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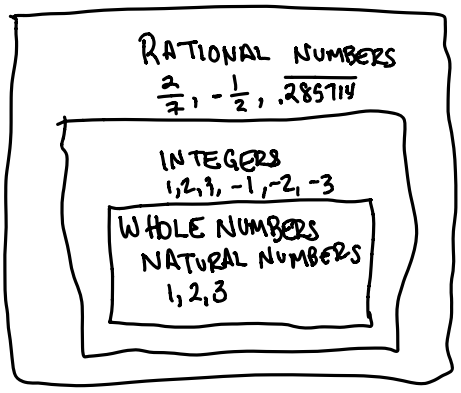
LEARNING OBJECTIVE: We will differentiate between rational and irrational numbers. (G8M7L6)

CONCEPT DEVELOPMENT:

Real Numbers		**Imaginary Numbers**
	IRRATIONAL $\pi \approx 3.14159...$ $\sqrt{82}$ $e \approx 2.71828...$ $\sqrt[3]{25}$	$i = \sqrt{-1}$ $i^2 = -1$

Rational Numbers: Any number that can be expressed as a fraction $\frac{p}{q}$ where p and q are both integers and $q \neq 0$.

Example: 4.3, $\frac{5}{2}$, $-\frac{1}{135}$, $68.\overline{9}$

RATIONAL

Finite Decimals: A subset of rational numbers which have terminating decimals. Written as fractions, the denominators are products of only 2's and 5's.

Example: $\frac{3}{32}$, 1.05, 4.253

RATIONAL

Repeating Decimals: A subset of rational numbers that have infinite decimals that repeat.

Example: $\frac{8}{9}$, $\frac{72}{93}$, 0.4545454545 ....

Irrational Numbers: The set of numbers that have infinite decimals that **DO NOT** repeat.

Example: $e, \pi, \sqrt{8}, \sqrt[3]{25}$

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Guided Practice:

Steps for Converting Fractions to Decimals

1. Determine if the fraction will be a finite or a repeating decimal.
2. If finite, multiply the fraction by factors of 2 and 5 until the denominator is equal to $(2\times5)^n = 10^n$.
3. Rewrite the fraction as a decimal.

$\frac{43}{64}$ FINITE!

$\frac{43}{2^6} \times \frac{5^6}{5^6} = \frac{671{,}875}{1{,}000{,}000}$

$= 0.671875$

$3125 \times 43 = 9375, 125000, 134375, 671875$

$2 \mid 134{,}375$

$\frac{7}{80}$ FINITE!

$\frac{7}{5^1 \cdot 2^4} \cdot \frac{5^3}{5^3} = \frac{7 \cdot 125}{10^4}$

$= \frac{875}{10{,}000} = 0.0875$

$\frac{29}{125}$ *

$\frac{29}{5^3} \times \frac{2^3}{2^3} = \frac{29 \times 8}{10^3} = \frac{232}{1000}$

$= 0.232$

$\frac{37}{40}$ *

40 → 4, 10 → 2, 2, 2, 5

$\frac{37}{5^1 \times 2^3} \cdot \frac{5^2}{5^2} = \frac{37 \cdot 25}{10^3} = \frac{925}{1000}$

$= 0.925$

FINITE $\frac{7}{1250}$

1250 → 10, 125 → 2, 5, 5, 5, 5

$\frac{7}{2^1 5^4} \cdot \frac{2^3}{2^3} = \frac{7 \cdot 8}{10^4} = \frac{56}{10000}$

$= 0.0056$

FINITE $\frac{15}{128}$

$\frac{15}{2^7} \cdot \frac{5^7}{5^7} = \frac{15 \cdot 78125}{10^7} = \frac{1{,}171{,}875}{10{,}000{,}000}$

$= .1171875$

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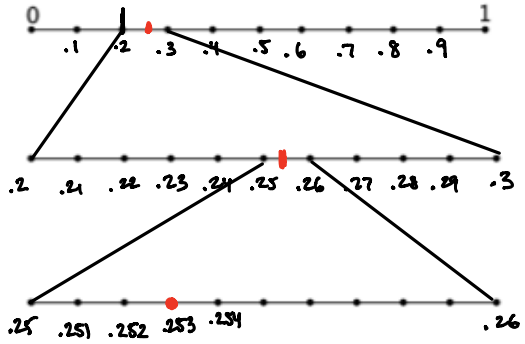
Steps for Rewriting Decimals (Finite and Infinite) in Expanded Form Using the Powers of 10

1. Represent each digit as a number with a denominator that is a power of 10.
2. Determine the decimal is finite (terminating) or infinite.
3. If required, draw number lines to represent the decimal.

