Ordering Numbers

Strand: Number and Number Sense

Topic: Comparing and ordering real numbers

Primary SOL: 8.1 The student will compare and order real numbers.

Related SOL: 8.3

Materials

- Ordering Numbers Cards (attached)
- Dry-erase boards and markers
- Sticky notes

Vocabulary

ascending, decimal, descending, fraction, greatest to least, least to greatest, percent, rational numbers, scientific notation (earlier grades)

irrational numbers, real numbers (8.1)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Introduce the terms ***ascending*** and ***descending order***. Make connections to real-life experiences. For example, what happens when an elevator or an airplane ascends or descends?
2. Distribute dry-erase boards and markers. Have five students come to the front of the classroom, and give each one of the Ordering Numbers Cards. Have them write their numbers on their whiteboards and convert the numbers to decimal form, if they are not already in that form. Then, direct the five students to line up in descending order, displaying their numbers.
3. Hold a discussion about how to order numbers and the need to convert numbers to the same form before ordering them. Emphasize that when ordering, numbers should be compared by place value.
4. Repeat this process with different groups of five students and different sets of numbers so that all students have a chance to participate in the ordering process.
5. Next, give each student five sticky notes, and instruct them to fold each note in half horizontally. Display a list of five numbers not in decimal form, and have students copy them on the top halves of their sticky notes, one number per note. Direct students to convert the numbers to decimal form, write the converted numbers on the bottom halves of their notes, and order the converted numbers from least to greatest. Then, have students unfold the notes so they can see the original forms of the numbers now placed in order. Review the conversion and ordering of the five numbers with the class, discussing to which form—decimal, fraction, percent, or scientific notation—it is easiest to convert a number, and checking the ordering of the numbers.
6. Use radical approximations of irrational numbers to compare and order, locating values on a number line.
7. To close, give each student an Ordering Numbers Card, and have the entire class order the numbers in ascending order. Check students' results by checking all conversions and the ordering of the converted numbers. Have students make corrections, as needed.

Assessment

- **Questions**
    - How would you order the following numbers from smallest to largest?

      0.25 $\qquad$ $\frac{2}{5}$ $\qquad$ 2.5×10^{-3} $\qquad$ 2.5% $\qquad$ $\sqrt{5}$
    - Which of the following is larger: 4.5×10^1 or 45%? How do you know?

- **Journal/writing prompts**
    - Explain how you would go about ordering five different numbers from largest to smallest.
    - Describe the steps you would use to order the following numbers from smallest to largest: $\frac{1}{3}$ $\qquad$ 1.3% $\qquad$ 3×10^0 $\qquad$ 0.13.

- **Other Assessments**
    - Provide students with a set of four numbers, already ordered. Provide an additional number for the students to place among the given numbers. Have the student explain how they determined where to place the given number.
    - Using a set of Ordering Number Cards, have the students play a game similar to War.

Extensions and Connections (for all students)

- Display on a number line the numbers the class ordered, and refer back to the different types of numbers when discussing the real number system.
- As students make conversions, relate the decimal form of numbers to amounts of money to help them understand how smaller and larger numbers are similar to lesser and greater quantities.

Strategies for Differentiation

- Have students complete a preparatory activity on scientific notation and all conversions so students are ready to compare and order numbers.
- Provide students with a number line so they can write numbers on it or attach sticky notes to it to assist them with ordering.
- Provide grid paper.
- Have students arrange decimal numbers vertically in order to line up and compare their various place values.
- Preteach the necessary vocabulary.
- Provide worked examples of the conversion process from one number form to another.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Ordering Numbers Cards

Copy on card stock, and cut out.

-6×10^{-3}	$\dfrac{1}{4}$	1.34	20%
4.2×10^1	$\dfrac{5}{3}$	2.5	2%
3.3×10^0	$\dfrac{3}{10}$	-0.33	0.5%
-1.2×10^3	$\dfrac{2}{3}$	0.45	1.1%
4×10^{-4}	$\dfrac{6}{7}$	-0.923	3.5%

10.9	10	$11\frac{2}{5}$	$\sqrt{110}$
π	−1	$-\sqrt{40}$	-6
$\sqrt{4}$	$\frac{12}{4}$	$3\frac{1}{3}$	$-\frac{1}{2}$
$\frac{46}{10}$	$-\frac{61}{1000}$	$5\frac{9}{10}$	$\sqrt{70}$
6^0	0^0	$\frac{16.3}{0}$	$\frac{0}{-2.9}$