MTH1W

Math 9 – Unit 1: Real Numbers

Name: Mr. Hagen

Lesson #1: Rational and Irrational Numbers

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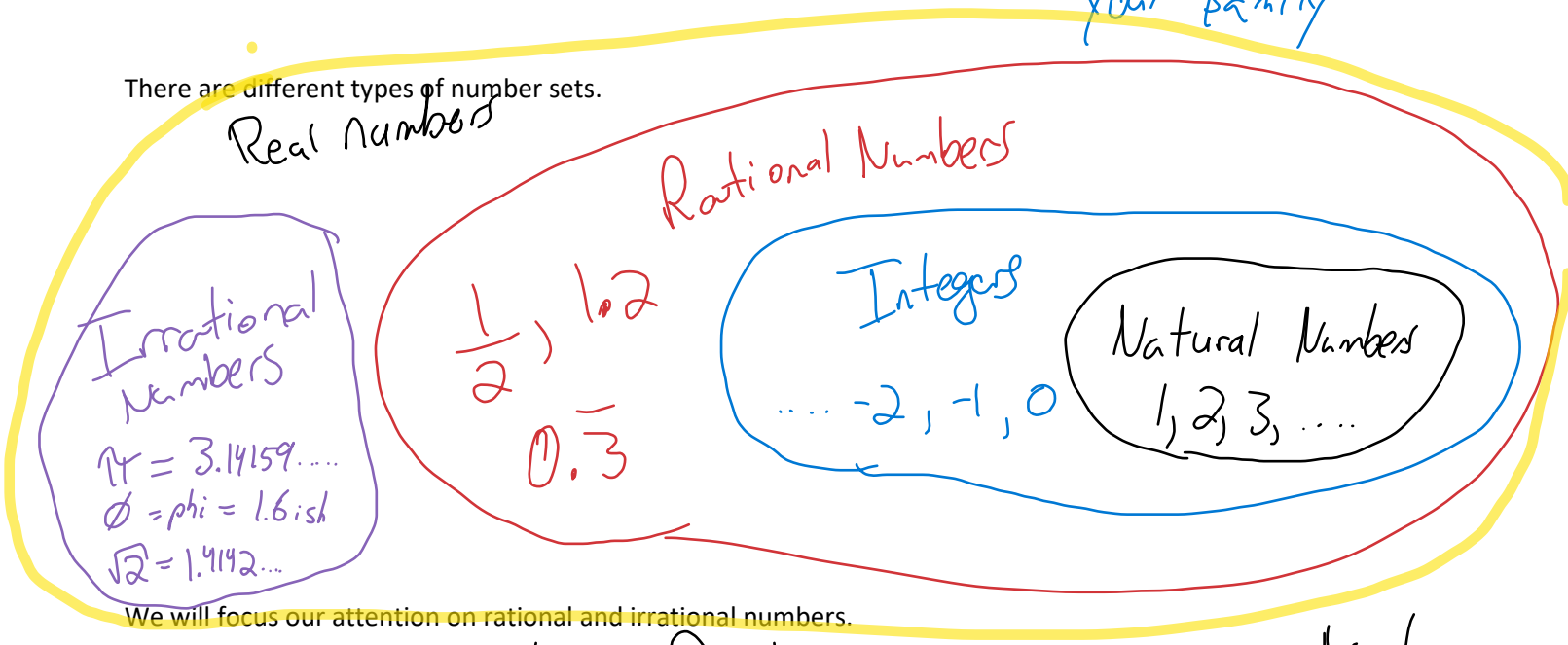
Learning Goal: We are learning to relate rational numbers to decimals, fractions, and integers.

Welcome to the wonderful and beautiful world of Mathematics. Math is a language with its own syntax, grammar, and rules. Also, for Math to be readable and elegant (yes, it can be elegant), it needs to be written in a certain way. It is essential that you learn and adapt to this structure. First, we begin by looking at sets of numbers.

A set is a collection of objects.

ex: math class
your family

There are different types of number sets.



We will focus our attention on rational and irrational numbers.

A rational number is: a ratio of two integers, a and b, where $b \neq 0$ (cannot equal)

→ $\frac{a}{b}$, $b \neq 0$ cannot divide by 0.

ex: $\frac{1}{2}$, $\frac{-20}{87}$, $\frac{0}{6}$, 0.5

Imaginary Numbers
Complex numbers
$\sqrt{-1}$

An irrational number is:

a number which cannot be written as a fraction.

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State if the following are rational, irrational, or neither:

a) $\frac{1}{2}$ R

b) $\frac{-3}{0}$ = undefined N

c) $\frac{-0}{4} = 0$ R

d) $\sqrt{5}$ = big long decimal I

e) $\sqrt{-9}$ (cannot square root a negative) N

Rational numbers can be represented as fractions or decimals. In decimal form, it can _terminate (stop)_ or _repeats_.

Write the fraction as a decimal: top ÷ bottom

a) $\frac{2}{3} = 0.66666... = 0.\overline{6}$

b) $\frac{3}{8} = 0.375$

c) $\frac{10}{7} = 1.\overline{428571}$

d) $\frac{5}{12} = 0.41\overline{6}$

If the decimal is a terminating decimal, it can be quickly converted to a fraction. (Repeating decimals can be converted, but it can be more complicated and we will not do it here.) The denominator is the place value of the right-most digit. The numerator is the number without the decimal. To finish it off, simplify the fraction to lowest terms.

Write the decimal as a fraction in lowest terms:

a) 0.6

$= \frac{6}{10} \div 2$

$= \frac{3}{5}$

b) 1.42

$= \frac{142}{100} \div 2$

$= \frac{71}{50} = 1\frac{21}{50}$

c) −0.875

$= \frac{-875}{1000} \div 5$

$= \frac{-175}{200} \div 5$

$= \frac{-35}{40} \div 5 = -\frac{7}{8}$

d) −3.25

Finally, rational numbers can also be written as a percent. Convert the following to a percent.

a) 0.32 × 100

$= \frac{32}{100}$

$= 32\%$

32%

b) 1.045 × 100

104.5%

c) $\frac{7}{25} \times \frac{4}{4}$ (out of 100)

$= \frac{28}{100} = 28\%$

$= 0.28 \times 100$

$= 28\%$

d) $\frac{23}{32} = 0.71875 \times 100$

$= 71.9\%$

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Complete the chart:

FRACTION	DECIMAL	PERCENT
$\frac{3}{5}$		
	0.64	
$\frac{55}{100}$		55%
	0.16	
$\frac{17}{100}$		
	0.35	
		28%

Success Criteria:

- I can identify rational and irrational numbers
- I can convert between decimals, fractions and percents