

Mark Scheme (Results)

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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
- o 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(a)		2.48×10^{8}	1	B1	cao			
(b)		0.000256	1	B1	cao			
(c)	Numerator of 2.37×10^{60} or 23.7×10^{107} oe		3	M1	Allow eg 23.7×10^{59} or $(25-1.3) \times 10^{59}$			
	or an answer in the form 1.58×10^n or $m \times 10^{108}$				Implied by a correct single value in any form			
	15.8×10^{107} or 158×10^{106} oe			A1	A correct single value seen in their working but			
					need not be in standard form.			
		1.58×10^{108}		A1				
	Total 5 marks							

Question	Working	Answer		Mark	Notes
2(a)	$\frac{9+8+7+6+10+a+7}{7} = 8 \text{ or } \frac{a+47}{7} = 8$		2	M1	Correct method to find the mean no errors.
		9		A1	
(b)	6, 7, 7, 8, 9, "9", 10		2	M1	For ordering allow correct ordering using their value for <i>a</i> . This is often seen in the text of the question
		8		Alft	Answer must follow their value for part (a) If $a \ge 8$ the median is 8
					If $a \leq 7$ the median is 7
					If there is no value of <i>a</i> found in part(a) the median is 7.5 Check that a median of 8 does not come from calculating the mean
(c)	$34 \times 49 - 11 \times 72$ [=1666 - 792 = 874]		3	M1	A correct method to find the total age of the passengers who are not pensioners.
	$\frac{"874"}{34-11}$ or $\frac{"874"}{23}$			M1dep	Dep on previous M being awarded. A correct method to find the mean age of the passengers who are not pensioners.
		38		A1	
					Total 7 marks

Question	Working	Answer	Mark		Notes
3 (a)	y = -x drawn or 2 points correct		2	M1	
		Correct triangle		A1	(-1, -4) (-5, -2) (-7, -8)
(b)	2 points correct or 3 <i>x</i> coordinates correct or 3 <i>y</i> coordinates correct		2	M1	
		Correct triangle		A1	(-7, 3) (-5, -1) (-1, 5)
(c)		enlargement	3	B1	
		SF - 0.5		B1	
		Centre (6, -1)		B1	
					Total 7 marks



Que	Working		Ans	Mark		Notes
4	$x^{2} + \left(\frac{40 - 3x}{4}\right)^{2} = 64 \text{or} \left(\frac{40 - 4}{3}\right)^{2}$ $\left(\frac{40 - 3x}{4}\right) = \sqrt{64 - x^{2}} \text{or} \left(\frac{40 - 4}{3}\right)^{2}$	$\left(\frac{y}{y}\right)^2 + y^2 = 64 \text{ oe}$ $\left(\frac{4y}{y}\right) = \sqrt{64 - y^2}$		6	M1	For substituting a correct expression for <i>x</i> or <i>y</i> into the quadratic equation to form an (un-simplified) quadratic equation in either <i>x</i> or <i>y</i> . Implied by the 2^{nd} M1
	$x^{2} + \left(\frac{1600}{16} - \frac{240}{16}x + \frac{9}{16}x^{2}\right) = 64 \text{ or}$ $\left(\frac{1600}{9} - \frac{320}{9}y + \frac{16}{9}y^{2}\right) + y^{2} = 64 \text{ or}$	e			M1	For a correct method to expand $\left(\frac{40-3x}{4}\right)^2 \operatorname{or}\left(\frac{40-4y}{3}\right)^2$ resulting with 3 or 4 terms. Condone 1 error in total (numerical or sign). NB $-3x^2$ and $-4y^2$ will count as 1 error. This must then be subst into the correct equation.
	$\frac{25}{16}x^{2} - 15x + 36 = 0 \text{ or } 25x^{2}$ $\frac{25}{9}y^{2} - \frac{320}{9}y + \frac{1024}{9} = 0 \text{ or }$	$-240x + 576 = 0 \text{or}$ $25y^2 - 320y + 1024 = 0 \text{ oe}$			M1	For correct 3 term quadratic dep on M1 (one of the 2 above) being awarded.
	$\left(\frac{5}{4}x-6\right)\left(\frac{5}{4}x-6\right) \text{ or } (5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24)(5x-24))(5x-24)(5x-$	(x-24) or (-32)(5y-32) or $-4(25 \times 576)$			M1	Solving their 3 term quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct. If using formula or completing the square allow one sign error. Working must be seen. By completing the square must see eg $\frac{25}{16}\left(x - \frac{24}{5}\right)^2 [\pm] = 0$ Allow calculation of the discriminant for their quadratic
	x = 4.8 or y = 6.4 or using discriminant $(-320)^2 - 4(25 \times 1024) = 0 \text{ or } \left(-\frac{320}{7}\right)^2$ $(-240)^2 - 4(25 \times 576) = 0 \text{ or } (-15)^2$	$\binom{2}{9}^{2} - 4\binom{25}{9} \times \frac{1024}{9} = 0$ $\binom{25}{-4} - 4\binom{25}{16} \times 36 = 0$			A1	correct single value for x or y. Award A0 if more than one value of x or more than one value of y is given For discriminant the calculation must be correct and = 0
		Only one solution. [therefor intersects the <i>C</i> only once	e line e.]		A1dep	Dep on all previous method marks awarded and only 1 value of x and/or y given. For a correct conclusion stating only one solution <i>Total 6 marks</i>

