

2.1 Comparing and Ordering Rational Numbers

Prescribed Learning Outcomes (PLO'S):

- Compare and order rational numbers.
- Identify a rational number between two given rational numbers.

Warm Up: Convert each number to a decimal using your calculator and circle all the terms which describe each decimal.

| Number | Decimal Equivalent | Description | |
|-----------------|--------------------|-----------------|---------------|
| $\frac{28}{11}$ | | Terminating | Repeating |
| | | Non-Terminating | Non-Repeating |
| $\frac{28}{8}$ | | Terminating | Repeating |
| | | Non-Terminating | Non-Repeating |
| $\sqrt{2}$ | | Terminating | Repeating |
| | | Non-Terminating | Non-Repeating |

Integers are **whole numbers** and their _____ {..., -3, -2, -1, 0, 1, 2, 3 ...}.

A **Rational Number** is a decimal that either _____ or _____. The root of the word rational is _____ so rational numbers can be expressed as ratios or _____ $\frac{a}{b}$, where a and b are **integers** and $b \neq 0$.

Example 1: Write the opposite of each rational number.

- a) 9 b) $-\frac{23}{3}$ c) -17.6 d) $\frac{-1}{-2}$
- e) $-\frac{-3}{4}$ f) $-\frac{2}{-3}$ g) $-\frac{-1}{-5}$ h) $-\frac{-3}{-10}$

Example 2: Show that each number is rational by expressing it as both a decimal and a fraction.

| Number | Decimal Form | Fraction Form |
|----------------|--------------|---------------|
| -5 | | |
| $4\frac{3}{5}$ | | |
| 7.8 | | |
| $\sqrt{49}$ | | |
| $\frac{1}{2}$ | | |
| $\frac{1}{4}$ | | |
| $\frac{1}{8}$ | | |
| $\frac{3}{4}$ | | |

Example 3: Circle the rational numbers.

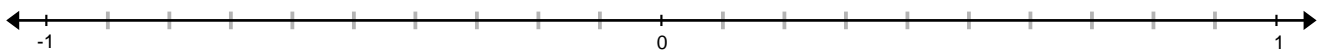
17 $\frac{5}{0}$ -3.606 $\sqrt{3}$ $-8\frac{3}{4}$ π $\sqrt{0.25}$

Example 4 : Is zero a rational number? Explain using the definition of a rational number.

Example 5: Is 1.2345678910111213141516171819202122232425....a rational number? Explain using the definition of a rational number in decimal form.

Example 6: Compare and order the rational numbers. $-\frac{3}{4}$, 0.7, -0.8, $\frac{1}{2}$, $-0.\bar{8}$

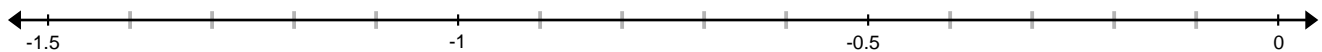
Strategy: Express all the numbers in decimal form and place them on a number line.



The numbers in ascending order are _____

The numbers in descending order are _____

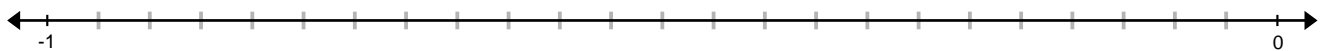
Practice: Compare the rational numbers $-0.\bar{3}$, -0.6, $-\frac{3}{4}$, $-1\frac{1}{5}$, -1.



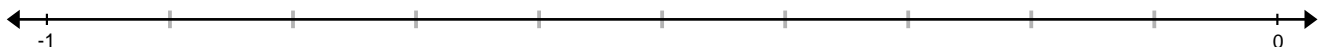
Ascending: _____ Descending: _____

Example 7: Which fraction is greater, $-\frac{5}{6}$ or $-\frac{7}{8}$?

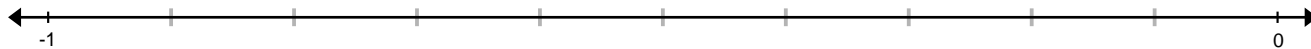
Method 1: Express the fractions as equivalent fractions with a common denominator.



Method 2: Compare by writing the fractions as decimal numbers.

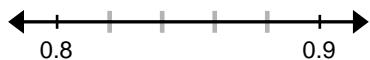


Practice: Using both of the methods presented above, determine which fraction is smaller, $-\frac{7}{10}$ or $-\frac{3}{5}$.

