

GCSE Mathematics (1MA1)

Themed papers – Recurring Decimals

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 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\text{Let } y = 0.\dot{2}.$ $10y = 2.\dot{2}; 9y = 2, \text{ thus } y = \frac{2}{9}$	M1	This mark is given for a method to convert $0.\dot{2}$ to a fraction
	$\text{Let } x = 0.1\dot{3}\dot{6}$ $10x = 1.3636... \quad 1000x = 136.3636$ $990x = 135, \text{ thus } x = \frac{135}{990}$	M1	This mark is given for a method to convert $0.13636...$ to a fraction
	$\frac{2}{9} \times \frac{135}{990} = \frac{270}{8910} = \frac{1}{33}$	C1	This mark is given for a correct arithmetic and concluding the proof

Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		1	This mark is given for the correct use of the ‘recurring’ symbol
	$0.246, 0.\dot{2}4\dot{6}, 0.2\dot{4}\dot{6}, 0.24\dot{6}$	1	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
	$\text{Let } x = 0.418181818...$ $1000x = 418.181818...$ $10x = 4.181818...$	B1	This mark is given for finding values for $1000x$ and $10x$
	$1000x - 10x =$ $418.181818... - 4.181818... = 414$		This mark is given for a method to eliminate recurring decimals
	$990x = 418$ $x = \frac{414}{990}$	B1	This mark is given for the correct answer only (or an equivalent fraction)

Question 4 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$10x = 2.56256\dots$ $1000x = 256.256\dots$	M1	This mark is given for a method to eliminate recurring decimals
	$990x = 254$	M1	This mark is given for an expression with eliminates the recurring decimals
	$x = \frac{254}{990};$ divding top and bottom by 2 gives $\frac{127}{495}$		This mark is given for a complete proof

Question 5 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$100x = 43.636\dots$	1	This mark is given for finding $100x$
	$99x = 43.2$	1	This mark is given for finding $99x$
	$x = \frac{432}{990} = \frac{24}{55}$	1	This mark is given for the correct algebra to reach a conclusion

Question 6 (Total 2 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$100 \times 0.4\dot{3} = 43.\dot{3}$ $10 \times 0.4\dot{3} = 4.\dot{3}$ So subtracting, $90 \times 0.4\dot{3} = 39$	M1	This mark is given for a fully complete method for finding two correct decimals that, when subtracted, give an integer
	Thus $0.4\dot{3} = \frac{39}{90} = \frac{13}{30}$	A1	This mark is given for correct working leading to a correct conclusion

Question 7 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$0.6\dot{2}\dot{4} \times \frac{99}{100} = 0.618,$ $0.6\dot{2}\dot{4} =$ $\frac{618}{990}$	M1	This method mark is given for method to find two multiples of $0.6\dot{2}\dot{4}$ that can be used to eliminate the decimals
	$\frac{618}{990} = \frac{206}{330} =$	M1	This method mark is given for complete method to find a fraction in its simplest form
	$\frac{103}{165}$	A1	This accuracy mark is given for the correct answer only

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$10x = 4.575757\dots$ $1000x = 457.575757\dots$	M1	This mark is given for finding values for x , $10x$ or $1000x$
	$990x = 453$	M1	This mark is given for finding an integer multiple of x equal to another integer
	$x = \frac{453}{990} = \frac{151}{330}$	A1	This mark is given for finding a simplified fraction for x

Mark scheme for 1MA1 Higher themed papers: Recurring Decimals

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	16	June 2017	2H	3	Number	N10	1	48	1.45	2.86	2.53	2.03	1.46	0.88	0.41	0.16	-	-	0.06
2	8	Nov 2017	1H	2	Number	N1, N2	1	43	0.86	2.00	1.74	1.39	1.48	1.21	0.90	0.64	-	-	0.48
3	15	Nov 2019	1H	3	Number	N10	1	30	0.90	2.67	2.57	2.17	1.84	1.21	0.52	0.15	-	-	0.03
4	16	Nov 2018	1H	3	Number	N10	1	29	0.87	2.50	2.33	2.20	1.86	1.35	0.58	0.19	-	-	0.10
5	15	Nov 2017	1H	3	Number	N10	1	10	0.29	2.12	2.26	1.64	1.08	0.62	0.16	0.05			0.00
6	13	Mock Set 2	1H	2	Number	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	14	Mock Set 1	1H	3	Number	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	14	Mock Set 3	3H	3	Number	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				22					4.37	12.15	11.43	9.43	7.72	5.27	2.57	1.19	-	-	0.67