.5\times 0.45\times"0.78"$
			1.29		A1 awrt 1.29 (condone 1.28 from correct working) actual 1.286..
There may be other correct methods (for part(b))					
	(b)	Volume of 1 bed = $"1.29"\times 0.1$ or $"1.29"\times 10$		4	M1 for multiplying by 10 or 0.1 Allow if (a) $\times$ by 10^n if not part of a unit conversion
		$\frac{"1.29\times 0.1"\times 6}{50}$ or $\frac{"1.29\times 10"\times 6}{50}$			M1 for multiplying by 6 and dividing by 50. Allow if multiplied by a power of 10
		$\frac{1.29\times 0.1\times 6}{50}$ or $\frac{12900\times 10\times 6}{50}$			A1 condone use of 1.28 or12800
		Eg $\frac{1.29\times 0.1\times 6}{50}\times 1000$ or $\frac{12900\times 10\times 6}{50}\times\frac{1}{10000}$ or $\frac{0.774}{50}\times 1000$ or $\frac{0.774}{0.05}$	15.4 $\therefore 16$		A1 awrt 15.4/15.5 and the statement 16 needed
	ALT 1	Volume of 1 bed = $"1.29"\times 0.1$ or $"1.29"\times 10$			M1 for multiplying by 10 or 0.1
		$"1.29\times 0.1"\times 6\times 1000$			M1 correct method to find the total compost in litres
		awrt 770 litres			A1 awrt 770
		$16\times 50=800$ **and** $15\times 50=750$ litres	$\therefore 16$		A1 must have awrt 770, 800 and 750 plus conclusion Sight of 770, 800 and 750 implies M1M1A1
	ALT 2	Volume of 1 bed = $"1.29"\times 0.1$ or $"1.29"\times 10$			M1 for multiplying their answer to (a) by 10 or 0.1
		$"1.29\times 10"\times 10000\times 6$			M1 correct method to find the total compost in cm^3
		awrt 770000 cm^3			A1 awrt 770000
		$16\times 50\times 1000[=800000]$ **and** $15\times 50\times 1000[=750000]$	$\therefore 16$		A1 must have awrt 770000, 800000 and 750000 plus conclusion. Sight of 770000, 800000 and 750000 implies M1M1A1

	ALT 3	Volume of 1 bed = $"1.29"\times 0.1$ or $"1.29"\times 10$			M1 for multiplying by 10 or 0.1
		$"1.29\times 0.1"\times 6$ [=0.77...] **and** $\frac{50\times 1000}{100^3}$ [=0.05]			M1 multiply by 6 to find the total compost in m^3 **and** correct method to find the compost in 1 bag in m^3
		0.77 16… and 0.05			A1 awrt 0.77
		$16\times 0.05[=0.8]$ **and** $15\times 0.05\left[=0.75\text{ m}^3\text{per bag}\right]$	$\therefore 16$		A1 must have 0.77, 0.8 **and** 0.75 plus conclusion Sight of 0.77, 0.8 **and** 0.75 implies M1M1A1
	ALT 4	$\frac{16}{"1.29"}$ or $\frac{15}{"1.29"}$			M1 dividing number of bags by their answer to (a) Allow if (a) $\times$ by 10^n
		$\frac{16\times 50}{6\times "1.29"}$ or $\frac{15\times 50}{6\times "1.29"}$			M1 for multiplying by 50 and dividing by 6. Allow if multiplied by a power of 10
		10.335… or 9.689…			A1 awrt 10.3/10.4 or awrt 9.7
		10.3… and 9.689…	$\therefore 16$		A1 awrt 10.3/10.4 **and** awrt 9.7 plus conclusion
	(c)	60º or 30º or 120 º used or 1.2 used as hypotenuse or these may be seen in correct place on diagram		4	M1 Implied by a correct value of r or correct method to find r
		[r =] 0.6 × tan 60 **or** $\sqrt{1.2^2-0.6^2}$ **or** $\frac{0.6}{\tan 30}$ or 1.2sin 60 [= $\frac{3\sqrt{3}}{5}$ = 1.039…]			M1 oe allow other correct methods eg $\sqrt{0.6^2+0.6^2+2\times 0.6^2\cos 120}$ or $1.05\tan 60-"0.9974"$ or $\frac{1.2\times\sin 120}{2\sin 30}$ Awrt 1.04 if no working shown do not ISW
		$\pi\times "1.039.."^2$			M1 using the correct formula for area of a circle ($\pi\times "r"^2$) where $0 < r < 2.1$
			3.39		A1 awrt condone 3.4 or 3.40
					Total 11 marks

