GCSE
MATHEMATICS
8300/3H

Higher Tier Paper 3 Calculator

Mark scheme

November 2022

Version: 1.0 Final

22BG8300/3H/MS

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values a $\leqslant$ value $<$ b
3.14 …	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles.

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Continental notation

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the student intended it to be a decimal point.

Q	Answer	Mark	Comment
1	5	B1	

Q	Answer	Mark	Comment
2	0.000 18	B1	

Q	Answer	Mark	Comment
3	$6x^5 + 12x^2$	B1	

Q	Answer	Mark	Comment
4	$15 < y < 150$	B1	

Q	Answer	Mark	Comments
5	$\frac{1}{2} \times (14 + 20) \times 11$ or 187	M1	oe any correct method to find the area of the trapezium
	$\frac{1}{2} \times 10 \times 7$ or 35	M1	oe eg $\frac{1}{2} \times 10 \times 7 \times \sin 90$
	222	A1	
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Ignore Pythagoras' theorem, trigonometry or perimeter calculations		
	$14 \times 11 + \frac{1}{2} \times 6 \times 11$		M1
	Missing brackets must be recovered eg1 $\frac{1}{2} \times 20 + 14 \times 11$ and 187 eg2 $\frac{1}{2} \times 20 + 14 \times 11$		M1 M0
	$20 \times 11 = 220$		M0M0A0

Q	Answer	Mark	Comments
6	**Alternative method 1**		
	$72 \div 6 \times 5$ or 60	M1	oe $72 \div 6 \times 11$ or 132 implies M1
	72×1.5 or 108	M1	oe eg $72 \times 3 \div 2$ 14×12 implies M2
	60 and 108 and 240 or $250 - 60 - 108 = 82$	A1	oe eg1 168 and 240 eg2 60 and 108 and 10 eg3 168 and $(250 - 72 =)$ 178
	Alternative method 2		
	6×1.5 or 9	M1	oe eg1 $6 \times 3 \div 2$ eg2 6 : 5 : 9
	$72 \div 6 \times (6 + 5 +$ their 9) or $72 \div 6 \times 5$ and $72 \div 6 \times$ their 9	M1dep	oe eg 12×20 14×12 implies M2
	9 and 240 or 60 and 108 and 240 or $250 - 60 - 108 = 82$	A1	oe eg1 168 and 240 eg2 60 and 108 and 10 eg3 168 and $(250 - 72 =)$ 178
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	In Alt 1 the 2nd mark is not dependent In Alt 2 the 2nd mark is dependent		
	240 alone or 240 with no correct method		M0
	$72 \div 6 \times 11 = 132$ and $132 + 108 = 240$		M1M1A1
	$1\frac{1}{2} \times 72 = 36$ and $72 + 36 = 108$ and $72 + 60 + 108 = 240$		M1M1A1
	$1\frac{1}{2} \times 72 = 36$		M1
	$1\frac{1}{2}$ of $72 = 36$		M0
	$72 \div 11$		M0

Q	Answer	Mark	Comments
7(a)	**Alternative method 1**		
	20	B3	B2 53 or $33 + 20$ or $73 - 20$ or $\frac{73-33}{2}$ or $\frac{40}{2}$ B1 $73 - 33$ or 40
	Alternative method 2		
	$33 + x$ or $73 - x$	M1	oe
	$x + 33 + x = 73$ or $2x + 33 = 73$ or $\frac{73-33}{2}$ or $\frac{40}{2}$	M1dep	oe eg $33 + x = 73 - x$
	20	A1	
	Additional Guidance		
	$33 + x = 73$		M1