Question	Working	Answer	Mark		Notes
For this qu	estion Marks for part(b) may be awarded if seen in part(a)			
5 (a)		-a + b	1	B1	
(b)	$\begin{bmatrix} \rightarrow \\ AE = \end{bmatrix} \pm k ("-\mathbf{a} + \mathbf{b}")$		6	M1	$\xrightarrow{\rightarrow}$ correct vector for \overrightarrow{AE} or This may be seen embedded in an equation
	$\begin{bmatrix} \overrightarrow{CD} = \\ -\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b} \text{ or } \begin{bmatrix} \overrightarrow{DC} = \\ 1\\ 3\\ -\frac{1}{5}\mathbf{b} \end{bmatrix}$			M1	A correct vector for CD seen. This may be seen \rightarrow embedded in AE or in an equation
	$\begin{bmatrix} \overrightarrow{AE} = \\ -\frac{2}{3}\mathbf{a} \pm m\left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}"\right) \text{ or} \\ -\frac{2}{3}\mathbf{a} \pm m\left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}"\right) = \pm k\left("-\mathbf{a} + \mathbf{b}"\right) \text{ or} \end{bmatrix}$			M1	A second correct vector for \overrightarrow{AE} These may be seen embedded in an equation or 2 different vectors for another side. They should
	$\begin{bmatrix} 3 & (3 & 5) \\ AE = \end{bmatrix} - \mathbf{a} + \frac{2}{5}\mathbf{b} \pm t \left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b} " \right) \text{ or }$				include $\pm \alpha AE$ and $\pm \beta CD$ somewhere but these may be embedded (see next page)
	$-\mathbf{a} + \frac{2}{5}\mathbf{b} \pm t\left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}"\right) = \pm k\left("-\mathbf{a} + \mathbf{b}"\right)$				
	$k = \frac{2}{3} + \frac{1}{3}m \text{or} k = 1 + \frac{1}{3}t \text{or}$ $k = \frac{2}{5}m \text{or} k = \frac{2}{5} + \frac{2}{5}t$			M1dep	Dep on the 1 st and 3 rd method marks being awarded. Equating the coefficients of \mathbf{a} or the coefficient of \mathbf{b} to form a linear equation in two unknowns
	$0 = \frac{2}{3} - \frac{1}{15}m \text{or} 0 = \frac{3}{5} - \frac{1}{15}t$			M1dep	Dep on the previous method mark being awarded. Eliminating either <i>m</i> or <i>k</i> or implied by m = 10 or $k = 4$ or $t = 9$
		$4(-\mathbf{a}+\mathbf{b})$		A1	oe Correct answer gets 6/6
	·	·	•	•	Total 7 marks