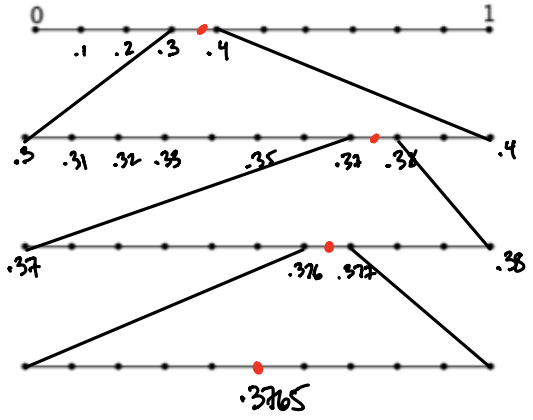
0.253 $= .2 + .05 + .003$

$\frac{2}{10} + \frac{5}{10^2} + \frac{3}{10^3}$

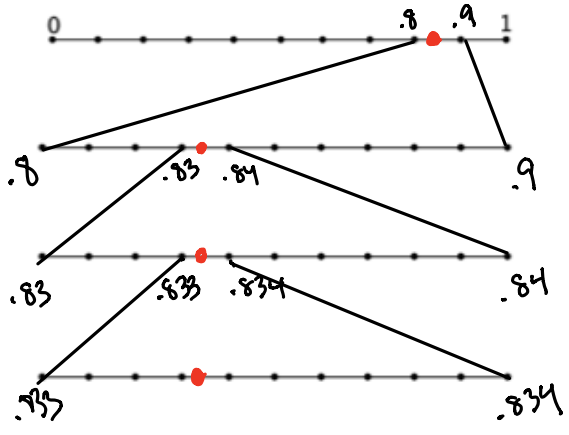


0.3765

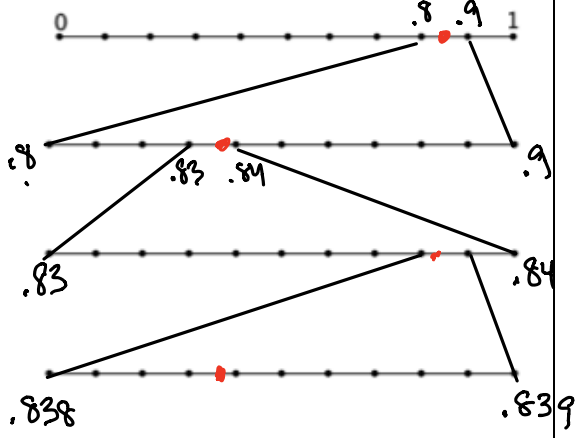
$\frac{3}{10} + \frac{7}{10^2} + \frac{6}{10^3} + \frac{5}{10^4}$



$0.8\overline{3}$



$0.\overline{83}$



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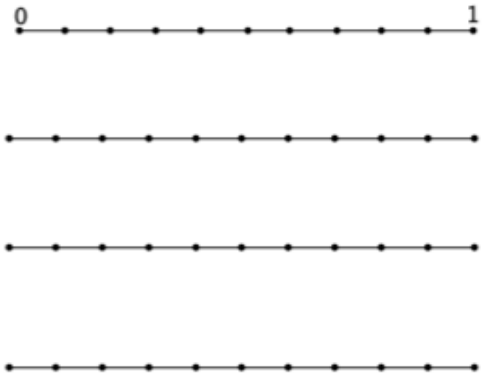
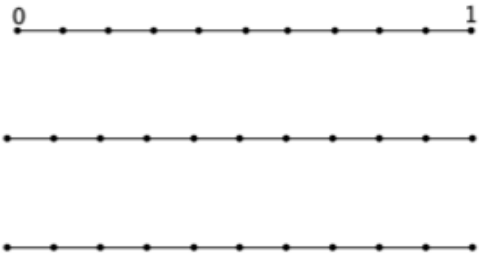
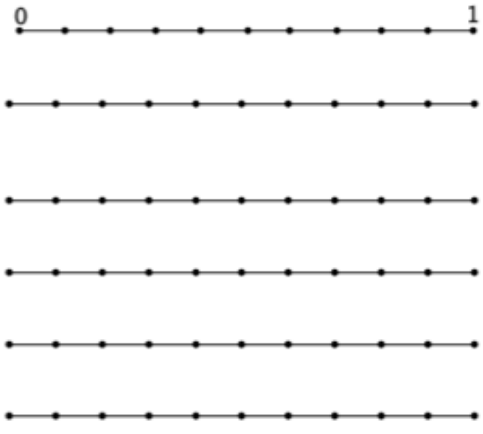
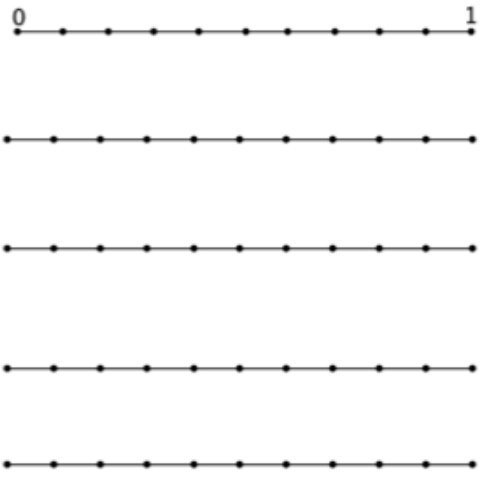
Independent Practice:

Rewrite Using the Powers of 10 and represent on a number line

$0.\overline{573}$ 	0.985 
$0.\overline{1422}$ 	0.14159 

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Activating Prior Knowledge:

We can rewrite fractions as decimals

$\frac{3}{10^3}$	$\frac{14}{10^4}$

Closure:

Does the fraction $\frac{22}{7}$ have a repeating or terminating decimal? How do you know?

Notes:

This maps to Lesson 7 and 8 from Module 7 Grade 8