

Fractions and Recurring Decimals

2) The *Trickier Type*



If the recurring bit doesn't come right after the decimal point, things are slightly trickier — but only slightly.

EXAMPLE:

Write $0.\dot{1}6$ as a fraction.

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|--|--|
| 1) Name your decimal. | Let $r = 0.\dot{1}6$ |
| 2) Multiply r by a <u>power of ten</u> to move the <u>non-repeating part</u> past the decimal point. | $10r = 1.\dot{6}$ |
| 3) Now multiply again to move <u>one full repeated lump</u> past the decimal point. | $100r = 16.\dot{6}$ |
| 4) <u>Subtract</u> to <u>get rid</u> of the decimal part: | $\begin{array}{r} 100r = 16.\dot{6} \\ - 10r = 1.\dot{6} \\ \hline 90r = 15 \end{array}$ |
| 5) <u>Divide</u> to leave r , and <u>cancel</u> if possible: | $r = \frac{15}{90} = \frac{1}{6}$ |

Fractions into Recurring Decimals



You might find this cropping up in your exam too — and if they're being really unpleasant, they'll stick it in a non-calculator paper.

EXAMPLE:

Write $\frac{8}{33}$ as a recurring decimal.

There are two ways you can do this:

- 1** Find an equivalent fraction with all nines on the bottom.
The number on the top will tell you the recurring part.

Watch out — the number of nines on the bottom tells you the number of digits in the recurring part.
E.g. $\frac{24}{99} = 0.\dot{2}4$, but $\frac{24}{999} = 0.\dot{0}24$

$$\frac{8}{33} = \frac{24}{99}$$

$$\frac{24}{99} = 0.\dot{2}4$$

- 2** Remember, $\frac{8}{33}$ means $8 \div 33$, so you could just do the division:
(This is OK if you're allowed your calculator, but could be a bit of a nightmare if not... you could use long division if you're feeling bold, but I recommend sticking with method 1 instead.)

$$8 \div 33 = 0.24242424\dots$$

$$\frac{8}{33} = 0.\dot{2}4$$

Oh, what's recurrin'?...

Learn how to tell whether a fraction will be a terminating or recurring decimal, and all the methods above. Then turn over and write it all down. Now, try to answer these beauties...

- Q1 Express $0.\dot{1}2\dot{6}$ as a fraction in its simplest form. [2 marks]
- Q2 Show that $0.\dot{0}7 = \frac{7}{99}$ [3 marks]
- Q3 Without using a calculator, convert $\frac{5}{111}$ to a recurring decimal. [2 marks]