Repeating Decimals to Fractions

Converting Repeating Decimals to Fractions

step1:

Identify the digits that are repeating

step2:

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. Undue multiplication by dinsion... whatever you multipied by in step 1, you must divide by before reducing the fraction (don't forget division rules!)
4. Reduce Fraction

Repeating Decimals to Fractions

Write each decimal as a fraction:

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

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

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

4) $3.\overline{63} = 3\frac{63}{99} \overset{\text{reduce}}{=} \boxed{3\frac{7}{11} \text{ or } \frac{40}{11}}$

5) $0.2\overline{8} =$

* Repeating digits are not directly after decimal!

Steps

1. Multiply by 10 — $0.2\overline{8} = 2.\overline{8}$
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 — $= \frac{26}{9} \div \frac{10}{1}$

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

6) $0.9\overline{7}$

1. Multiply by 10 — $0.9\overline{7} = 9.\overline{7}$
2. Write mixed # — $9\frac{7}{9}$
3. Divide by 10 — $9\frac{7}{9} \div 10$
4. Reduce — $\frac{88}{9} \div \frac{10}{1}$

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

Repeating Decimals to Fractions

Guided Practice: Solve.

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

2) $1\frac{3}{5} \div 2.\overline{2} = 1\frac{3}{5} \div 2\frac{2}{9}$

$= 1\frac{3}{5} \div 2\frac{2}{9}$ (×5+, ×9+)

$= \frac{8}{5} \div \frac{20}{9}$

$= \frac{8}{5} \cdot \frac{9}{20} = \frac{72 \div 4}{100 \div 4} = \boxed{\frac{18}{25}}$

3) $1.\overline{3} + 2\frac{1}{18} = 1\frac{3}{9} + 2\frac{1}{18}$ * Make common Denominators

$1\frac{3 \times 2}{9 \times 2} + 2\frac{1}{18}$

$1\frac{6}{18} + 2\frac{1}{18}$

$= 3\frac{7}{18}$ (×3+) or $\boxed{\frac{61}{18}}$