There may be other combinations used. If there is another method	d use that merits marks send to review
$\overrightarrow{AC} = -\frac{2}{3}\mathbf{a} \text{ and } \overrightarrow{AC} = \pm k \left("-\mathbf{a} + \mathbf{b}" \right) \pm m \left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}" \right)$	
	or $-\frac{2}{3}\mathbf{a} = \pm k \left(\mathbf{-a} + \mathbf{b} \right) \pm m \left(\mathbf{-\frac{1}{3}}\mathbf{a} + \frac{2}{5}\mathbf{b} \right)$
$\overrightarrow{OE} = \mathbf{a} \pm k ("-\mathbf{a} + \mathbf{b}") \text{ and } \overrightarrow{OE} = \frac{1}{3}\mathbf{a} \pm m \left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}" \right)$	
	or $\mathbf{a} \pm k ("-\mathbf{a} + \mathbf{b}") = \frac{1}{3} \mathbf{a} \pm m ("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}")$
$\overrightarrow{CE} = \frac{2}{3}\mathbf{a} \pm k \left("-\mathbf{a} + \mathbf{b}" \right) \text{ and } \overrightarrow{CE} = m \left("-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b}" \right)$	
	or $\frac{2}{3}\mathbf{a} \pm k(\mathbf{"-a+b"}) = m\left(\mathbf{"-\frac{1}{3}a+\frac{2}{5}b"}\right)$
$\overrightarrow{AO} = -\mathbf{a} \text{ and } \overrightarrow{AO} = \pm k \left("-\mathbf{a} + \mathbf{b} " \right) \pm q \left(-\frac{1}{3}\mathbf{a} + \frac{2}{5}\mathbf{b} \right) - \frac{2}{5}\mathbf{b}$	
	or $\mathbf{a} = \pm k ("-\mathbf{a} + \mathbf{b}") \pm m ("\frac{1}{3}\mathbf{a} - \frac{2}{5}\mathbf{b}") - \frac{2}{5}\mathbf{b}$

Question	Working	Answer	Mark		Notes
6	$[\mathbf{A}^{-1} =] -\frac{1}{(4 \times -2) - (3 \times -2)} \begin{pmatrix} 4 & 3 \\ -2 & -2 \end{pmatrix} \begin{bmatrix} -1 & 4 & 3 \\ -2 & -2 \end{bmatrix}$		7	M1	oe allow correct un-simplified
	$[\mathbf{B} =] \mathbf{B} \mathbf{A} \mathbf{A}^{-1} \text{ or } [\mathbf{B} =] \begin{pmatrix} 4x & -14 \\ x & -1 \end{pmatrix} \begin{bmatrix} "-\frac{1}{2} \begin{pmatrix} 4 & 3 \\ -2 & -2 \end{pmatrix}" \end{bmatrix}$			M1	For writing or using $\mathbf{B} \mathbf{A} \mathbf{A}^{-1}$ ft their inverse of \mathbf{A}
	$\begin{bmatrix} \mathbf{B} = \end{bmatrix} -\frac{1}{2} \begin{pmatrix} 16x + 28 & 12x + 28 \\ 4x + 2 & 3x + 2 \end{pmatrix} \text{or} \begin{pmatrix} -8x - 14 & -6x - 14 \\ -2x - 1 & -\frac{3}{2}x - 1 \end{pmatrix}$			M1dep	Dep on previous M mark being awarded. Correct method for multiplying out B AA^{-1} to find a single matrix for B in terms of <i>x</i> (determinant and 2 terms correct)
	$10 = "\frac{1}{4}"(("16x+28")("3x+2")-("4x+2")("12x+28"))$ or $10 = ("-8x-14")("-\frac{3}{2}x-1")-("-2x-1")("-6x-14")$			M1	Correct method for finding the determinant in terms of x and equating to 10. If full working shown then ft their matrix for B if it is in terms of x Allow $(12x^2 + 29x + 14) - (12x^2 + 34x + 14)$
	$10 = -5x$ or $10x = 10 \times -2$			M1dep	Dep on all previous M marks being awarded. Obtaining a correct linear equation which need not be fully simplified.
	x = -2			A1	Correct value for <i>x</i>
		$\mathbf{B} = \begin{pmatrix} 2 & -2 \\ 3 & 2 \end{pmatrix}$		A1	
ALT	$\begin{bmatrix} \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} -2 & -3 \\ 2 & 4 \end{pmatrix} = \begin{bmatrix} -2a+2b & -3a+4b \\ -2c+2d & -3c+4d \end{bmatrix}$			M1	Correct matrix – letters may be different.
	"-2a+2b" = 4x "-3a+4b" = -14"-2c+2d" = x "-3c+4d" = -1			M1	Forming the 4 equations ft their matrix
	a = -8x - 14 and $b = -6x - 14c = -2x - 1 and d = -\frac{3}{2}x - 1$			M1dep	Dep on previous M mark being awarded. Solving to get a , b , c and d in terms of x (2 correct)
	$10 = ("-8x-14")("-\frac{3}{2}x-1") - ("-2x-1")("-6x-14")$			M1	Correct method for finding the determinant in terms of <i>x</i> and equating to 10. Ft their matrix only if working seen
	$10 = -5x$ or $10x = 10 \times -2$			M1dep	Dep on all previous M marks being awarded. Obtaining a correct linear equation which need not be fully simplified
	x = -2			A1	Correct value for <i>x</i>
		$\mathbf{B} = \begin{pmatrix} 2 & -2 \\ 3 & 2 \end{pmatrix}$		A1	
					Total 7 marks