Q	Answer	Mark	Comments
7(b)	No and gives valid reason	B1	eg No and the first term is zero or No and $1 - 1^2 = 0$ or No and all the terms are negative except the first
	Additional Guidance		
	Ignore incorrect or irrelevant statements alongside correct statements		
	Ignore all other statements and evaluations if $1 - 1^2 = 0$ seen		
	Ticks Yes		B0
	No and 0, –2, –6, …		B1
	No and $1 - 1^2 = 0$ with $2 - 1^2 = 1$		B1
	No and $1 = 1^2$		B1
	No and $1 - 1 = 0$ (0 is positive) (condone)		B1
	No and n^2 can be equal to n and $1^2 = 1$		B1
	No and n^2 can be equal to n		B0
	No and n could equal 1 which cannot become bigger when squared		B1
	No and if you put $n = 1$ it's not negative		B1
	No and $n = 1$ and $n^2 = 1$		B1
	No, all the terms are negative except when $n = 1$		B1
	No and if $n = 1$ it creates 0		B1
	No, not when $n = 1$		B0
	No, it doesn't work for the first term		B0
	No and $0.5 - 0.5^2 = 0.25$		B0
	No and when $n = 0$ it won't be negative		B0

Q	Answer	Mark	Comments
8	24×1.8 or 43.2 or 20×1.92 or 38.4 or $\frac{432}{384}$ or $\frac{9}{8}$ or $1\frac{1}{8}$	M1	oe eg1 24×180 or 4320 eg2 20×192 or 3840
	1.125 or 1.13	A1	accept 1.1 with M1 awarded
	Additional Guidance		
	M1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Ignore attempts at rounding after correct answer seen		
	Condone use of units in answer eg 1.125 m		M1A1
	$\frac{9}{8} = 1.125$ on answer line		M1A1
	$\frac{9}{8}$ and 1.125 on answer line		M1A0
	$\frac{43.2}{38.4}$		M1A0
	$\frac{1.92}{1.8} = 1.1$		M0A0

Q	Answer	Mark	Comments
9	$-\frac{5}{4}$ or $-1\frac{1}{4}$ or -1.25	B2	B1 $\frac{5}{4}$ or $1\frac{1}{4}$ or 1.25 or $x+4$ and $y-5$ or possible coordinates for *P* and *Q* stated or shown on a diagram eg *P*(0, 5) and *Q*(4, 0) or right-angled triangle shown with 4 as horizontal length and 5 as vertical length

Additional Guidance	
B1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts	
Ignore attempts at rounding after correct answer seen	
Accept $\frac{-5}{4}$	B2
Condone $\frac{5}{-4}$	B2
$(x+4)$ $(y-5)$	B1
$x+4$ and $y-5$ may be seen embedded in a fraction eg $\frac{y-(y-5)}{x-(x+4)}$ or $\frac{y-(y-5)}{x+(x+4)}$	B1
$-\frac{4}{5}$	B0
$\frac{4}{5}$	B0

Q	Answer	Mark	Comments
10	**Alternative method 1**		
	$0.49 \times (250 + 50)$ or 0.49×300 or 147	M1	oe
	their $147 - 128$ or 19	M1dep	
	19 : 31	A1	SC2 answer 31 : 19
	Alternative method 2		
	$(1 - 0.49) \times (250 + 50)$ or 0.51×300 or 153	M1	oe
	their $153 - 122$ or 31	M1dep	
	19 : 31	A1	SC2 answer 31 : 19
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	147 : 153 or 153 : 147		M1M0A0
	0.49 : 0.51		M0M0A0
	Beware of 147 and 153 from incorrect working $122 + 25 = 147$ $128 + 25 = 153$		 M0 M0

Q	Answer	Mark	Comments
11	$0.5 \times \pi \times 45$ or $0.5 \times [141, 141.4]$ or $[70.5, 70.7]$ or $0.5 \times \pi \times 45 + 75$ or $[145.5, 145.7]$	M1	oe eg 22.5π
	$(0.5 \times \pi \times 45 + 75) \div 18$ or their $[145.5, 145.7] \div 18$	M1	oe their $[145.5, 145.7]$ can be any value
	$8.08(\ldots)$ or $8.09(\ldots)$	A1	may be implied by 8.1
	8.1	B1ft	ft any answer seen with greater than 2 sf SC2 3.9
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts, B1ft may also be awarded		
	$\frac{120}{18} = 6.67$ answer 6.7		M0M1A0B1ft
	$\frac{120}{18} = 6.7$		M0M1A0B0ft
	$0.5 \times \pi \times 45$ and $70.7 \div 18 = 3.93$ answer 3.9		M1M1A0B1ft
	SC2 for an answer of 3.9 without working is when 75 is not used		

