NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Learning Objective: We will convert repeating decimals to fractions. (G8M7L7)

Activating Prior Knowledge:

We can solve systems of equations using substitution

$\begin{cases} x + y = 15 \\ y = 3x - 3 \end{cases}$ $4.5 + y = 15$ $y = 10.5$ $x + 3x - 3 = 15$ $4x - 3 = 15$ $+3 \quad +3$ $\frac{4x}{4} = \frac{18}{4}$ $x = 4.5$	$\begin{cases} 2x + y = 21 \\ y = 3x + 1 \end{cases}$ $x = 4$ $y = 13$

Concept Development:

Repeating Decimals: Numbers with infinite decimal expansions that repeat are rational numbers.

Example: $\frac{4}{11}$, $0.\overline{253}$

We would know what to do to convert 0.35 to a fraction, but what about $0.\overline{35}$?

$$\frac{35 \div 5}{100 \div 5} = \frac{7}{20}$$

We can use linear equations to convert repeating decimals into fractions.

Even though repeating decimals are infinite, when we work with them, we treat them as finite. Why?

When Decimals repeat, they become less significant.

$.33333333 = \overline{3}$

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Guided Practice:

Steps to Converting from a Repeating Decimal to a Fraction

1. Let *x* equal the repeating decimal.
2. Multiply both sides of the equation by a power of ten depending on how many digits are repeating.
3. Rewrite the right side as a whole number plus *x*.
4. Use properties of equality to isolate your variable.

$0.\overline{81}$ Let $x = 0.\overline{81}$ ← get rid of $.\overline{81}$ $100x = 81.\overline{81}$ $100x = 81 + x$ $-x \quad -x$ $\frac{99x}{99} = \frac{81}{99}$ $x = \frac{81 \div 9}{99 \div 9} = \frac{9}{11}$ $x = \frac{9}{11}$	$0.\overline{39}$ $x = .\overline{39}$ $100x = 39.\overline{39}$ $100x = 39 + x$ $-x \quad -x$ $\frac{99x}{99} = \frac{39}{99}$ $x = \frac{13}{33}$
$0.\overline{123}$ $x = .\overline{123}$ $1000x = 123.\overline{123}$ $1000x = 123 + x$ $-x \quad -x$ $\frac{999x}{999} = \frac{123}{999}$ $x = \frac{41}{333}$	$0.\overline{567}$ $x = .\overline{567}$ $1000x = 567.\overline{567}$ $1000x = 567 + x$ $-x \quad -x$ $\frac{999x}{999} = \frac{567}{999}$ $x = \frac{21}{37}$

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

$2.13\overline{8}$	$1.6\overline{23}$
Let $x = 2.13\overline{8}$ Let $100x = 213.\overline{8}$ Let $y = .\overline{8}$ $10y = 8.\overline{8}$ $10y = 8 + y$ $-y \quad -y$ $\frac{9y}{9} = \frac{8}{9}$ $100x = 213 + y$ $100x = 213 + \frac{8}{9}$ $\frac{100x}{100} = \frac{1925}{9} \div 100$ $x = \frac{1925}{900}$ $x = \frac{77}{36}$ $213 \times 9 = 1917$	$x = 1.6\overline{23}$ $10x = 16.\overline{23}$ $y = .\overline{23}$ $100y = 23.\overline{23}$ $100y = 23 + y$ $-y \quad -y$ $\frac{99y}{99} = \frac{23}{99}$ $y = \frac{23}{99}$ $10x = 16 + \frac{23}{99}$ $\frac{10x}{10} = \frac{1607}{99} \div 10$ $= \frac{1607}{990}$ $99 \times 16 = 1584$

Independent Practice:

$1.\overline{12}$	$0.03\overline{2}$

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

$0.\overline{312}$	$1.90\overline{32}$
$0.\overline{50}$	$3.0\overline{15}$

NAME:_____ Math _____, Period _____

Mr. Rogove Date:_____

Closure:

What is the difference in how you'd convert the two repeating decimals to fractions:

$$2.\overline{34} \ \ v. 2.3\overline{4}$$

Notes:

This maps to Lesson 10 from Module 7