Question	Working	Answer		Mark	Notes
7 (a)	$\angle ODC = 90 - 38 [= 52]$		6	M1	Correct method to find $\angle ODC$ or correct angle
	Or $\angle CAD = 38$ or $\angle DBC = 38$				for $\angle CAD$ May be seen on diagram. If it is not
	Or $\angle ADE = 180 - (180 - 86 + 38) [= 48]$				on the diagram it must be clearly labelled
	$\angle ODA \text{ or } \angle OAD = 180 - 86 - "52" [= 42] \text{ or } 90 - 48 [= 42]$			M1	Correct method to find $\angle ODA$, $\angle OAD$ or
	or $\angle COD = 76$				$\angle COD$ May be seen on diagram,
	or $\angle ABD = 86 - 38[= 48]$				If it is not on the diagram it must be clearly labelled
	$\angle AOD = 180 - 2 \times "42" [= 96]$			M1	Correct method to find $\angle AOD$ May be seen on
	or $\angle AOD = 86 \times 2 - "76" [= 96]$				diagram
	or $\angle AOD = 48 \times 2 [= 96]$				If it is not on the diagram it must be clearly
					labelled Allow $\angle O$ for $\angle AOD$
	$\frac{"96"}{m} \times 2\pi r = 0.8\pi$ or $\frac{"96"}{m} \times 2\times \pi \times 1.5$			M1	Allow without π
	360^{-12}				Must use "their $\angle AOD$ "from diagram or clearly
	0.8			M1	labelled
	$r = \frac{0.8\pi \times 360}{100}$ oe or $\frac{96}{200} \times 2 \times \pi \times 1.5 = 0.8\pi$			IVI I	Allow without π in. Must use "their $\angle AOD$ "from diagram or clearly
	"96"× 2π 360				labelled
	Angle between tangent and radius (diameter) is 90°	1.5		A1	Need all of the previous method marks and a
	Alternate segment theorem			shown	fully correct solution with at least two relevant
	<u>Opposite angles of a cyclic quad</u> rilateral				reasons for their working. Minimum needed is
	<u>Angle at the centre is $2 \times$ (double) angle at circumference /</u>				the words underlined (allow abbreviations if
	<u>angle at circumference is ¹/2</u> angle at <u>centre</u>				clear). If verifying then must state the radius is therefore 1.5×3 $m = 1.5$ rather than just 1.5
	Angles in a triangle add to 180°				therefore 1.5 e.g. $r = 1.5$ rather than just 1.5
	Angles on a straight line add to 180°				
(b)	$[\text{Area} -] \pi \times 15^2$		2	M1	
(~)		7.07	-	A1	Awrt 7 07
	1		I		Total 8 marks

Question	Working	Answer	Mark		Notes
8 (a)		3	3	B3	All 8 correct
				B2	6 or 7 correct
	8 1000			B1	4 or 5 correct
	6×3				
	5 3				
We do not	ft if they have blanks for a region needed for that part of the	e question b	out corre	ct ansv	vers gain the marks
(b)(i)		3	3	B 1	Correct answer or Ft their Venn diagram ie the
					number outside of the circles.
(ii)	"15" + "6" + "11" + "3" + "13" or 33 + "15"	48		B1	Correct answer or Ft their Venn diagram.
(iii)	66 - "5" or "3"+"3"+"13"+"11"+"6"+"15"+"10"	61		B1	Correct answer or Ft their Venn diagram.
(c)(i)		0	1	B1	Mark the final answer, ignore working. We will
					allow 0 or $\frac{0}{2}$ as the final answer
					29 29 29
(ii)	"11"+"3" or "11"+"3"		2	M1	Correct answer or Ft their Venn diagram but the
	29 "10"+"11"+"3"+"5"				numerator must be less than the denominator
		14		A1	
		29			
					Total 9 marks