Q	Answer	Mark	Comment
12	**Alternative method 1: *ABC* to *DEF***		
	Translation and $\begin{pmatrix}6\\4\end{pmatrix}$ or 6 right and 4 up	B2	B1 translation or $\begin{pmatrix}6\\4\end{pmatrix}$ or 6 right and 4 up
	Alternative method 2: *DEF* to *ABC*		
	Translation and $\begin{pmatrix}-6\\-4\end{pmatrix}$ or 6 left and 4 down	B2	B1 translation or $\begin{pmatrix}-6\\-4\end{pmatrix}$ or 6 left and 4 down
	Additional Guidance		
	Do not accept 'across' for left or right		
	Do not accept (6, 4) or $\begin{pmatrix}3\\2\end{pmatrix}$		
	Do not accept any contradicting description and vector for B2 or B1		
	Ignore fraction line shown in a correct vector		
	Accept the vector implied by addition to each coordinate oe eg Translation and *A* to *D* → $-4+6=2$ and $1+4=5$ *B* to *E* → $-5+6=1$ and $-3+4=1$ *C* to *F* → $-2+6=4$ and $-3+4=1$		B2
	More than one transformation used		B0

Q	Answer	Mark	Comment
13(a)	The probabilities sum to 1	B1	oe eg $0.1 + 0.3 + 0.6 = 1$
	Additional Guidance		
	Ignore comments about the dice, eg $0.5 + 0.5 = 1$		
	Do not accept an incorrect statement alongside a correct one eg they add up to 1 and $0.1 + 0.4 + 0.6 = 1$		B0
	All probabilities add up to 100%		B1
	It doesn't include any other colours		B0
	They add to a whole number		B0
	The probabilities are not zero		B0
	The only colours on the tree diagram are red, blue and green		B0

Q	Answer	Mark	Comment
13(b)	0.4	B1	

Q	Answer	Mark	Comment
13(c)	0.15	B1	

Q	Answer	Mark	Comment
14(a)	$\sqrt{784}$ or 28	M1	
	(their 28)^3 or 21 952	M1dep	21 952 implies M1M1
	10.976 ÷ their 21 952 or 0.000 5 or digits 10 976 ÷ their 21 952	M1dep	oe eg 5×10^{-4} eg 1097.6 ÷ their 21 952
	0.5	A1	oe
	Additional Guidance		
	784×6 or $784 \div 6$ or $784 \div 2$		M0M0M0A0

Q	Answer	Mark	Comment
14(b)	It is less than the answer to part (a)	B1	

Q	Answer	Mark	Comment
15(a)	Vertical line drawn from correct point on graph to horizontal axis or [25, 27]	M1	implied by mark on horizontal axis
	[10.25, 10.27] (am)	A1	SC1 10.23 (am)

Q	Answer	Mark	Comment
15(b)	80	B1	

Q	Answer	Mark	Comment
15(c)	Correct tangent drawn where charge is 90%	M1	
	Correct gradient for their tangent	A1	
	Additional Guidance		
	No tangent drawn		M0A0

