

## GRADE 8 UNIT 2 – THE NUMBER SYSTEM

<p><b>Established Goals:</b> Standards</p> <p><b>8.NS.1:</b> Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.</p> <p><b>8.NS.2:</b> Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. For example, by truncating the decimal expansion of the square root of 2, show that the square root of 2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</p> <p><b>8.EE.1:</b> Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p> <p><b>8.EE.3:</b> Use numbers expressed in the form of a single digit times an integer power of 10 estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as <math>3 \times 10^8</math> and the population of the world as <math>7 \times 10^9</math> and determine that the world population is more than 20 times larger</p> <p><b>8.EE.4:</b> Perform operations with numbers expressed in scientific notation, including problems where both decimals decimal and scientific notation are used. Use scientific</p>	<b>Transfer</b>	
	<p><i>Students will be able to:</i></p> <ul style="list-style-type: none"> <li>• Compare rational and irrational numbers to demonstrate that the decimal expansion of irrational numbers do not repeat; show that every rational number has a decimal expansion which eventually repeats and convert such decimals into rational numbers.</li> <li>• Use rational numbers to approximate and locate irrational numbers on a number line and estimate the value of expressions involving irrational numbers.</li> <li>• Apply the properties of integer exponents to simplify and write equivalent numerical expressions.</li> <li>• Use scientific notation to estimate and express the values of very large or very small numbers and compare their values (how many times larger/smaller is one than the other).</li> <li>• Perform operations using numbers expressed in scientific notation, including problems where both decimals and scientific notation are used (interpret scientific notation generated when technology has been used for calculations).</li> </ul>	
	<b>Meaning</b>	
	<b>ENDURING UNDERSTANDING</b>	<b>ESSENTIAL QUESTIONS</b>
	<ul style="list-style-type: none"> <li>• Models, diagrams, manipulatives and patterns are useful in developing and remembering algorithms for computing with positive and negative rational numbers.</li> <li>• Properties of real numbers hold for all rational numbers.</li> <li>• Positive and negative rational numbers are often used to solve problems in everyday life.</li> <li>• An irrational number is a real number that cannot be written as a ratio of two integers.</li> <li>• All real numbers can be plotted on a number line.</li> <li>• Exponents are useful for representing very large or very small numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• What properties will help me simplify and evaluate rational numbers?</li> <li>• How can rational numbers be applied to solve real-world situations?</li> <li>• When are exponents used and why are they important?</li> <li>• What is the meaning of negative exponents?</li> <li>• How are power, base, and exponent related to multiplication?</li> <li>• Why is it useful for me to express quantities in scientific notation?</li> </ul>
<b>Acquisition</b>		
<b>KNOWLEDGE</b>	<b>SKILLS</b>	
<i>Students will know how to...</i>	<i>Students will be skilled at...</i>	

<p>notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.</p>	<ul style="list-style-type: none"> <li>• identify rational numbers.</li> <li>• simplify a fraction.</li> <li>• convert between fractions and decimals</li> <li>• compare and order rational numbers and integers.</li> <li>• write, simplify, and evaluate expressions involving exponents.</li> <li>• express quantities in scientific notation.</li> </ul>	<ul style="list-style-type: none"> <li>• identifying rational numbers.</li> <li>• simplifying fractions.</li> <li>• converting a fraction to a decimal.</li> <li>• converting a decimal to a fraction.</li> <li>• comparing and ordering rational numbers.</li> <li>• writing, simplifying, and evaluating expressions with exponents.</li> <li>• expressing quantities in scientific notation.</li> </ul>
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Vocabulary	Instruction and Pacing	
Rational Number Repeating Decimal Terminating Decimal Simplest Form Equivalent Least Common Denominator Absolute Value Exponent Scientific Notation Standard Form	<b>Pretest</b>	<b>1 day</b>
	<b>Rational Numbers</b>	<b>2 weeks</b>
	<b>Scientific Notation</b>	<b>1 week</b>
	<b>Exponents</b>	<b>2 weeks</b>
	<b>Post-Test</b>	<b>1 day</b>

Resources
<ul style="list-style-type: none"> <li>• <i>Course 3</i> Chapter 2: Lessons 2, 3, 8; Chapter 12: Lessons 3, 5</li> <li>• Manipulatives:               <ul style="list-style-type: none"> <li>○ Number Line</li> <li>○ Fraction Tiles</li> </ul> </li> <li>• Study Island</li> <li>• <a href="http://phschool.com">http://phschool.com</a></li> <li>• <a href="https://www.pearsonsuccessnet.com">https://www.pearsonsuccessnet.com</a></li> <li>• Buckle Down</li> </ul>

- Games/Centers

### Differentiation and Accommodations

Provide graphic organizers  
 Provide additional examples and opportunities for additional problems for repetition  
 Provide tutoring opportunities  
 Provide retesting opportunities after remediation (up to teacher and district discretion)  
 Teach for mastery not test  
 Teaching concepts in different modalities  
 Adjust pace and homework assignments

### ELL Modifications

#### 21<sup>st</sup> Century Skills

Critical Thinking, Creative Thinking, Collaborating, Communicating, and Technology Literacy

#### Instructional Strategies

Fairfield Township School recognizes the importance of the varying methodologies that may be successfully employed by teachers within the classroom and, as a result, identifies a wide variety of possible instructional strategies that may be used effectively to support student achievement. These may include, but not be limited to, strategies that fall into categories identified by the Framework for Teaching by Charlotte Danielson:

- Communicating with students
- Using questioning and discussion techniques
- Engaging students in learning
- Using assessment in instruction
- Demonstrating Flexibility and Responsiveness

#### Interdisciplinary Connections

ELA, Science, and Technology

#### Common Misconceptions

When converting a fraction to a decimal, the numerator is the divisor.  
 Negative exponents yield a negative answer.  
 Zero as an exponent equals zero.

#### Proper Conceptions

When converting a fraction to a decimal, the numerator is the dividend.  
 Negative exponents yield an answer that is a fraction.  
 Zero as an exponent always equals 1.

### Performance Task

**Students analyzed statistics from their school basketball team's winter season. The table shows the fraction of shots made for each of the team's players:**

Name	Shooting Record
George	46/120
Matt	58/110
Justin	25/115
Josh	75/90
Kyle	96/128

- Write each player's shooting record as a fraction in simplest form.
- Write each player's shooting record as a decimal.
- Rank the players in order from lowest shooting record to highest shooting record.
- If you had to select the team's most valuable player, who would you choose? Explain why.

#### Rubric

When used as a quiz grade (based on 100%), each bullet would be worth 25 points for a correct answer, with the second bullet being worth 5 points for each correct decimal.

# ASSESSMENTS

## Suggested Formative Assessment

Problem of the Day

Lesson Quizzes

Exit Ticket

Anecdotal Records (Topic Observation Checklist)

## Suggested Summative Assessment

Grade level developed Unit/Envisions Topic Tests

Ed-Connect Express Tests /State Unit Benchmark Assessment/Performance Task

