

$$.54545454$$

Example 2: The decimal $0.\overline{54}$ is a repeating decimal that can be thought of as $0.54545454\dots$ where the " \dots " indicates that the 54 repeats forever. Let's see how to express this as a fraction.

Let a represent our number $a = 0.\overline{54}$.

$$\begin{array}{r} 100a = 54.\overline{54} \\ - a = .\overline{54} \\ \hline 99a = 54 \end{array}$$

$$a = \frac{54}{99}$$

Why do you think we multiplied the second example by 100 instead of 10 as we did in the first example? What would have happened if we had multiplied by 10 in example 2? Try it below and see.

① Set up two equations making sure the decimals will cancel out.

② Subtract the 2 equations.

③ Solve for the variable.

Example 3: Change the decimal $2.\overline{4}$ into a fraction.

The decimal $2.\overline{4}$ is a repeating decimal that can be thought of as $2.444444\dots$ where the " \dots " indicates that the 4s repeat forever.

Let a represent our number $a = 2.\overline{4}$.

$$\begin{array}{r} 10a = 24.\overline{44} \\ - a = 2.\overline{44} \\ \hline 9a = 22 \end{array}$$

$$a = \frac{22}{9}$$

3

Example 4: Change the decimal $3.\overline{12}$ into a fraction.

$$\begin{array}{r} 100a = 312.\overline{24} \\ - 10a = 31.\overline{2} \\ \hline 90a = 281 \end{array}$$

$$a = \frac{281}{90}$$

$$a = \frac{11}{390}$$

Example 5: Change the decimal $0.\overline{123}$ into a fraction.

$$\begin{array}{r} 1000a = 123.\overline{123} \\ - a = .\overline{123} \\ \hline 999a = 123 \end{array}$$

$$a = \frac{41}{333}$$

Example 6: Change the decimal $4.\overline{1}$ into a fraction.

$$\begin{array}{r} 10a = 41.\overline{1} \\ - a = 4.\overline{1} \\ \hline 9a = 37 \end{array}$$

$$a = \frac{37}{9}$$

Example 7: Change the decimal $2.\overline{015}$ into a fraction.

$$\begin{array}{r} 1000a = 2015.\overline{15} \\ - 10a = 20.\overline{15} \\ \hline 990a = 1995 \end{array}$$

$$a = \frac{133}{660}$$

$$a = 2.0\overline{15}$$

4