Q	Answer	Mark	Comment
16(a)	**Alternative method 1**		
	$H \propto \frac{1}{\sqrt[3]{L}}$ or $H = \frac{k}{\sqrt[3]{L}}$	M1	oe equation any letter implied by $7 = \frac{k}{\sqrt[3]{64}}$
	$(k =)\ 7 \times \sqrt[3]{64}$ or $(k =)\ 28$	M1dep	oe
	$H = \frac{28}{\sqrt[3]{L}}$	A1	oe equation SC1 $H = \frac{7}{4}\sqrt[3]{L}$ or $\frac{4}{7}H = \sqrt[3]{L}$
	Alternative method 2		
	$H \propto \frac{1}{\sqrt[3]{L}}$ or $cH = \frac{1}{\sqrt[3]{L}}$	M1	oe equation any letter implied by $7c = \frac{1}{\sqrt[3]{64}}$
	$(c =)\ \frac{1}{7 \times \sqrt[3]{64}}$ or $(c =)\ \frac{1}{28}$	M1dep	oe
	$\frac{H}{28} = \frac{1}{\sqrt[3]{L}}$	A1	oe equation SC1 $H = \frac{7}{4}\sqrt[3]{L}$ or $\frac{4}{7}H = \sqrt[3]{L}$
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	$(k =)\ 28$ or $(k \propto)\ 28$ or $(c =)\ \frac{1}{28}$ or $(c \propto)\ \frac{1}{28}$		M1M1
	Condone use of $\propto$ for up to M1M1A0 eg $H \propto \frac{k}{\sqrt[3]{L}}$ $k \propto 28$ $H \propto \frac{28}{\sqrt[3]{L}}$		M1 M1dep A0

Q	Answer	Mark	Comment
16(b)	$\frac{\text{their } 28}{\sqrt[3]{2744}}$ or $\frac{\text{their } 28}{14}$	M1	oe
	2	A1ft	ft their equation of the form $H = \frac{k}{\sqrt[3]{L}}$ or $cH = \frac{1}{\sqrt[3]{L}}$ SC1 24.5
	Additional Guidance		
	$k = 56$ in part (a) then $H = \frac{56}{\sqrt[3]{2744}}$ and $H = 4$		M1A1ft

	Answer	Mark	Comment
17	$BOD = 2 \times 32$ or 64	M1	oe eg $BOC = 64$ may be seen on diagram
	$OBD = 90$	M1	may be seen on diagram or implied by further working or answer
	26	A1	
	Additional Guidance		
	90 can be implied by a square angle sign		
	180 – 154 implies M1M1		

Q	Answer	Mark	Comment
18	$8m - 4$	B1	
	$9m$ + their $8m - pm = p^2$ + their 4 or $17m - pm = p^2$ + their 4	M1	collects terms after expansion
	$m(9$ + their $8 - p) = p^2$ + their 4 or $m(17 - p) = p^2$ + their 4 or $\frac{p^2 + 4}{17 - p}$	M1dep	factorises
	$m = \frac{p^2 + 4}{17 - p}$	A1	oe in the form $m =$ eg $m = \frac{-p^2 - 4}{p - 17}$
	Additional Guidance		
	$m = \frac{p^2 + 4}{17 - p}$ in working, with $\frac{p^2 + 4}{17 - p}$ on answer line		B1M1M1A1
	$8m - 1$ $17m - pm = p^2 + 1$ $m(17 - p) = p^2 + 1$ $m = \frac{p^2 + 1}{17 - p}$		B0 M1 M1 A0

Q	Answer	Mark	Comment
19	$x^2 + y^2 = 121$ or $x^2 + y^2 = 11^2$	B1	oe equation
	Additional Guidance		
	$(x - 0)^2 + (y - 0)^2 = 11^2$		B1
	$x^2 + y^2 = 11^2$ followed by incorrect working		B1

Q	Answer	Mark	Comment
20(a)	0.9×0.8^2 or 0.9×0.64	M1	oe
	0.576 or 0.58 or $\frac{72}{125}$	A1	oe fraction decimal or percentage
	Additional Guidance		
	Ignore any attempt to convert a correct answer		M1A1

