

Recurring decimals where one number after decimal is fixed and others repeat

Maths

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Recurring decimals where one number after decimal is fixed and others repeat

1. Look at these decimals.

$$\boxed{0.\dot{6}\dot{2}} \quad \boxed{0.6\dot{2}} \quad \boxed{0.0\dot{2}}$$

What is the same? What is different?

2. Complete the workings to write $0.5\dot{6}$ as a fraction in its simplest form.

$$\text{Let } x = 0.5\dot{6}$$

$$\underline{\quad} x = 5.\dot{6}$$

$$9x = \underline{\quad}$$

$$90x = \underline{\quad}$$

$$x = \underline{\quad}$$

3. Show that $0.5\dot{1}$ is equal to $\frac{23}{45}$

4. Write these decimals as fractions in their simplest form.

a) $0.2\dot{5}$

d) $1.2\dot{4}$

b) $0.0\dot{3}$

e) $0.8\dot{1}\dot{9}$

c) $0.7\dot{6}$

f) $0.4\dot{6}\dot{2}$



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5. a) Write each of these decimals as a fraction in its simplest form.

$0.\dot{3}\dot{1}$

$0.\dot{0}\dot{1}\dot{4}$

$0.\dot{4}32\dot{1}$

b) What do you notice about these fractions?

c) Without any working, can you write these decimals as fractions in their simplest form?

$0.\dot{2}\dot{1}$

$0.\dot{7}0\dot{1}$

$0.\dot{0}00\dot{5}$

6. What would be the same and what would be different when writing these recurring decimals as fractions?

$0.\dot{4}$

$0.1\dot{4}$

$0.0\dot{4}$

$0.\dot{1}\dot{4}$

$1.\dot{4}$

7. Calculate

$$0.\dot{1}\dot{1} + 0.1\dot{2} + 0.1\dot{3} + 0.1\dot{4} + 0.1\dot{5}$$



Answers



Recurring decimals where one number after decimal is fixed and others repeat

1. Look at these decimals.

$$\boxed{0.\dot{6}\dot{2}} \quad \boxed{0.6\dot{2}} \quad \boxed{0.0\dot{2}}$$

What is the same? What is different?

Same – written to two decimal places
but all are recurring

Different – one or two digits recur

2. Complete the workings to write

$0.5\dot{6}$ as a fraction in its simplest form.

$$\begin{aligned} \text{Let } x &= 0.5\dot{6} \\ \underline{10} x &= 5.\dot{6} \\ 9x &= \underline{5.1} \\ 90x &= \underline{51} \\ x &= \frac{51}{90} = \frac{17}{30} \end{aligned}$$

3. Show that $0.5\dot{1}$ is equal to $\frac{23}{45}$

$$\begin{aligned} \text{Let } x &= 0.5\dot{1} \\ 10x &= 5.\dot{1} \\ 9x &= 4.6 \\ 90x &= 46 \\ x &= \frac{23}{45} \end{aligned}$$

4. Write these decimals as fractions in their simplest form.

$$\begin{array}{ll} \text{a) } 0.2\dot{5} & \frac{23}{90} \\ \text{b) } 0.0\dot{3} & \frac{1}{30} \\ \text{c) } 0.7\dot{6} & \frac{23}{30} \end{array} \quad \begin{array}{ll} \text{d) } 1.2\dot{4} & \frac{56}{45} \\ \text{e) } 0.8\dot{1}\dot{9} & \frac{811}{990} \\ \text{f) } 0.4\dot{6}\dot{2} & \frac{229}{495} \end{array}$$



Recurring decimals where one number after decimal is fixed and others repeat

5. a) Write each of these decimals as a fraction in its simplest form. $\frac{31}{99}$ $\frac{14}{999}$ $\frac{4321}{9999}$

$0.\dot{3}\dot{1}$ $0.\dot{0}1\dot{4}$ $0.\dot{4}32\dot{1}$

b) What do you notice about these fractions?

They don't simplify. Where

- two digits recur, there is a denominator of 99
- three digits recur, there is a denominator of 999

This is different to the fractions in the previous question as there is no fixed digit in these decimals.

c) Without any working, can you write these decimals as fractions in their simplest form?

$0.\dot{2}\dot{1}$ $0.\dot{7}0\dot{1}$ $0.\dot{0}00\dot{5}$

$$\frac{21}{99} = \frac{7}{33}$$

$$\frac{701}{999}$$

$$\frac{5}{9999}$$



Recurring decimals where one number after decimal is fixed and others repeat

6. What would be the same and what would be different when writing these recurring decimals as fractions?

$0.\dot{4}$ $0.1\dot{4}$ $0.0\dot{4}$ $0.1\dot{4}$ $1.\dot{4}$

$0.\dot{4}$, $0.1\dot{4}$ and $1.\dot{4}$ have denominators containing only 9s

7. Calculate

$$0.1\dot{1} + 0.1\dot{2} + 0.1\dot{3} + 0.1\dot{4} + 0.1\dot{5}$$
$$\frac{10}{90} + \frac{11}{90} + \frac{12}{90} + \frac{13}{90} + \frac{14}{90} = \frac{2}{3}$$