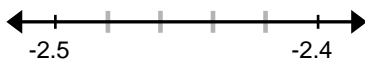


Example 8: Identify a fraction:

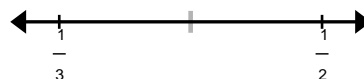
a) between 0.8 and 0.9.



b) between -2.4 and -2.5 .

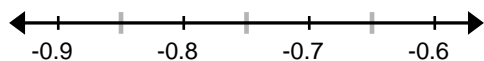


c) between $\frac{1}{2}$ and $\frac{1}{3}$

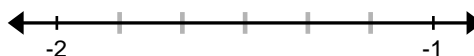


Example 9: Fill in each with $<$, $>$, or $=$ to make each statement true. Clearly show your reasoning.

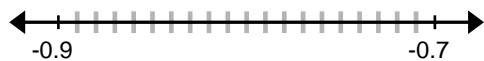
a. $-\frac{3}{4}$ -0.8



b. $-\frac{5}{3}$ $-\frac{11}{6}$



c. -0.81 $-\frac{4}{5}$

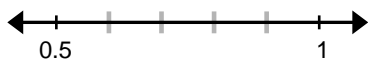


d. $-\left(\frac{-12}{-5}\right)$ -2.4

Example 10: Which number in each pair is greater? Explain each answer.

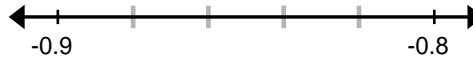
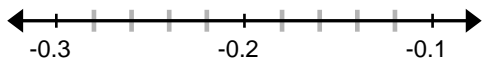
a. 0.9 and 0.99

b. $0.\bar{1}$ and 0.11



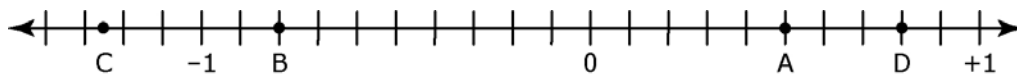
c. -0.2 and -0.22

d. -0.88 and $-0.\bar{8}$



Review Questions

1. a) Match each fraction with a letter on the number line.



$\frac{4}{5}$ _____ $\frac{1}{2}$ _____ $\frac{-5}{4}$ _____ $\frac{-4}{5}$ _____

b) Which letter is closest to zero? _____

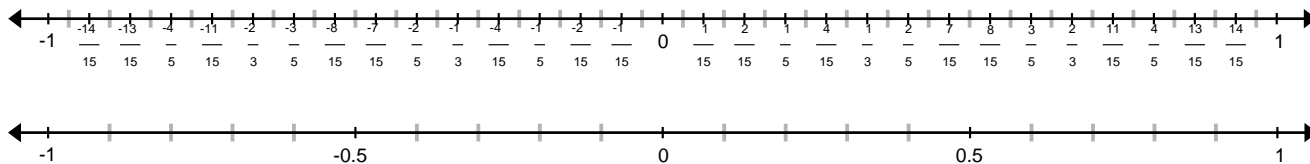
c) Which fraction is closest to zero? _____

d) Which fraction is smallest? _____

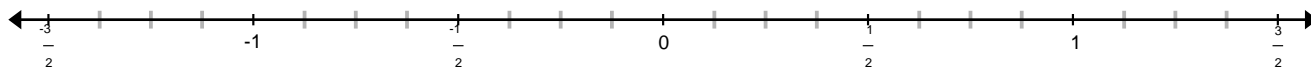
e) Is $\frac{-5}{4}$ or $\frac{-4}{5}$ closer to 0? Which fraction is smaller? Explain.

2. Which fraction in each pair is closer to zero? Which fraction is smaller? Verify by graphing each pair of fractions on the number line.

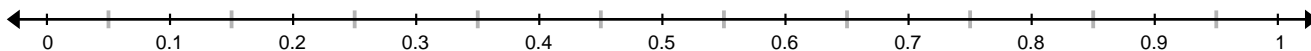
a) $\frac{-2}{3}$, $-\frac{4}{5}$



b) $\frac{-5}{4}$, $\frac{9}{8}$



c) $\frac{1}{4}$, $\frac{1}{5}$



d) $\frac{-4}{5}$, $\frac{-3}{4}$