Q	Answer	Mark	Comment
20(b)	**Alternative method 1**		
	(late, on time =) $(1 - 0.65) \times 0.65$ or 0.35×0.65 or 0.2275 or (on time, late =) $0.65 \times (1 - 0.8)$ or 0.65×0.2 or 0.13	M1	may be seen on tree diagram
	$(1 - 0.65) \times 0.65 + 0.65 \times (1 - 0.8)$ or $0.2275 + 0.13$	M1dep	oe
	0.3575 or $\frac{143}{400}$	A1	oe fraction, decimal or percentage Accept 0.358 or 0.36 with M1 scored
	Alternative method 2		
	(late, late =) $(1 - 0.65)^2$ or 0.35^2 or 0.1225 or (on time, on time =) 0.65×0.8 or 0.52	M1	may be seen on tree diagram
	$1 - (1 - 0.65)^2 - 0.65 \times 0.8$ or $1 - 0.1225 - 0.52$	M1dep	oe
	0.3575 or $\frac{143}{400}$	A1	oe fraction, decimal or percentage Accept 0.358 or 0.36 with M1 scored
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts		
	Ignore any attempt to convert a correct answer		M1M1A1

Q	Answer	Mark	Comment
21(a)	$-\frac{1}{2}$	B1	may be seen on diagram

Q	Answer	Mark	Comment
21(b)	$(2, -1)$	B1	may be seen on diagram

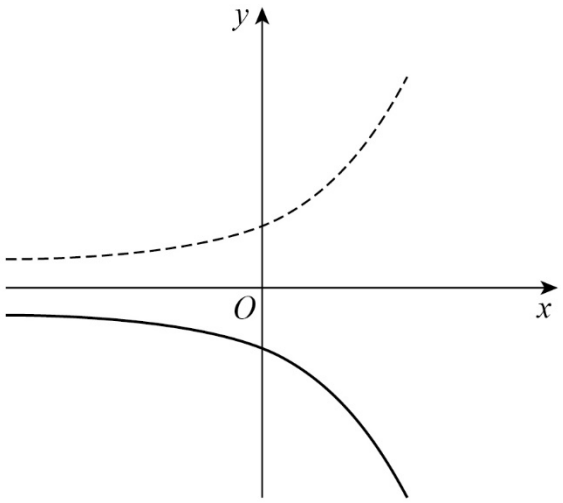
Q	Answer	Mark	Comment
22	$\frac{6}{3(x+1)}$ or $\frac{(7-5x)(x+1)}{3(x+1)}$ or $\frac{3\times 4x(x+1)}{3(x+1)}$	M1	oe one correct term with possible common denominator
	$\frac{6}{3(x+1)}$ and $\frac{(7-5x)(x+1)}{3(x+1)}$ and $\frac{3\times 4x(x+1)}{3(x+1)}$	M1dep	oe all terms correct with common denominator may be a single fraction
	$\frac{6}{3(x+1)} + \frac{7x+7-5x^2-5x}{3(x+1)}$ $+ \frac{12x^2+12x}{3(x+1)}$	M1dep	oe all terms correct with common denominator and brackets on numerator expanded
	$\frac{7x^2+14x+13}{3(x+1)}$	A1	SC3 $7x^2 + 14x + 13$ $(= 0)$ or $\frac{7x^2+14x+13}{3x+1}$
	Additional Guidance		
	Do not award A mark if further incorrect simplification is seen after a correct answer		
	$3(x + 1)$ can be $3x + 3$ throughout		

Q	Answer	Mark	Comment
23	$\frac{1}{3} \times 9^2 \times 30 \times \pi$ or 810π or [2543, 2545.1]	M1	oe
	$\frac{2}{3} \times 6^3 \times \pi$ or 144π or [452.1, 452.5]	M1	
	$30 \times \frac{6}{9}$ or 20 or $\left(\frac{6}{9}\right)^3$	M1	oe implied by 240π or [753.6, 754.1]
	$\frac{1}{3} \times 9^2 \times 30 \times \pi - \frac{1}{3} \times 6^2 \times$ their $20 \times \pi$ or $\frac{1}{3} \times 9^2 \times 30 \times \pi - \frac{1}{3} \times 9^2 \times 30 \times \left(\frac{6}{9}\right)^3 \times \pi$ or $810\pi - 240\pi$ or their [2543, 2545.1] – their [753.6, 754.1] or 570π or [1788.9, 1791.5]	M1dep	dep on 1st and 3rd M1
	426π or [1336, 1339.4]	A1	
	Additional Guidance		
	All values may be seen on diagrams		

