HIGHER

6.1 Recurring Decimals to Fractions: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write 0.4444... (4 recurring) as a fraction. You do not need to simplify or show any working.

(Total for Question 1 is 1 mark)

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2 Which fraction is equal to 0.5555... (5 recurring)?

- ☐ A) 5/10
- ☐ B) 5/9
- ☐ C) 5/11
- ☐ D) 5/6

(Total for Question 2 is 1 mark)

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3 The recurring decimal 0.083083083... has a repeating block of digits after the decimal point. Write down the repeating block, and state how many digits it contains.

(Total for Question 3 is 2 marks)

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4 Jamal is converting 0.272727... (27 recurring) to a fraction. His working is shown below.

Line 1: $x = 0.272727...$

Line 2: $10x = 2.727272...$

Line 3: $9x = 2.45$

Line 4: $x = 2.45/9$

Identify the mistake in Jamal's method and write down the correct fraction in its simplest form.

(Total for Question 4 is 3 marks)

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5 Kofi has a piece of wire of length 4/9 metres. He cuts the wire into 3 equal pieces. Work out the length of each piece as a decimal, giving your answer correct to 3 decimal places.

(Total for Question 5 is 3 marks)

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6 Write 0.777... (7 recurring) as a fraction. Hence work out 0.777... + 2/6 as a single fraction in its simplest form.

(Total for Question 6 is 4 marks)

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7 Show that 0.474747... (47 recurring) = 47/99.

(Total for Question 7 is 3 marks)

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8 Write 0.333... (3 recurring) as a fraction. Hence work out 0.333... + 1/6 as a single fraction in its simplest form.

(Total for Question 8 is 4 marks)

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9 Show that 0.181818... (18 recurring) = 2/11.

(Total for Question 9 is 3 marks)

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10 Convert 8/33 to a decimal, stating clearly which digit(s) recur.

(Total for Question 10 is 2 marks)

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11 Write these four numbers in order of size, starting with the smallest: 0.37, 0.373, 0.3737, 37/99

(Total for Question 11 is 3 marks)

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12 Using prime factors, explain why 7/24 gives a recurring decimal, but 7/25 gives a terminating decimal.

(Total for Question 12 is 3 marks)

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13 The recurring decimal 0.a7a7a7... (where the two-digit block a7 recurs, and a is a single digit) is equal to 29/33. Find the value of a.

(Total for Question 13 is 4 marks)

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14 Prove algebraically that for any single non-zero digit d (where d is an integer from 1 to 9), the recurring decimal 0.ddd... (d recurring) is always equal to d/9.

(Total for Question 14 is 4 marks)

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15 Convert 0.024242424... (24 recurring, following a single non-recurring digit) to a fraction, giving your answer in its simplest form.

(Total for Question 15 is 5 marks)

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Mark scheme · 6.1 Recurring Decimals to Fractions: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

4/9 cao	**B1**

Answer: 4/9

Question 2

B (5/9) selected	**B1**

Answer: B) 5/9

Question 3

083 (or 0, 8, 3) identified as the repeating block, oe	**B1**
3 digits stated cao	**B1**

Answer: The repeating block is 083, which contains 3 digits

Question 4

identifies that Jamal should have multiplied by 100 (not 10), because two digits (27) recur, so 10x does not align the recurring blocks	**B1**
correct working using 100x = 27.272727..., giving 99x = 27	**M1**
3/11 cao	**A1**

Answer: 3/11

Question 5

(4/9) / 3 = 4/27 found	**M1**
4/27 converted to a decimal, 0.148148... seen	**M1**
awrt 0.148	**A1**

Answer: 0.148 m (awrt)

Question 6

10x - x = 7 or equivalent method	**M1**
7/9 cao	**A1**
common denominator used: 7/9 + 2/6	**M1**
10/9 cao	**A1**

Answer: 10/9

Question 7

x = 0.474747... and 100x = 47.4747... written (or equivalent)	**M1**
subtracts to get 99x = 47, dependent on M1	**M1**
cso, x = 47/99 with full algebraic method shown	**A1**

Answer: 47/99 (shown)

Question 8

10x - x = 3 or equivalent method	**M1**
1/3 cao	**A1**
common denominator used: 1/3 + 1/6	**M1**
1/2 cao	**A1**

Answer: 1/2

Question 9

x = 0.181818... and 100x = 18.181818... written	**M1**
subtracts to get 99x = 18, dependent on M1	**dM1**
cso, x = 2/11 with full algebraic method shown (18/99 simplified)	**A1**

Answer: 2/11 (shown)

Question 10

0.242424... seen (or awrt 0.2424)	**B1**
correctly states that the two-digit block 24 recurs, oe	**B1**

Answer: 0.242424... ; the block 24 recurs

Question 11

converts 37/99 to 0.373737... (or awrt 0.3737)	**M1**
correctly compares all four values	**M1**
correct order: 0.37, 0.373, 0.3737, 37/99	**A1**

Answer: 0.37, 0.373, 0.3737, 37/99

Question 12

$24 = 2^3 \times 3$ has a prime factor (3) other than 2 or 5, so 7/24 gives a recurring decimal, oe	**B1**
$25 = 5^2$ has only the prime factor 5, so 7/25 gives a terminating decimal, oe	**B1**
correct general link stated: a fraction in its simplest form terminates only when its denominator's prime factors are just 2s and/or 5s, oe	**B1**

Answer: 7/24 recurs; 7/25 terminates

Question 13

recognises 0.a7a7a7... = (10a + 7)/99, from a valid algebraic method	**M1**
converts 29/33 to ninety-ninths, 29/33 = 87/99	**M1**
sets 10a + 7 = 87, dependent on both M marks	**dM1**
a = 8 cao	**A1**

Answer: a = 8

Question 14

sets x = 0.dddd... and recognises 10x = d.dddd... = d + x, oe valid algebraic reasoning	**M1**
forms 9x = d (from 10x - x = d), dependent on M1	**dM1**
cso, x = d/9 with a valid general argument shown	**A1**
correctly notes the argument holds for every digit d from 1 to 9, since no step depended on the specific value of d, oe	**B1**

Answer: d/9 (proved for every digit d from 1 to 9)

Question 15

x = 0.024242424... and 10x = 0.242424... written (shifts past the single non-recurring digit)	**M1**
1000x = 24.242424... written (shifts a further two places, past one full recurring block)	**M1**
subtracts to get 990x = 24, dependent on both M marks	**dM1**
24/990 seen	**A1**
4/165 cao, fully simplified	**A1**

Answer: 4/165

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