

Richmond Public Schools
Curriculum Framework
7th Grade Math

Strand: Number and Number Sense

7.1 The student will

- a) investigate and describe the concept of negative exponents for powers of ten;**
- b) compare and order numbers greater than zero written in scientific notation;***
- c) compare and order rational numbers;***

*On the state assessment, items measuring this objective are assessed without the use of a calculator.

Suggested Pacing

First Nine Weeks- 6 Instructional Days

Spiraling Standards

Spiraling Down:

7.1a

- 6.4 The student will recognize and represent patterns with whole number exponents and perfect squares.

7.1b - N/A

7.1c

- 4.2 The student will
 - a) compare and order fractions and mixed numbers, with and without models
- 4.3 The student will
 - c) compare and order decimals
- 5.2 The student will

Spiraling Up:

- 8.1** The student will compare and order real numbers.

Richmond Public Schools
Curriculum Framework
7th Grade Math

<p>a) represent and identify equivalencies among fractions and decimals, with and without models; and</p> <p>b) compare and order fractions, mixed numbers, and/or decimals in a given set, from least to greatest and greatest to least.</p> <p>- 6.2 The student will</p> <p>a) represent and determine equivalencies among fractions, mixed numbers, decimals, and percents; and</p> <p>b) compare and order positive rational numbers.</p> <p>- 6.3 The student will</p> <p>a) identify and represent integers;</p> <p>b) compare and order integers; and</p> <p>c) identify and describe absolute value of integers.</p>	
Essential Questions	Common Misconceptions
<p>7.1a</p> <ul style="list-style-type: none"> ● What does a negative exponent mean when the base is 10? A base of 10 raised to a negative exponent represents a number between 0 and 1. <p>7.1b</p> <ul style="list-style-type: none"> ● When should scientific notation be used? Scientific notation should be used whenever the situation calls for use of very large or very small numbers. <p>7.1c</p> <ul style="list-style-type: none"> ● How are fractions, decimals and percents related? 	<ul style="list-style-type: none"> ● Difference between an exponent of 0 and 1 ● Decimal Percents (ex. 2.5%) converted to decimal form ● Decimals greater than one converted to percent form ● Students often translate negative exponents to negative numbers. ● Students may believe the greater the negative exponent the greater the number when comparing powers of ten. ● Students may assume the greater the denominator the greater the number when comparing rational numbers.

Richmond Public Schools
Curriculum Framework
7th Grade Math

<p>Any rational number can be represented in fraction, decimal and percent form.</p>	<p>Virginia Math Connects, Course 2, ©2012, Glencoe/McGraw-Hill page(s) 127, 133-138, 174-175, 181-184, 185-189, 346-350, 351-354, 355-358, 827-828.</p>
<p>Understanding the Standard</p>	<p>Essential Knowledge and Skills</p>
<p>7.1a</p> <ul style="list-style-type: none"> ● Negative exponents for powers of 10 are used to represent numbers between 0 and 1. $\left(\text{eg., } 10^{-3} = \frac{1}{10^3} = 0.001\right)$. ● Negative exponents for powers of 10 can be investigated through patterns such as: $10^2 = 100$ $10^1 = 10$ $10^0 = 1$ $10^{-1} = \frac{1}{10^1} = \frac{1}{10} = 0.1$ $10^{-2} = \frac{1}{10^2} = \frac{1}{100} = 0.01$ ● Percent means “per 100” or how many “out of 100”; percent is another name for hundredths. ● A percent is a ratio in which the denominator is 100. A number followed by a percent symbol (%) is equivalent to that number with a denominator of 100 $\left(\text{eg., } \frac{3}{5} = \frac{60}{100} = 0.60 = 60\%\right)$. 	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> ● Recognize powers of 10 with negative exponents by examining patterns. (a) ● Represent a power of 10 with a negative exponent in fraction and decimal form. (a) ● Convert between numbers greater than 0 written in scientific notation and decimals. (b) ● Compare and order no more than four numbers greater than 0 written in scientific notation. Ordering may be in ascending or descending order. (b) ● Compare and order no more than four rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions and mixed numbers may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. Ordering may be in ascending or descending order. (c)

