Terminating decimals All terminating decimals end with one number.

examples: 0.12**3**, 5.6121**9**, 0.0018**7**

They are rational numbers. Remember the definition of a rational number is one that can be expressed as a fraction.

Recurring Decimals - These decimals have number patterns that repeat themselves.

$0.\dot{6} = 0.66666\ldots \quad 0.\dot{3}2\dot{9} = 0.329329329329\ldots$

$0.\dot{4}125\dot{6} = 0.412564125641256\ldots$

Converting a fraction to a decimal - Simply divide the numerator by the denominator.

$\frac{5}{6} = 5 \div 6 = 0.8\dot{3} \qquad \frac{2}{9} = 2 \div 9 = 0.\dot{2} \qquad \frac{6}{7} = 6 \div 7 = 0.\dot{8}5714\dot{8}57\ldots$

Converting a non-recurring decimal to a fraction - First, write out the decimal as a fraction of powers of ten eg 10 ths, 100 ths or 1000 ths. Then just cancel the fraction to its smallest factors.

$0.6 = \frac{6}{10} = \frac{3}{5} \qquad 0.375 = \frac{375}{1000} = \frac{75}{200} = \frac{15}{40} = \frac{3}{8}$

$0.08 = \frac{8}{100} = \frac{4}{50} = \frac{2}{25} \qquad 0.012 = \frac{12}{1000} = \frac{3}{250}$

Converting a recurring decimal to a fraction

- Multiply the recurring decimal by 10 if 1 decimal place(100 for 2 d.p., 1000 for 3 d.p. etc.).
- Subtract the recurring decimal.
- Rearrange the equation to make the recurring decimal the subject.

example #1 - make 0.55555... into a fraction

$$\begin{aligned}
10\times 0.\dot{5} &= 5.555555555\ldots \\
-\quad \underline{\quad 0.\dot{5} \quad} &\underline{\quad 0.\dot{5} \qquad\qquad} \\
10\times 0.\dot{5} - 0.\dot{5} &= 5.555555\ldots\ldots - 0.555555\ldots\ldots \\
10\times 0.\dot{5} - 0.\dot{5} &= 5 \\
(10\times 0.\dot{5}) - (1\times 0.\dot{5}) &= 5 \\
9\times 0.\dot{5} &= 5 \\
0.\dot{5} &= \frac{5}{9}
\end{aligned}$$

example #2 - make 0.75757575... into a fraction

$$\begin{aligned}
100\times 0.\dot{7}\dot{5} &= 75.7575757575\ldots \\
-\quad \underline{\quad 0.\dot{7}\dot{5} \quad} &\underline{\quad 0.\dot{7}\dot{5} \qquad\qquad} \\
100\times 0.\dot{7}\dot{5} - 0.\dot{7}\dot{5} &= 75.757575\ldots\ldots - 0.757575\ldots\ldots \\
100\times 0.\dot{7}\dot{5} - 0.\dot{7}\dot{5} &= 75 \\
(100\times 0.\dot{7}\dot{5}) - (1\times 0.\dot{7}\dot{5}) &= 75 \\
99\times 0.\dot{7}\dot{5} &= 75 \\
0.\dot{7}\dot{5} &= \frac{75}{99}
\end{aligned}$$

example #3 - make 0.692692692... into a fraction

$$1000\times 0.\dot{6}\dot{9}\dot{2} = 692.692692692...$$

$$- \underline{\quad\quad 0.\dot{6}\dot{9}\dot{2} \quad\quad 0.\dot{6}\dot{9}\dot{2} \quad\quad\quad\quad}$$

$$1000\times 0.\dot{6}\dot{9}\dot{2} - 0.\dot{6}\dot{9}\dot{2} = 692.692692692... - 0.692692692...$$

$$1000\times 0.\dot{6}\dot{9}\dot{2} - 0.\dot{6}\dot{9}\dot{2} = 692$$

$$(1000\times 0.\dot{6}\dot{9}\dot{2}) - (1\times 0.\dot{6}\dot{9}\dot{2}) = 692$$

$$999\times 0.\dot{6}\dot{9}\dot{2} = 692$$

$$0.\dot{6}\dot{9}\dot{2} = \frac{692}{999}$$
