Outcome	NF7	Student can consistently:	Write a recurring decimal as a fraction in its simplest form.

How the topic is examined	- Examined through the exam paper. - This topic is usually examined on non-calculator examination papers as students could simply use a calculator to get the answer. - The questions will ask students to write a particular recurring decimal as a fraction in its simplest form. Questions don't vary that much. - Occasionally questions give the answer to the problem and students have to show how they can get the answer.

Prior knowledge	- Students should be confident: - Multiplying and dividing without a calculator. - Simplifying a fraction. - Rearranging formulae (AEx10) - Solving equations (AEq1)

Suggested tuition approaches	- Before starting this topic it is important that students understand what a recurring decimal is and how it is written. - You might want to ask students to use short division to find the decimal equivalent of $\frac{5}{9}$ or $\frac{2}{7}$. What do they notice? - Recurring decimals are written using the following notation $0.\dot{5}$ is read 0.5 recurring and is shorthand for 0.55555555 ……… $0.\dot{2}\dot{6}$ is read 0.26 recurring and is shorthand for 0.2626262626…… $0.\dot{3}1\dot{9}$ is read 0.319 recurring as is shorthand for 0.319319319…. $0.3\dot{1}\dot{9}$ is shorthand for 0.31919191919….. - To write a recurring decimal as a fraction the following steps should be followed: - Call the number x and write out the recurring bit of the number a few times. - Multiply x by either 10, 100, 1000 etc… depending on how many numbers are recurring. - Subtract the two numbers. The recurring parts should disappear. - Solve the equation by dividing. - Simplify the fraction if possible.

Write $0.\dot{2}\dot{7}$ as a fraction in its simples form	Write $0.2\dot{7}$ as a fraction in its simplest form
$x = 0.2727272727\dots..$	$x = 0.2777777\dots....$
Multiply both sides by 100 as there are two numbers recurring	Note only the 7 is repeating in this. Multiply both sides by 10 as there is one number that is recurring.
$100x = 27.272727\dots....$	$10x = 2.7777777\dots$
If you now subtract one from the other you get	If you now subtract one from the other you get
$99x = 27$	$9x = 2.5$
Now solve by dividing and then simplify	Now solve by dividing and then simplify
$x = \dfrac{27}{99} = \dfrac{3}{11}$	$x = \dfrac{2.5}{9}$
	Multiply numerator and denominator by 10
	$x = \dfrac{25}{90} = \dfrac{5}{18}$

- In the second method some students might have been told to multiply x by 100 and subtract 10x from 100x. There are different approaches, but all will lead to the same answer.

Common errors and misconceptions

- Students sometimes think that they have to put a dot over each individual number that is recurring. It is only the first and end number where you put the dot and everything in between recurs also.
- It is impossible for any numbers to appear after the recurring symbol (e.g. $0.\dot{2}\dot{6}75$ is impossible.)
- Students simplify incorrectly.

Suggested

- Questions
  - http://www.cimt.org.uk/projects/mepres/allgcse/pr6-es.pdf (p 97)

resources	o https://corbettmaths.files.wordpress.com/2013/02/recurring-decimals-pdf.pdf
	• Past GCSE Questions
	o https://keshgcsemaths.files.wordpress.com/2013/11/93_recurring-decimals-into-fractions.pdf
	• Video tutorial
	o http://corbettmaths.com/2013/03/29/recurring-decimals-to-fractions/