Quest	Working	Ans	Mark		Notes
9	$[AB =]\frac{30}{\tan 32}[=48.01]$ or $[AB =]\sqrt{\left(\frac{30}{\sin 32}\right)^2 - 30^2}[=48.01]$ oe		8	M1	A correct method to find the length <i>AB</i> . Allow awrt 48 May be seen on diagram
	$[CB =] \frac{30}{\tan 25} [= 64.3]$ or $[CB =] \sqrt{\left(\frac{30}{\sin 25}\right)^2 - 30^2} [= 64.3]$ oe			M1	A correct method to find the length <i>CB</i> . Allow awrt 64.3 May be seen on diagram
	$[\angle CBA =]280 - 195 [=85]$			M1	A correct method to find $\angle CBA$ May be seen on diagram
The next	xt 3 method marks can only be awarded if using their $\angle CBA$ or a	correct	value		
	$\left[AC^{2}\right]^{"}48.01^{"2}+"64.335^{"2}-2\times"48.01"\times"64.335"\cos"85"$			M1	A correct method to find the length AC
	L J [-5005]				Allow awrt 5910 or 76.8
	[= <i>39</i> 03]				May be seen on diagram
					Ft through their AB, AC and $\angle CBA$ if they are labelled
	$[AC =]\sqrt[9]{48.01} + [64.335]^{2} - 2 \times [48.01] \times [64.335] \cos[85]$				clearly(allow on diagram) or it must come from correct
	[= 76.8]				working
	$\frac{\sin \angle CAB}{"64.335"} = \frac{\sin"85"}{"76.85"} \text{ or } \frac{\sin \angle ACB}{"48.01"} = \frac{\sin"85"}{"76.85"} \text{ or} "64.3"^2 = "48.01"^2 + "76.8"^2 - 2 \times "48.01" \times "76.8" \cos \angle CAB \text{ or} "48.01"^2 = "64.3"^2 + "76.8"^2 - 2 \times "64.3" \times "76.8" \cos \angle ACB $			M1	A fully correct method to find $\angle CAB$ or $\angle ACB$. Ft through their CB (or AB), AC and $\angle CBA$ if they are labelled clearly (allow on diagram) or come from correct working. May use cosine rule.
	$\sin \angle CAB = \frac{\sin^{11}85^{11}}{76.85^{11}} \times (64.335^{11}) \rightarrow \angle CAB = 56.5 \text{ or}$ $\cos \angle CAB = \frac{(48.01)^{12} + (76.8)^{12} - (64.3)^{12}}{2 \times (48.01)^{12} \times (76.8)^{12}} \rightarrow \angle CAB = 56.5$ $\sin \angle ACB = \frac{\sin^{11}85^{11}}{(76.85)^{11}} \times (48.01)^{11} \rightarrow \angle ACB = 38.487 \text{ or}$ $\cos \angle ACB = \frac{(64.3)^{12} + (76.8)^{12} - (48.01)^{12}}{2 \times (64.3)^{12} \times (76.8)^{12}} \rightarrow \angle ACB = 38.487$			M1	Rearranging and using inverse sine leading to an angle for $\angle CAB$ or $\angle ACB$ does not need to be correct) This implies the 5 th M1
	360+15-"56.5" or $360-(180-(100+"38.487"))$ oe			M1	A correct method to find required bearing. eg 180 + 100 + "38.487"
		318		A1	awrt 318 or awrt 319 Condone degree sign.
					Total 8 marks

Question	Working	Answer	Mark		Notes
10 (a)	$\frac{2}{1-2}$ × 120 000		2	M1	
	5+3+2				
		24 000		A1	Ignore any units eg condone \$24 000
(b)	$5 \times 1.1 + 3 \times 1.05 + 2 \times 0.96 [= 5.5 + 3.15 + 1.92 = 10.57]$ or		3	M1	Allow any multiple.
	60 000×1.1+36 000×1.05+"24 000"×0.96 [= 66000				
	+37800 + 23040 = 126840]				
	"10.57" $\begin{bmatrix} -1.057 \end{bmatrix}$ or			M1	Ft their total from the step before.
	$\frac{1}{5+3+2}$ [-1.037] or				Allow multiples eq. is a multiply of $\frac{"10.57"}{}$
	"126840"-120000["6840" 100] "126840"				" $5+3+2$ "
	$\boxed{120000} = \frac{120000}{120000} \times 100 \text{ or } \frac{120000}{120000} \text{ oe}$				
		5.7[%]		A1	
(c)	$\frac{360000}{100}$ or $\frac{360000}{1000} \times 4$		2	M1	
	0.75 3				
		[\$]480 000		A1	
(d)	360 000 r 266 666 c]		3	M1	A correct first step for example
	$\left[\frac{1.35}{1.35}\right] = 200000.0.]$				360 000×388.5 =[139 860 000]
					or $\frac{1.35}{388.5} [= 0.00347]$ or $\frac{388.5}{1.35} [= 287.7]$
	260,000			M1	A fully correct method
	$\frac{300000}{1.35} \times 388.5$			1011	A fully confect method.
		103 600 000		A1	oe awrt 103600000
					Total 10 marks

