Guide to:
Recurring decimals

maths Links

Explanation:

To convert a recurring decimal into a fraction algebraically, let **x** equal the recurring decimal written out with several repeating digits. Multiply **x** by powers of 10 (**10x, 100x, 1000x**) so that two equations have the **exact same recurring tail after the decimal point**.

Subtract the smaller equation from the larger equation so that all the recurring digits after the decimal point cancel out to zero, then divide and simplify the fraction.

Example 1: Prove algebraically that $\mathbf{0.\dot{4}\dot{5} = \frac{5}{11}}$.

Solution:

Let **x = 0.454545...**
Multiply by 100 (2 repeating digits): **100x = 45.454545...**
Subtract (100x − x): **99x = 45**
$x = \frac{45}{99} = \frac{5}{11}$ (divide top and bottom by 9)
Answer: $\mathbf{\frac{5}{11}}$

Example 2: Convert $\mathbf{0.2\dot{7}\dot{3}}$ (where 73 recurs) into a fraction in its simplest form.

Solution:

Let x = 0.2737373... → **10x = 2.737373...**
Multiply by 1000: **1000x = 273.737373...**
Subtract (1000x − 10x): **990x = 271**
Divide by 990: $x = \frac{271}{990}$
Answer: $\mathbf{\frac{271}{990}}$

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