Question		Working	Answer	Mark	Notes
9	(a)		*A* correctly drawn	1	B1
	(b)		*B* correctly drawn (–1, 1), (–4, 2), (–6, 4) and (–3, 3)	2	B2ft follow through their shape B1ft for 3 points correct. (or a shape the correct size and shape with the correct orientation or shape *A* rotated 90° clockwise about (0,0) ie coordinates (1, −1), (4, – 2), (6, – 4) and (3, – 3))
	(c)	$\begin{pmatrix}1 & 3\\1 & 1\end{pmatrix}\begin{pmatrix}-1 & -4 & -6 & -3\\1 & 2 & 4 & 3\end{pmatrix}$		3	M1ft their *B*. For intention to multiply matrices the right way round. At least one co-ordinate pair the right way round in the 2nd matrix. Implied by trapezium *C* correctly drawn. Allow for $\begin{pmatrix}1 & 3\\1 & 1\end{pmatrix}\begin{pmatrix}-1\\1\end{pmatrix}$ using any point
		$\begin{pmatrix}2 & 2 & 6 & 6\\0 & -2 & -2 & 0\end{pmatrix}$			M1ft dep on M1. An attempt to find all 4 points with at least 2 correct coordinates (x, y) gained. **ft** their points. Implied by 2 correct points plotted. Pairs can be in any order. Implied by trapezium *C* drawn correctly.
			C correctly drawn (2,0), (2, –2), (6, –2) and (6, 0)		A1
					SC for MA allow $\begin{pmatrix}4 & -14 & 22 & 6\\2 & 6 & 10 & 0\end{pmatrix}$ all 4 points with at least 2 correct coordinates gained M0M1A0
	(d)		–2	1	B1
	(e)	Area of *A* = $5\times3-2\times(2+2+1.5)$ **or** $"2\times4"\div2$ oe		2	M1 finding "area of their *C* "÷"2" or finding the area of their *A* eg $0.5\sqrt{2^2+2^2}\times\sqrt{1^2+1^2}$ $\frac{1}{2}\begin{vmatrix}1 & 2 & 4 & 3 & 1\\1 & 4 & 6 & 3 & 1\end{vmatrix}=\frac{1}{2}\left[(4+12+12+3)-(2+16+18+3)\right]$
			4 (cm^2)		A1 –4 scores M1A0 condone lack of units. NB answer of 4 gains 2/2
					Total 9 marks