Quest	Working	Answer	Mark		Notes
11 (a) (i)	A correct straight line drawn between at least		2	M1	Allow ± 1 small square for all points.
	2 integer values of x				
		Correct line		A1	A straight line through $(-2, 0)$ and $(2, 3)$ Allow ± 1 small
					square for all points. Must cover at least -2 to 3
(ii)	A correct straight line drawn between at least		2	M1	Allow ± 1 small square for all points.
	2 integer values of x	~			
		Correct line		AI	A straight line through $(0,5)$ and $(3,3)$ Allow ± 1 small
(1-)			1	D16	square for all points. Must cover at least -2 to 3
(0)		x = 2.5	1	BIII	Allow $2.4 \le x \le 2.6$ and $3.3 \le y \le 3.5$ or it their graph where
		y = 3.4	1	D10	their two lines cross. If lines don't cross or none drawn BU
(C)		x < 2.5	1	BIII	ft their "2.5" value .Allow $x < \frac{42}{17}$ (awrt 2.5)
		or $x < \frac{42}{17}$			17
		17			allow $-3 \le x < \frac{42}{17}$ or $(-\infty, "2.5")$ or $[-\infty, "2.5")$ or
					$[-3, "2.5")$ $]-\infty, "2.5"]]-\infty, "2.5"[$
(d)		7 2 _2 _1	2	BJ	B2 for <i>A</i> correct
(u)		7, 2, 2, 1	2	D2	B1 for 3 correct
	y 7 2 -1 -2 -1 2 7				
(e)	At least 5 points plotted correctly		2	M1	Ft their points.
		Correct curve		A1	Fully correct curve drawn. Allow ± 1 small square
(f)	$x^{2}-2x-1 < \frac{6+3x}{4}$ oe		3	M1	Rearranging to use the graph. eg $x^2 - 2x - 1 - \frac{6 + 3x}{4}$ This
	4				4 must be seen
		-0.7 or 3.5		A1ft	M1 must be awarded If parts(a) (i) and (e) are correct we
		0.7 01 5.5		1111	will allow -0.7 ± 0.1 or 3.5 ± 0.1 Otherwise the numbers
					must match their graphs Allow ± 1 small square Must give
					values to 1dp
		-0.7 < x < 3.5	"	B1ft	Allow awrt –0.7 and awrt 3.5 or ft their 2 values accept
					other notation eg $(-0.7, 3.5)$ or $]-0.7, 3.5[$
					This mark does not imply M1A1
					Total 13 marks



Question	Working	Answer	Mark		Notes
12 (a)		- 11	1	B1	
(b)		$g(x) \leqslant 5$	1	B1	Allow g or y. Allow $(-\infty, 5]$ or $[-\infty, 5]$ or
]– ∞ ,5] DO NOT allow $x \leq 5$
(c)	g(2) = 1 or f(1) or fg(x) = $\frac{4}{2(5-x^2)-11}$ oe		2	M1	
		$-\frac{4}{9}$		A1	Allow equivalent exact answer
(d)	2xy-11y=4 or $y(2x-11)=4$		3	M1	Different letters may be used.
	$2xy = 4 + 11y$ or $2x = \frac{4}{y} + 11$ or $x = \frac{4}{2y} + \frac{11}{2}$ oe			M1	Isolating term in <i>x</i> . Allow 1 sign error
		$\left[f^{-1}:x\mapsto\right]\frac{4+11x}{2x}$		A1	oe Must be in terms of <i>x</i> .
(e)		0	1	B1	Allow $x \neq 0$ but DO NOT allow $x > 0$ or $x < 0$
(f)	$\frac{4}{2\left(\frac{4}{2x-11}\right)-11}$ oe		3	M1	
	$\frac{\frac{4}{8-11(2x-11)}}{2x-11}$			M1	Reducing the denominator to a single fraction. Allow $\frac{5(2x-11)^2-16}{2x-11}$
		$\frac{8x-44}{129-22x}$		A1	Must be in simplest form
(g)	hm(x) = (3x+3)(3x+2) or (ax+b)(ax+b+1)		2	M1	Rewriting hm(x) in the form $y(y+1)$ where y is
	or $a^2x^2 + 2abx + b^2 + ax + b$]		a function of <i>x</i> . ISW
		$\overline{a=3} \ b=2$		A1	Allow $3x + 2$
Total 13 marks					



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