

Mark scheme for 1MA1 Higher themed papers: Upper and Lower Bounds

GCSE Mathematics (1MA1)

Themed papers – Upper and Lower Bounds

Compiled from student-friendly mark schemes

Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme

M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.

P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.

A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.

C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.

Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Question 1 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$4.755 \leq n < 4.765$	B2	These marks are given for the correct answer only (One mark is given for 4.755 or 4.765 or 4.7649 seen)

Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$8.3 \leq y < 8.4$	B1	This mark is given for either 8.3 or 8.4 seen in the correct position
		B1	This mark is given for the correct answer only

Question 3 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{1}{1.6} = 0.625$	1	This mark is given for the correct answer only
(b)		1	This mark is given for 9.75 and 9.85 seen
	$9.75 \leq x < 9.85$	1	This mark is given for the correct answer only

Question 4 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$7.3 \leq x < 7.4$	B2	These two marks are given for a correct answer only (B1 is given for numbers 7.3 and 7.4 seen)

Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$7 \leq N < 8$	M1	This mark is given for identifying the numbers 7 and 8
		A1	This mark is given for the correct answer only

Question 6 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$5.365 \leq p < 5.375$ $2.85 \leq s < 2.95$	B1	This mark is given for the upper and lower bounds of p and s
	Upper bound for $m = \frac{1}{5.365 \times 2.85}$	M1	This mark is given for using the two lower bounds for p and s to find the upper bounds for m
	0.0654 (to 3 significant figures)	A1	This mark is given for the correct answer only

Question 7 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	a : 6.425 or 6.435 (or 6.434999...) b : 5.5135 or 5.5145 (or 5.5144999...)	B1	This mark is given for finding a bound of a or a bound of b
		P1	This mark is given for a process to use the upper bounds and lower bounds in an expression
	Lower bound for $v = \sqrt{\frac{6.425}{5.5145}}$ Upper bound for $v = \sqrt{\frac{6.435}{5.5135}}$	P1	This mark is given for choosing the correct upper and lower bounds
	$\sqrt{\frac{6.425}{5.5145}} = 1.079(4027\dots)$ $\sqrt{\frac{6.435}{5.5135}} = 1.080(3403\dots)$	A1	This mark is given for finding 1.079... and 1.080... (both values must clearly come from correct working)
	1.08; both the upper bound and the lower bound round to this value	C1	This mark is given for a correct answer and explanation

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Performance data:

Q	Taken from			Total Marks available	TOPIC	Spec Ref	AO	% Mean marks	Edexcel mean averages Marks of candidates who achieved grade:										
	Q	Series	Paper						ALL	9	8	7	6	5	4	3	2	1	U
1	7	June 2017	2H	2	Number	N15	1	45	0.9	1.72	1.46	1.19	0.92	0.63	0.32	0.1	-	-	0.02
2	6	June 2019	2H	2	Number	N15	1	20	0.39	1.1	0.6	0.37	0.28	0.27	0.28	0.24	-	-	0.22
3a	5a	Nov 2017	3H	1	Number	N3	1	14	0.14	0.75	0.74	0.49	0.45	0.28	0.13	0.03	-	-	0.02
3b	5b	Nov 2017	3H	2	Number	N15	1	21	0.41	1.62	1.38	1.18	0.98	0.77	0.42	0.18	-	-	0.06
4	8	Mock Set 3	3H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	9	Nov 2018	2H	2	Number	N15	1	1	0.02	0.4	0.32	0.09	0.02	0.01	0.01	0.01	-	-	0
6	16	Mock Set 3	2H	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	20	Mock Set 1	3H	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				19					1.86	5.59	4.5	3.32	2.65	1.96	1.16	0.56	-	-	0.32