y
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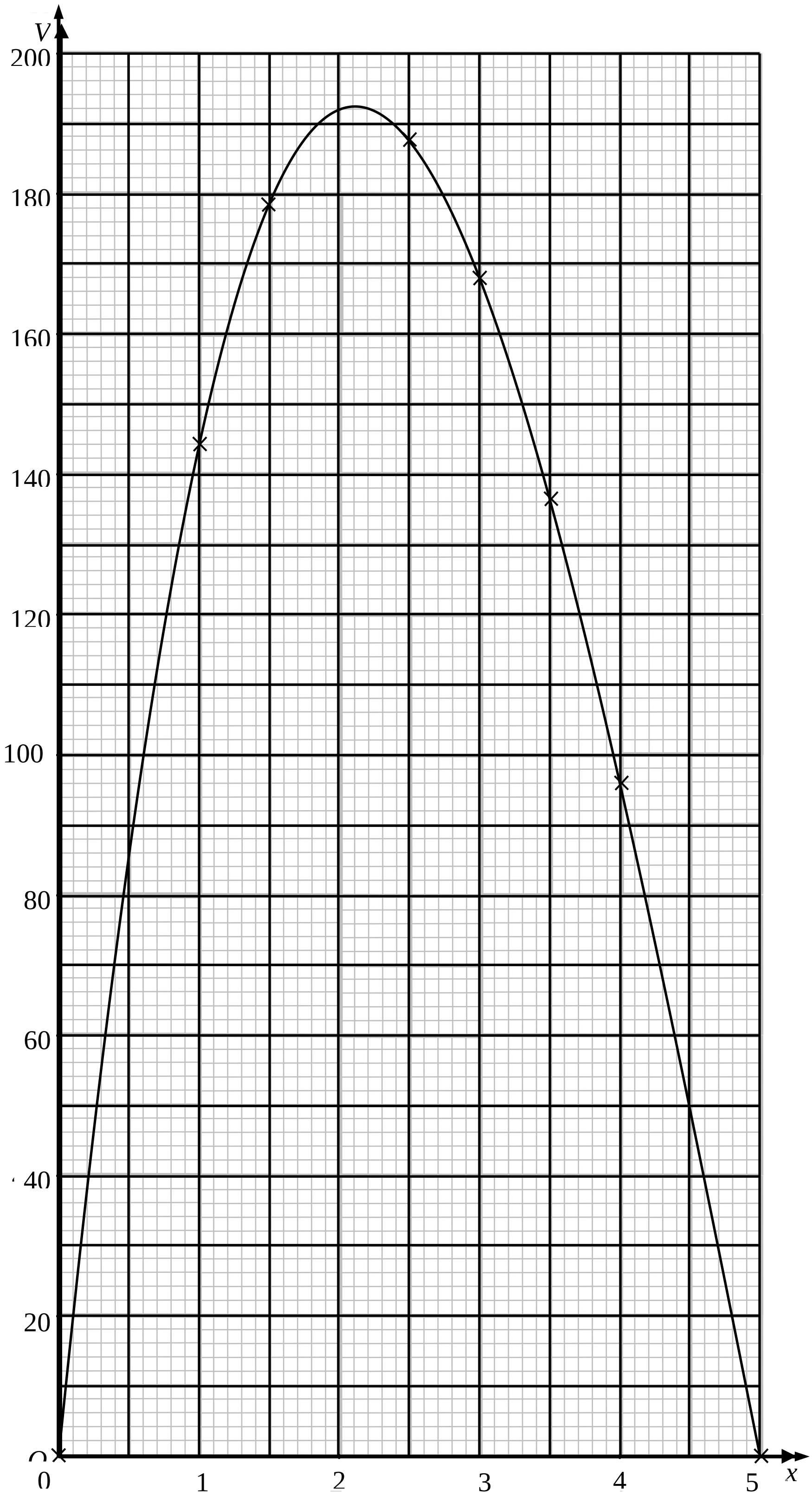
2
-2
-4
-6
-4
-2
2
4
6
A
B
C

Question		Working	Answer	Mark	Notes
10	(a)	$V = x(10-2x)(20-2x)$		2	M1 Condone $x(10-x)(20-x)$
		$x(200-40x-20x+4x^2)$ or $(200x-40x^2-20x^2+4x^3)$	$V = 4x^3-60x^2+200x$		A1 must see one of the 2 given lines of working followed by the correct answer.
	(b)	$\left[\frac{dV}{dx}=\right]12x^2-120x+200$		4	M1 Attempt to differentiate at least 1 term correct
		$12x^2-120x+200=0$ oe			M1 At least 2 terms correct and equated to zero
		$x=\frac{120\pm\sqrt{120^2-4\times12\times200}}{2\times12}$			M1 A correct method to solve their 3 term quadratic equation. Implied by awrt 2.11 or awrt 7.89 or $\frac{15\pm5\sqrt{3}}{3}$
			2.11		A1 awrt 2.11 Allow $\frac{15-5\sqrt{3}}{3}$ do not accept 7.89 given. If correct answer seen ignore subsequent rounding.
	(c)	168, 96		2	B2
	(d)			2	B2 Fully correct graph. Allow max at $1.5 < x \leqslant 2.5$ (Allow if curve goes through points even if you can't see the point plotted (B1 All points plotted correctly or 4 points plotted correctly with curve joining all their plotted points)
	(e)	Tangent drawn at 1.5		2	M1 attempt to draw tangent at 1.5
			40 – 55		A1 must see tangent drawn.
	(f)	$y = 200-25x$		3	M1 for indicating that 200 – 25x is the line. Implied by correct line drawn
		line $y=200-25x$ drawn			A1 line through (1, 175) and (4 ,100)
			1.3, 3.9		A1 correct line must be drawn allow ± 0.1
					Total 15 marks



