

REPEATING DECIMALS AND SQUARE ROOTS

What type of number is $0.\overline{7}$?

It is rational because it is a repeating decimal.

ALL rational numbers can be written as a fraction.

Turning a repeating decimal into a fraction:

$$0.\overline{7}$$

Step 1) Define a variable N to be the repeating decimal.

$$N = 0.777\dots$$

Step 2) Multiply both sides by 10, 100, 1000, etc.

$\begin{matrix} \nearrow & \nearrow & \nearrow \\ 1 \text{ repeated} & 2 \text{ repeated} & 3 \text{ repeated} \\ \text{digit} & \text{digits} & \text{digits} \end{matrix}$

$$N = 0.777\dots$$

$$10N = 10(0.777\dots)$$

$$10N = 7.777\dots$$

Step 3) Subtract $N = \underline{\hspace{2cm}}$ from both sides.

$$10N = 7.777\dots$$

$$- \underline{N = 0.777\dots} \quad \leftarrow \text{from step 1}$$

$$9N = 7$$

Step 4) Solve for N .

$$\frac{9N = 7}{\frac{9}{9} \quad \frac{9}{9}} \\ \boxed{N = \frac{7}{9}}$$

$$0.\overline{1}$$

Step 1) $N = 0.111\dots$

Step 2) $10N = 10(0.111\dots)$

$$\begin{array}{r} 10N = 1.111\dots \\ - N = 0.111\dots \\ \hline \end{array}$$

Step 4) $\frac{9N}{9} = \frac{1}{9}$

$N = \frac{1}{9}$

$$0.\overline{23}$$

$$\text{Step 1) } N = .2323\dots$$

$$\text{Step 2) } 100N = 100(.2323\dots)$$

$$100N = 23.2323\dots$$

$$\text{Step 3) } \begin{array}{r} 100N = 23.2323\dots \\ - N = .2323\dots \\ \hline \end{array}$$

$$\text{Step 4) } \begin{array}{r} 99N = 23 \\ \hline 99 \quad 99 \end{array}$$

$$\boxed{N = \frac{23}{99}}$$

SQUARE ROOTS

$$-\sqrt{16} = -4$$

$$\sqrt{\frac{16}{25}} = \frac{4}{5}$$

$$\sqrt{.64} = .8$$

$$\pm\sqrt{4} = \pm 2$$