ESSENTIAL STANDARD

(6.2) Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:

(D) Order a set of rational numbers arising from mathematical and real-world contexts.

Reporting Category 1 Numbers, Operations, and Quantitative Reasoning

VERTICAL ALIGNMENT

Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
4.2C - Compare and order whole numbers to 1,000,000,000 and represent comparisons using the symbols >, <, or =. 4.2F - Compare and order decimals using concrete and visual models to the hundredths.	5.2B - Compare and order two decimals to thousandths and represent comparisons using the symbols >, <, or =.	**6.2D - Order a set of rational numbers arising from mathematical and real-world contexts.**		8.2D - Order a set of real numbers arising from mathematical and real-world contexts.

SPECIFICITY

Order
A SET OF RATIONAL NUMBERS ARISING FROM MATHEMATICAL AND REAL-WORLD CONTEXTS
Including, but not limited to:

- Rational numbers – the set of numbers that can be expressed as a fraction $\frac{a}{b}$, where *a* and *b* are integers and $b \neq 0$. The set of rational numbers is denoted by the symbol Q.
- Various forms of positive and negative rational numbers
  - Integers
  - Decimals
  - Fractions
  - Percents
- Place value – the value of a digit as determined by its location in a number such as ones, tens, hundreds, one thousands, ten thousands, etc.
- Order numbers – to arrange a set of numbers based on their numerical value
- Number lines (horizontal/vertical)
- Numbers increase from left to right on a horizontal number line and from bottom to top on a vertical number line.
  - Points to the left of a specified point on a horizontal number line are less than points to the right.
  - Points to the right of a specified point on a horizontal number line are greater than points to the left.
  - Points below a specified point on a vertical number line are less than points above.
  - Points above a specified point on a vertical number line are greater than points below.
- Quantifying descriptor in mathematical and real-world problem situations (e.g., between two given numbers, greatest/least, ascending/descending, tallest/shortest, warmest/coldest, fastest/slowest, longest/shortest, heaviest/lightest, closest/farthest, oldest/youngest, etc.)

INSTRUCTIONAL CONSIDERATIONS

Key Questions

- Why is it important to identify the unit or attribute being described by numbers before comparing or ordering the numbers?
- How does understanding equivalence aid in the comparison and/or ordering of numbers?
- How can …
  - place value
  - numeric representations
  - concrete representations
  - pictorial representations
  - number lines
- … aid in the comparison and/or ordering of numbers?
- How can the comparison of two numbers be described and represented?
- What is the process for ordering a set of numbers?
- How are quantifying descriptors used to determine the order of a set of numbers?

Misconceptions:

- Some students may think that negative integers with larger absolute values are greater than negative integers with smaller absolute values.
- Some students may think that a number can only belong to one set (counting [natural] numbers, whole numbers, integers, or rational numbers) rather than understanding that some sets of numbers are nested within another set as a subset.

Vocabulary:

- **Counting (natural) numbers** – the set of positive numbers that begins at one and increases by increments of one each time {1, 2, 3, ..., *n*}
- **Integers** – the set of counting (natural) numbers, their opposites, and zero {–*n*, …, –3, –2, –1, 0, 1, 2, 3, ..., *n*}. The set of integers is denoted by the symbol Z.
- **Order numbers** – to arrange a set of numbers based on their numerical value
- **Percent** – a part of a whole expressed in hundredths
- **Place value** – the value of a digit as determined by its location in a number such as ones, tens, hundreds, one thousands, ten thousands, etc.
- **Positive rational numbers** – the set of numbers that can be expressed as a fraction $\frac{a}{b}$, where *a* and *b* are counting (natural) numbers
- **Rational numbers** – the set of numbers that can be expressed as a fraction $\frac{a}{b}$, where *a* and *b* are integers and $b \neq 0$. The set of rational numbers is denoted by the symbol Q.
- **Whole numbers** – the set of counting (natural) numbers and zero {0, 1, 2, 3, ..., *n*}