V
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20
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2
3
4
5
x

Question		Working		Answer	Mark	Notes
11	(a)	$\frac{3\times3+1}{3-1}$			2	M1 implied by correct value
				5		A1
	(b)			1	1	B1
	(c)	$xy-y=3x+1$	$xy-y=3x+1$		4	M1 For a correct expression. May use 2 other letters eg $yx-x=3y+1$
		$xy-3x=y+1$	$-y-1=3x-xy$			M1 Collect all of their x terms on one side. (must be more than one) Allow 1 sign error. Condone both sides being over x or y eg $\frac{-y-1}{x}=\frac{3x-xy}{x}$ May use other letters eg $yx-3y=x+1$
		$x(y-3)=y+1$	$-y-1=x(3-y)$			M1 Isolating term in x ie taking x out as common factor so it only appears once in the equation
		$\frac{x+1}{x-3}$	$\frac{-x-1}{3-x}$	$\frac{x+1}{x-3}$		A1 oe eg $\frac{-x-1}{3-x}$ Must be in terms of x
	(d)	$[\mathrm{g}(a)=]\dfrac{\frac{a-1}{3a+1}+1}{\frac{a-1}{3a+1}-3}$ or $\frac{3g(x)+1}{g(x)-1}=\frac{x-1}{3x+1}$			7	M1 ft Their part (c) using g(a) = f^{-1}(fg(a)) ie substituting $\frac{a-1}{3a+1}$ into their answer to (c) Allow any letter or substituting g(x) into f(x) and equating to fg(x) [Allow g or any letter for g(x) but must be different to the letter used in the inverse of f(x)]
		$[\mathrm{g}(a)=]\frac{a-1+3a+1}{a-1-9a-3}\left[=\frac{4a}{-8a-4}=\frac{-a}{2a+1}\right]$ oe or $8\mathrm{g}(x)x+4\mathrm{g}(x)=-4x$				M1 dep on 1st M1 and the answer to (c) being of the form $\frac{ax\pm b}{cx\pm d}$ for removing nested fractions. or removing fractions and collecting the g(x) terms on one side and the x terms on the other side Allow any letter and 1 sign/numerical error
		$[\mathrm{gf}(a)]=\dfrac{-\frac{3a+1}{a-1}}{2\left(\frac{3a+1}{a-1}\right)+1}$				M1ft follow through their g(a) For substituting $\frac{3a+1}{a-1}$ into their g(a) Allow any letter
		$[\mathrm{gf}(a)]=\frac{-3a-1}{6a+2+a-1}\left[=\frac{-3a-1}{7a+1}\right]$				A1 A correct expression for gf(a) without nested fractions. Allow any letter
		$\frac{a-1}{3a+1}=\frac{-3a-1}{7a+1}$				M1 dep on 3rd M1 being awarded. Forming an equation by equating their gf(a) to fg(a). Allow any letter
		$(a-1)(7a+1)=(-3a-1)(3a+1)$				A1 removing the fractions to gain a correct equation. Allow any letter. If this line is not seen it may implied by the final A1
				[a =] 0		A1 from correct working.
						Total 14 marks

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