

Topic 6: Classifying and Ordering Rational Numbers

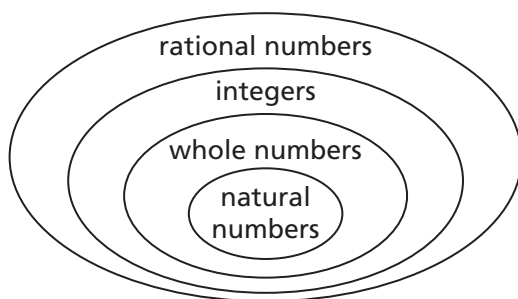
for use after **Accentuate the Negative** Investigation 1

The **natural numbers** are the counting numbers 1, 2, 3,....

The **whole numbers** are all the natural numbers and zero.

The **integers** are the whole numbers and their opposites.

Rational numbers are numbers that can be expressed as one integer divided by another non-zero integer. Examples of rational numbers are $\frac{1}{4}$, $-\frac{3}{5}$, 5, 0.5, $\sqrt{25}$ and $0.\bar{3}$.

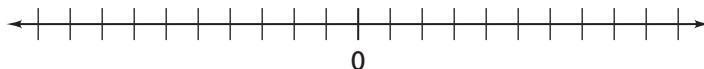


Problem 6.1

Andrew, Brittany, Christopher, and Elizabeth are playing a math game. Each player draws a card with a rational number.

- A.** In the first round, each player must classify the number in as many ways as possible. The player moves a piece according to the correct number of classifications made.
1. Andrew draws the number 13. Which sets of numbers does 13 belong to?
 2. Brittany's number is $-\frac{18}{3}$. Which sets of numbers does $-\frac{18}{3}$ belong to?
 3. Christopher draws $\sqrt{9}$. Which sets of numbers does $\sqrt{9}$ belong to?
 4. Elizabeth she draws a 0. Which sets of numbers does zero belong to?
 5. Each player correctly classified the number. Order the players' positions at the end of the first round.

- B.** In the second round, each player must place the number on a number line. Each player earns 5 points for correctly locating the number.



1. Andrew draws $\sqrt{81}$. Place his number on the number line.
 2. Brittany's number is 3.2. Place her number on the number line.
 3. Christopher draws 400%. Place his number on the number line.
 4. Elizabeth draws $-\frac{14}{3}$. Place her number on the number line.
 5. Each player correctly locates the number. List each player's total at the end of round 2.
- C.** The final round requires each player to select three cards. The player must then put the numbers in order from least to greatest. The player receives one point for each number that is in the correct order.
1. Andrew draws first and selects $\sqrt{49}$, $-\frac{19}{8}$, and 12. Put these numbers in order from least to greatest.
 2. Brittany is next. She draws $\frac{2}{3}$, 0.34, and 47%. Put these numbers in order from least to greatest.

Exercises

1. Give an example of a number that is a whole number, but not a natural number.
2. Give an example of a number that is a rational number, but not an integer.
3. Give an example of a number that is an integer, but not a whole number.

Place each of the following numbers on a number line.

4. $\sqrt{100}$
5. -9.2
6. 47%

Order each set of numbers from least to greatest.

7. -6.3 , $\sqrt{36}$, 82%, $-\frac{15}{4}$, $\frac{3}{9}$
8. $\sqrt{1}$, $-\frac{2}{3}$, 175%, -1

Topic 6: Classifying and Ordering Rational Numbers

PACING 1 day

Mathematical Goals

- Develop number sense for negative rational numbers.
- Represent the location of rational numbers on a number line.
- Compare rational numbers by using the symbols $<$, $>$, and $=$.

Guided Instruction

Students should identify several rational numbers from selections of integers, fractions, decimals, and square roots of perfect squares. Point out equivalent quantities such as fractions and decimals that are equal.

- *How can I represent 3 as a fraction?* ($\frac{3}{1}$)
- *Describe a procedure for writing a decimal as a fraction.* (For terminating decimals, place the number after the decimal point over the place value. Simplify.)
- *How can you write a fraction as a decimal?* (Divide the numerator by the denominator.)
- *Which procedure would be most helpful in comparing rational numbers: writing all the decimals as fractions or writing all the fractions as decimals? Why?* (Writing all the fractions as decimals. It allows you to line up the decimal points and then compare the digits from left to right.)

Students may already be familiar with benchmarks. Some rational numbers like -1 , $-\frac{1}{2}$, 0 , $\frac{1}{2}$, and 1 are easy to understand and helpful when comparing other rational numbers. For example, suppose you want to compare $-\frac{7}{8}$ and $-\frac{2}{5}$. Since each fraction is negative, you first decide whether each fraction is between -1 and $-\frac{1}{2}$ or between $-\frac{1}{2}$ and 0 . You place $-\frac{7}{8}$ between -1 and $-\frac{1}{2}$ and $-\frac{2}{5}$ between $-\frac{1}{2}$ and 0 . Because $-1 < -\frac{1}{2}$, you can write $-\frac{7}{8} < -\frac{2}{5}$.

You will find additional work on rational numbers in the grade 6 unit *Bits and Pieces I*.

Vocabulary

- natural numbers
- whole numbers
- integers
- rational numbers

ACE Assignment Guide for Topic 6

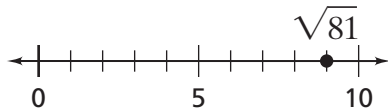
Core 1–8

Answers to Topic 6

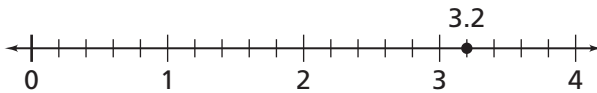
Problem 6.1

- A. 1. 13 belongs to the set of natural numbers, whole numbers, integers, and rational numbers. He earns 4 points.
2. $-\frac{18}{3}$ (or -6) belongs to the set of integers and rational numbers. She earns 2 points.
3. $\sqrt{9}$ (or 3) belongs to the set of natural numbers, whole number, integers, and rational numbers. He earns 4 points.
4. 0 belongs to the set of whole numbers, integers, and rational numbers. She earns 3 points.
5. Andrew and Christopher are tied for first with 4 points, next is Elizabeth with 3 points, and last is Brittany with 2 points.

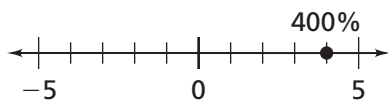
B. 1.



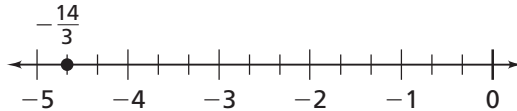
2.



3.



4.



5. Andrew now has 9 points, Brittany has 7 points, Christopher has 9 points, and Elizabeth has 8 points.

C. 1. $-\frac{19}{8}$, $\sqrt{49}$, 12

2. 0.34, 47%, $\frac{2}{3}$

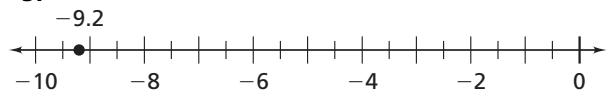
Exercises

1. 0
2. Answers may vary. Sample: 6.2.
3. There is no such number.

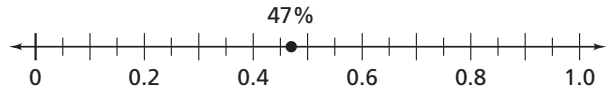
4.



5.



6.



7. -6.3 , $-\frac{15}{4}$, $\frac{3}{9}$, 82%, $\sqrt{36}$

8. -1 , $-\frac{2}{3}$, $\sqrt{1}$, 175%