Richmond Public Schools
Curriculum Framework
7th Grade Math

- Scientific notation should be used whenever the situation calls for use of very large or very small numbers.
- A number written in scientific notation is the product of two factors — a decimal greater than or equal to 1 but less than 10, and a power of 10
(eg., $3.1 \times 10^5 = 310,000$ and $2.85 \times 10^{-4} = 0.000285$).
- The set of integers includes the set of whole numbers and their opposites, $\{\dots -2, -1, 0, 1, 2 \dots\}$. Zero has no opposite and is neither positive nor negative.
- The opposite of a positive number is negative and the opposite of a negative number is positive.
- The set of rational numbers includes the set of all numbers that can be expressed as fractions in the form $\frac{a}{b}$ where a and b are integers and b does not equal zero. The decimal form of a rational number can be expressed as a terminating or repeating decimal. A few examples of rational numbers are:
 $\sqrt{25}$, $\frac{1}{4}$, -2.3 , 82 , 75% , $4.\overline{59}$.
- Rational numbers may be expressed as positive and negative fractions or mixed numbers, positive and negative decimals, integers and percents.
- Proper fractions, improper fractions, and mixed numbers are terms often used to describe fractions. A proper fraction is a fraction whose numerator is less than the denominator.

Richmond Public Schools
Curriculum Framework
7th Grade Math

<ul style="list-style-type: none"> ● An improper fraction is a fraction whose numerator is equal to or greater than the denominator. An improper fraction may be expressed as a mixed number. A mixed number is written with two parts: a whole number and a proper fraction (e.g., $3\frac{5}{8}$). Fractions can be positive or negative. ● Equivalent relationships among fractions, decimals, and percents may be determined by using concrete materials and pictorial representations (e.g., fraction bars, base ten blocks, fraction circles, colored counters, cubes, decimal squares, shaded figures, shaded grids, number lines and calculators). ● Negative numbers lie to the left of zero and positive numbers lie to the right of zero on a number line. ● Smaller numbers always lie to the left of larger numbers on the number line. 	
Vocabulary	Instructional Activities Organized by Learning Objective
<p>7.1a Powers of Ten Negative Exponents</p> <p>7.1b Scientific Notation Power</p> <p>7.1c Rational Numbers Ascending Order Descending Order Proper Fraction</p>	<p>Virginia Department of Education</p> <ul style="list-style-type: none"> ● Lesson on Powers of Ten ● Lesson on Scientific Notation ● Lesson on Ordering Fractions Decimals and Percents <p>Textbook:</p> <p>Virginia Math Connects, Course 2, ©2012, Glencoe/McGraw-Hill page(s) 127, 133-138, 174-175, 181-184, 185-189, 346-350, 351-354, 355-358, 827-828(in part)</p>

Richmond Public Schools
Curriculum Framework
7th Grade Math

<p>Improper Fraction Integer Mixed Number Percent Ratio Terminating Decimal Repeating Decimal Equivalent</p>	<p>Notes: Exponents and Scientific Notation Equivalent Relationships</p> <p>Resources</p> <ul style="list-style-type: none"> ● Print <ul style="list-style-type: none"> ○ Virginia Coach, New SOL Edition, Mathematics, Grade 7, @2018, Triumph Learning pg(s) 8 - 30 ● Technology-based <ul style="list-style-type: none"> ○ LearnZillion <ul style="list-style-type: none"> ▪ Powers of 10 ○ PBS <ul style="list-style-type: none"> ▪ PBS Dunk Tank - Convert Fraction, Decimals & Percents ○ Math-Play.com <ul style="list-style-type: none"> ▪ Converting Fraction/Decimal/Percent <p>Station Activities: Powers of 10 Powers of 10 Task Cards</p>
Assessment	
<p><u>Power Schools Assessment SOL7.1abc</u></p>	
Cross-Curricular Connections	
<p>Science – Scientific notation is used to describe the size of very small particles, and the size and distance of very large planets in our solar system.</p>	<p>Tier 1 Error Analysis activity where students are given copies of student work and they determine which have been done correctly and incorrectly. They need to explain what is incorrect and what misconception they believe the student had.</p> <p>Tier 2</p>
Tiered Differentiations	

Richmond Public Schools
Curriculum Framework
7th Grade Math

	<p>Human Number Line Activity: $\frac{1}{4}$ to $\frac{1}{2}$ of the students hold up number line cards (labeled with integers). The rest of the students are given a rational number. On whiteboards they should convert the number to all other forms and then when called on go stand where the number belongs and explain why.</p> <p>Tier 3 Students practice converting fractions, mixed numbers and percents into decimal form. Students are asked to show lining up the decimal, saying and/or writing how we say the decimal, and relate the decimal to money terms before ordering.</p>
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End of first nine weeks