

Repeating Decimals to Fractions

Converting Repeating Decimals to Fractions

step 1:

Identify the digits that are repeating

step 2:

Are the repeating digits directly after the decimal?

Yes

1. Write the digits that are repeating in the numerator.
2. Place 9's in the denominator.
*** The number of 9's depends on the number of digits repeating ***
3. Reduce Fraction

No

1. Multiply by 10, 100, 1000 etc. to move the repeating digits behind the decimal.
2. Write the new decimal number as a mixed number - write the whole number and write the digits that are repeating in the numerator. Place 9's in the denominator.
*** The number of 9's depends on the number of digits repeating ***
3. Undo multiplication by division... whatever you

multiplied by in step 1, you must divide by before reducing the fraction (don't forget division rules!)

4. Reduce Fraction

27

20

Repeating Decimals to Fractions

Write each decimal as a fraction:

1) $0.\overline{3} = \frac{3}{9} = \frac{1}{3}$

2) $0.\overline{18} = \frac{18}{99} \xrightarrow{\text{Reduce } \div 9} \frac{2}{11}$

3) $2.\overline{2} = 2 \frac{2}{9}$ or $\frac{20}{9}$

4) $3.\overline{63} = 3 \frac{63}{99} \xrightarrow{\text{Reduce}} 3 \frac{7}{11}$ or $\frac{40}{11}$

5) $0.\overline{28} =$

* Repeating digits are not directly after decimal!

Steps

1. Multiply by 10 $0.\overline{28} = 2.\overline{8}$

2. Write mixed # $2 \frac{8}{9}$

3. Divide by 10 to undo multiplication (use division rules) $2 \frac{8}{9} \div 10$

4. Reduce $= \frac{26}{9} \div \frac{10}{1}$

$\frac{26}{9} \cdot \frac{1}{10} = \frac{26}{90} \div 2 = \frac{13}{45}$

6) $0.\overline{97}$

1. Multiply by 10 $0.\overline{97} = 9.\overline{7}$

2. Write mixed # $9 \frac{7}{9}$

3. Divide by 10 $9 \frac{7}{9} \div 10$

4. Reduce $\frac{88}{9} \div \frac{10}{1}$

$\frac{88}{9} \cdot \frac{1}{10} = \frac{88}{90} \div 2 = \frac{44}{45}$

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Repeating Decimals to Fractions

Guided Practice: Solve.

$$1) \ .\overline{4} \times \frac{2}{3} = \frac{4 \rightarrow 2}{9 \rightarrow 3} = \boxed{\frac{8}{27}}$$

$$\begin{aligned}
 2) \ 1\frac{3}{5} \div 2.\overline{2} &= 1\frac{3}{5} \div 2\frac{2}{9} \\
 &= 1\frac{3 \times 9}{5 \times 9} \div 2\frac{2 \times 9}{9 \times 9} \\
 &= \frac{8}{5} \div \frac{20}{9} \\
 &= \frac{8}{5} \cdot \frac{9}{20} = \frac{72 \div 4}{100 \div 4} = \boxed{\frac{18}{25}}
 \end{aligned}$$

$$\begin{aligned}
 3) \ 1.\overline{3} + 2\frac{1}{18} &= 1\frac{3}{9} + 2\frac{1}{18} \quad * \text{Make Common Denominators} \\
 &= 1\frac{3 \times 2}{9 \times 2} + 2\frac{1}{18} \\
 &= 1\frac{6}{18} + 2\frac{1}{18} \\
 &= 3\frac{7}{18} \text{ or } \boxed{\frac{61}{18}}
 \end{aligned}$$