Unit 3 - Rational Numbers

Section 3.1: What is a Rational Number?

Natural Numbers (N) are counting numbers {1, 2, 3, 4, 5, ...}.

Whole Numbers (W) are a set of numbers including zero and the natural numbers {0, 1, 2, 3, 4, 5, ...}.

Integers (I) are a set of numbers that include positive and negative numbers and zero {...-3, -2, -1, 0, 1, 2, 3, ...}.

Note: The number sets above do not include fractions or decimals. Therefore, we need to consider *rational* and *irrational numbers*.

Rational Numbers (Q) include any number that can be written in the form $\frac{m}{n}$ where m and n are both integers and $n \neq 0$.

Using any two integers, we can create a fraction and change the fraction to a decimal (numerator divided by denominator):

A. $\frac{100}{25}$

$= 100 \div 25$

$= 4$

4 is an integer and a rational number.

B. $\frac{2}{3}$

$= 2 \div 3$

$= 0.\overline{6}$

$0.\overline{6}$ is a repeating decimal and a rational number.

C. $\frac{7}{8}$

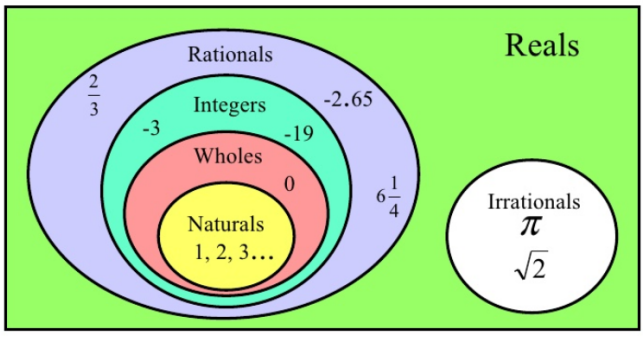
$= 7 \div 8$

$= 0.875$

0.875 is a terminating decimal and a rational number.

Therefore, rational numbers include all **integers, fractions, terminating decimals and repeating decimals**.

Irrational Numbers ($\overline{Q}$) are non-repeating and non-terminating decimals. For example, 3.5678123903..., $\sqrt{13}$.



Comparing and Ordering Rational Numbers

Use > , < , or = to determine which rational number is greater.

A. $\frac{4}{7} > \frac{5}{9}$

-Use a common denominator:

$\frac{4}{7} \times \frac{9}{9} = \frac{36}{63}$ $\quad\quad$ $\frac{5}{9} \times \frac{7}{7} = \frac{35}{63}$

-The fraction with the largest numerator represents the greater fraction.

B. $\frac{-10}{4} > -2.8$

- Change the fraction to a decimal or the decimal to a fraction

$\frac{-10}{4} = -10 \div 4 = -2.5$ $\quad\quad$ $-2.8 = \frac{-28}{10} = \frac{-28 \div 2}{10 \div 2} = \frac{-14}{5}$

$\frac{-10}{4} \times \frac{5}{5} = \frac{-50}{20}$ $\quad\quad$ $\frac{-14}{5} \times \frac{4}{4} = \frac{-56}{20}$

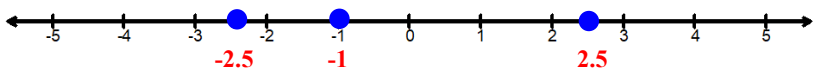
C. $8.234 > 8.23$

- Express each number such that both numbers have the same number of decimal places.

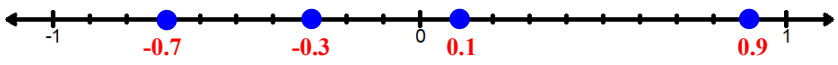
D. $-8.234 < -8.23$

Using number lines, identify the rational numbers labelled below:

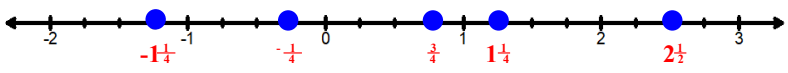
A.



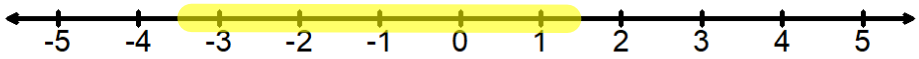
B.



C.



Write 3 rational numbers that lie between 1.3 and -3.3.



We can choose any 3 numbers between -3.3 and 1.3. For example, -3, -2.1, and 1.1. Answers will vary.

Identify a decimal between each pair of rational numbers.

A. $\frac{-1}{2}$ and $\frac{-1}{4}$

$\frac{-1}{2} = -1 \div 2 = -0.5$ $\frac{-1}{4} = -1 \div 4 = -0.25$

A decimal in between is -0.35. Answers will vary.

Identify a fraction between each pair of rational numbers.

A. $\frac{-2}{3}$ and $\frac{-3}{4}$

It is easier to change the fractions to a decimal:

$\frac{-2}{3} = -2 \div 3 = -0.\overline{6}$ $\frac{-3}{4} = -3 \div 4 = -0.75$

Choose a decimal in between $-0.\overline{6}$ and -0.75. For example, -0.70.

Changing -0.70 back to a fraction:

$-0.70 = \frac{-70}{100} = \frac{-70}{100} \overset{\div 10}{\underset{\div 10}{}} = \frac{-7}{10}$

B. $\frac{5}{2}$ and $\frac{7}{3}$

Changing to a decimal:

$\frac{5}{2} = 5 \div 2 = 2.5$ and $\frac{7}{3} = 7 \div 3 = 2.\overline{3}$

Choose a decimal in between (for example, 2.4) and change back to a fraction:

$2.4 = \frac{24}{10} = \frac{24^{\div 2}}{10^{\div 2}} = \frac{12}{5}$

Practice Exercises - Pgs. 101-103

#'s 7, 8, 10, 12, 14, 18,

21, 23 (a),(b) & 24 (a),(b).