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comment</th></tr>
<tr><td rowspan="11">24</td><td>0.65 or 0.9 or 1.04</td><td>M1</td><td rowspan="3">oe
M3 for
$14\,000 \times 0.65 \times 0.9^3$ or 6633.9(0)
or
$14\,000 \times 0.65 \times 0.9^4$ or 5970.51</td></tr>
<tr><td>$14\,000 \times 0.65$ or 9100</td><td>M1</td></tr>
<tr><td>their 9100×0.9^3 or 6633.9(0)
or
their 9100×0.9^4 or 5970.51</td><td>M1dep</td></tr>
<tr><td>5000×1.04^4 or 5849.29…
or
5000×1.04^5 or 6083.26…</td><td>M1</td><td>oe</td></tr>
<tr><td>6633.9(0) and 5970.51
and
5849.29… and 6083.26…</td><td>A1</td><td>value of car at years 4 and 5

value of painting at years 4 and 5</td></tr>
<tr><td colspan="4">Additional Guidance</td></tr>
<tr><td colspan="3">5970.51 and 6083.26… with no values for year 4</td><td>M4A0</td></tr>
<tr><td colspan="3">6083.26… or 5849.29… with no method or other correct working or evaluations</td><td>M1M0M0M1A0</td></tr>
<tr><td colspan="3">9100 implies M2</td><td></td></tr>
<tr><td colspan="3">7000 + 1400 + 700 = 9100</td><td>M1M1</td></tr>
<tr><td colspan="3">7000 + 1400 + 700</td><td>M0M1</td></tr>
<tr><td colspan="3">Values by year
<table><tr><th>Year</th><th>Car value (£)</th><th>Painting value (£)</th></tr><tr><td>1</td><td>9100</td><td>5200</td></tr><tr><td>2</td><td>8190</td><td>5408</td></tr><tr><td>3</td><td>7371</td><td>5624.32</td></tr><tr><td>4</td><td>6633.9(0)</td><td>5849.29</td></tr><tr><td>5</td><td>5970.51</td><td>6083.26</td></tr></table></td><td></td></tr>
</table>

Q	Answer	Mark	Comment	
25	7.15 or 7.25 or 13.55 or 13.65 or 109.5 or 110.5	B1		
	7.25 and 13.65 and 109.5 chosen	B1		
	0.5 × their 7.25 × their 13.65 × sin their 109.5	M1	their 7.25 must be [7.2, 7.25] their 13.65 must be [13.6, 13.65] their 109.5 must be [109.5, 110] or 110.5	
	46.6(4…) with correct bounds seen	A1ft	condone 47 with B1B1 scored ft their three bounds within M1 ranges which are not 7.2 or 13.6 or 110	
	Additional Guidance			
	Accept $7.24\dot{9}$ for 7.25 or $13.64\dot{9}$ for 13.65 or $110.4\dot{9}$ for 110.5			
	7.25 and 13.65 and 110.5 used and answer 46.3…			B1B0M1A1ft
	7.25 and 13.65 and 110 used and answer 46.497… or 46.5			B1B0M1A0ft
	7.2 and 13.6 and 110 used, with or without answer 46(.0…)			B0B0M1A0ft
	46.6(4…) or 47 with no working			B0B0M0A0

Q	Answer	Mark	Comment
26(a)	Reflection of given graph in the x-axis	B1	mark intention
	Additional Guidance		
			

Q	Answer	Mark	Comment
26(b)	Translation downwards of given graph which must go through (0, 0)	B1	mark intention, but must be negative for negative values of x and be positive for positive values of x drawn below dashed line
	Additional Guidance		
	