

Recurring Decimals to Fractions

Mark Scheme

Level	GCSE
Subject	Maths
Exam Board	Edexcel GCSE
Topic	Recurring Decimals to Fractions
Grade Level	Grade 6
Booklet	Mark Scheme

Time Allowed: 48 minutes

Score: /40

Percentage: /100

Grade Boundaries:

1. (a) Change $\frac{3}{11}$ to a decimal.

$$\begin{array}{r} 0.2727 \\ 11 \overline{) 3.0000} \end{array}$$

$$0.\dot{2}\dot{7}$$

(1)

- (b) Prove that the recurring decimal $0.\dot{3}\dot{9} = \frac{13}{33}$

$$\begin{aligned} 0.\dot{3}\dot{9} &= x \\ 39.\dot{3}\dot{9} &= 100x \\ 39 &= 99x \\ \frac{39}{99} &= x \\ x &= \frac{13}{33} \end{aligned}$$

(3)

(Total 4 marks)

2. Prove that the recurring decimal $0.\dot{4}\dot{5} = \frac{15}{33}$

$$\begin{aligned} 0.\dot{4}\dot{5} &= x \\ 45.\dot{4}\dot{5} &= 100x \\ 45 &= 99x \\ \frac{45}{99} &= x \\ x &= \frac{15}{33} \end{aligned}$$

(Total 3 marks)

3. Express the recurring decimal $0.2\dot{1}\dot{3}$ as a fraction.

$$\begin{aligned}
 0.2\dot{1}\dot{3} &= x \\
 2.\dot{1}\dot{3} &= 10x \\
 213.\dot{1}\dot{3} &= 1000x \\
 211 &= 990x \\
 x &= \frac{211}{990}
 \end{aligned}$$

$$\begin{array}{r}
 211 \\
 \hline
 \dots 990 \dots
 \end{array}$$

(Total 3 marks)

4. Prove that $0.4\dot{7}\dot{3}$ can be written as the fraction $\frac{469}{990}$

$$\begin{aligned}
 0.4\dot{7}\dot{3} &= x \\
 4.\dot{7}\dot{3} &= 10x \\
 473.\dot{7}\dot{3} &= 1000x \\
 469 &= 990x \\
 x &= \frac{469}{990}
 \end{aligned}$$

(Total 2 marks)

5. Prove that the recurring decimal $0.\dot{1}\dot{7} = \frac{17}{99}$

$$\begin{aligned} 0.\dot{1}\dot{7} &= x \\ 17.\dot{1}\dot{7} &= 100x \\ 17 &= 99x \\ x &= \frac{17}{99} \end{aligned}$$

(Total 2 marks)

6. (a) Express $0.\dot{2}\dot{7}$ as a fraction in its simplest form.

$$\begin{aligned} 0.\dot{2}\dot{7} &= x \\ 27.\dot{2}\dot{7} &= 100x \\ 27 &= 99x \\ x &= \frac{27}{99} \\ &= \frac{3}{11} \end{aligned}$$

$$\frac{3}{11}$$

(3)

x is an integer such that $1 \leq x \leq 9$

(b) Prove that $0.\dot{0}\dot{x} = \frac{x}{99}$

$$\begin{aligned} 0.\dot{0}\dot{x} &= y \\ 0x.\dot{0}\dot{x} &= 100y \\ x &= 99y \\ y &= \frac{x}{99} \end{aligned}$$

(2)

(Total 5 marks)

7. Change the recurring decimal $0.\dot{2}\dot{3}$ to a fraction.

$$\begin{aligned} 0.\dot{2}\dot{3} &= x \\ 23.\dot{2}\dot{3} &= 100x \\ 23 &= 99x \\ x &= \frac{23}{99} \end{aligned}$$

$$\begin{array}{r} 23 \\ \hline 99 \end{array} \dots\dots\dots$$

(Total 2 marks)

8. (i) Convert the recurring decimal $0.\dot{3}\dot{6}$ to a fraction.

$$\begin{aligned}
 0.\dot{3}\dot{6} &= x \\
 36.\dot{3}\dot{6} &= 100x \\
 36 &= 99x \\
 x &= \frac{36}{99} \\
 &= \frac{4}{9} \quad \dots\dots\dots \frac{4}{9}
 \end{aligned}$$

- (ii) Convert the recurring decimal $2.1\dot{3}\dot{6}$ to a mixed number.
Give your answer in its simplest form.

$$\begin{aligned}
 &\boxed{2 + x} \\
 0.1\dot{3}\dot{6} &= x \\
 1.\dot{3}\dot{6} &= 10x \\
 136.\dot{3}\dot{6} &= 1000x \\
 135 &= 990x \\
 x &= \frac{135}{990} \\
 &= \frac{3}{22} \quad \dots\dots\dots 2\frac{3}{22}
 \end{aligned}$$

(Total 5 marks)

9. Convert the recurring decimal $2.1\dot{4}\dot{5}$ to a fraction.

$$\begin{aligned}
 2.1\dot{4}\dot{5} &= x \\
 21.\dot{4}\dot{5} &= 10x \\
 2145.\dot{4}\dot{5} &= 1000x \\
 2124 &= 990x \\
 x &= \frac{2124}{990} = \frac{118}{55}
 \end{aligned}$$

(Total 3 marks)

10. Express the recurring decimal $0.\dot{1}2\dot{6}$ as a fraction.

$$\begin{aligned}
 0.\dot{1}2\dot{6} &= x \\
 1.\dot{2}\dot{6} &= 10x \\
 126.\dot{2}\dot{6} &= 1000x \\
 125 &= 990x \\
 x &= \frac{125}{990} \\
 &= \frac{25}{198}
 \end{aligned}$$

$$\frac{25}{198}$$

(Total 3 marks)

11. Express $0.3\dot{2}\dot{8}$ as a fraction in its simplest form.

$$\begin{aligned}
 0.3\dot{2}\dot{8} &= x \\
 3.\dot{2}\dot{8} &= 10x \\
 328.\dot{2}\dot{8} &= 1000x \\
 325 &= 990x \\
 x &= \frac{325}{990} \\
 &= \frac{65}{198}
 \end{aligned}$$

$$\frac{65}{198}$$

(Total 3 marks)

12. The recurring decimal $0.\dot{7}\dot{2}$ can be written as the fraction $\frac{8}{11}$

Write the recurring decimal $0.5\dot{7}\dot{2}$ as a fraction.

$$0.\dot{7}\dot{2} = \frac{8}{11}$$

$$0.0\dot{7}\dot{2} = \frac{8}{110}$$

$$0.5 + 0.0\dot{7}\dot{2} = \frac{55}{110} + \frac{8}{110}$$

$$\frac{63}{110}$$

(Total 2 marks)

13. Express the recurring decimal $2.0\dot{6}$ as a fraction.
Write your answer in its simplest form.

$$2.0\dot{6} = x$$

$$20.\dot{6} = 10x$$

$$206.\dot{6} = 100x$$

$$186 = 90x$$

$$x = \frac{186}{90}$$

$$= \frac{93}{45}$$

$$= \frac{31}{15}$$

$$\frac{31}{15}$$

(Total 3 marks)