Your notes

GCSE Maths: revision notes

Recurring decimals to fractions

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Recurring decimals (Higher)

- A **recurring decimal** has digits that repeat forever. A dot over a digit (or over the first and last digits of a block) shows the repeating part: 0.333... = $0.\dot{3}$ and 0.181818... = $0.\dot{1}\dot{8}$.
- Every **recurring decimal** can be written as a fraction.

Which fractions terminate? (Higher)

- A fraction in its **simplest form** gives a **terminating decimal** if the only prime factors of its denominator are 2 and 5.
- 3/8 terminates ($8 = 2^3$), and 7/40 terminates ($40 = 2^3 \times 5$). 1/6 recurs because $6 = 2 \times 3$ has a factor of 3.

Converting to a fraction (Higher)

- One repeating digit: let x = 0.444..., so 10x = 4.444.... Subtract: 9x = 4, so x = 4/9.
- Two repeating digits: let x = 0.181818..., so 100x = 18.1818.... Subtract: 99x = 18, so x = 18/99 = 2/11.
- A non-repeating digit first: let x = 0.1666.... 10x = 1.666... and 100x = 16.666.... Subtract: 90x = 15, so x = 1/6.

Showing your working (Higher)

- For '**prove algebraically**' questions, write x = ..., multiply by 10 or 100 to line up the repeating parts, subtract, and simplify the fraction.

Worked examples

Write 0.272727... as a fraction in its simplest form

Call it x. Two digits repeat, so multiply by 100. **100x = 27.2727...**

Subtract x to get rid of the repeating part. **100x − x = 27, so 99x = 27**

Divide by 99. **x = 27/99**

Simplify by dividing top and bottom by 9. **3/11**

Answer: 3/11

Key terms

Recurring decimal	A decimal in which a digit or block of digits repeats forever.
Terminating decimal	A decimal that ends.
Recurring dot	A dot placed over the repeating digits of a recurring decimal.
Prove algebraically	Show something is true using algebra, not just examples.
Simplest form	A fraction that can't be simplified any further.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is 0.777... as a fraction? (Higher)
2. What is 0.454545... as a fraction in its simplest form? (Higher)
3. Which fraction gives a terminating decimal? (Higher)
4. What is 1/11 as a decimal? (Higher)
5. What is 0.1666... as a fraction? (Higher)
6. What is 0.363636... as a fraction in its simplest form? (Higher)
7. To convert 0.272727... to a fraction, what should you multiply x by first? (Higher)
8. What is 0.333... + 0.666...? (Higher)

Answers

1. 7/9
2. 5/11
3. 3/8
4. 0.090909...
5. 1/6
6. 4/11
7. 100
8. 1

What to do next

Practise 10 questions on this topic

Your notes

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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