Unit 1
The Number System

Acceleration to Algebra
(Grade 7 & 8 LSSM Standards)

Unit Description:

Students will solve real-world problems using the four operations with integers. An understanding of rational numbers will be extended to describe them as terminating and repeating decimals. Additionally, students will solve real-world problems that include signed whole numbers, as well as signed rational numbers.

Students will write numbers in both scientific notation and standard form. Students will also use properties of exponents and scientific notation to evaluate expressions and solve real-world problems. Square roots and cube roots will be used to solve problems. Additionally, students will explore the difference between rational and irrational numbers.

Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.

Louisiana Student Standards for Mathematics (LSSM)

NS: The Number System	
A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	
7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **a.** Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. **b.** Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number

	and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. **c.** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. **d.** Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **a.** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. **b.** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-\left(\frac{p}{q}\right) = \frac{-p}{q} = \frac{q}{-p}$. Interpret quotients of rational numbers by describing real-world contexts. **c.** Apply properties of operations as strategies to multiply and divide rational numbers. **d.** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
EE – Expressions and Equations	
A. Work with radicals and integer exponents.	
8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. - Note: LSSM **do not include** simplifying radicals as an 8th grade standard. Ex: students **are not assessed** on $\sqrt{12} = 2\sqrt{3}$
8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to 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 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.
8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notations are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
NS – The Number System	
A. Know that there are numbers that are not rational, and approximate them by rational numbers.	
8.NS.A.1	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. Convert a decimal expansion which repeats eventually into a rational number by analyzing repeating patterns.
8.NS.A.2	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 (e.g., π^2). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations to the hundredths place.

Enduring Understandings:

- Rational numbers use the same properties as whole numbers.
- Positive and negative rational numbers can be used to solve multi-step real-life and mathematical problems.

Essential Questions:

- How do perform operations with rational numbers including positive and negative numbers?
- How is computation with rational numbers similar to and different from whole number computation?

• The properties of integer exponents are used to simplify expressions containing integer exponents. • Numbers can be expressed in scientific notation to compare very large and very small quantities and to perform computations with those numbers. • Expressions are powerful tools for exploring, reasoning about, and representing situations. • The number system consists of numbers that are rational and irrational. • Irrational numbers can be represented on a real number line. • Every number has a decimal expansion.	• How are rational numbers used and applied in real-life and mathematical situations? • Why is it helpful to write numbers in different ways? • How can you evaluate positive exponents? • How can you evaluate negative exponents? • How can you develop and use the properties of integer exponents? • How can you use scientific notation to express very large and very small quantities? • Why are quantities represented in multiple ways? • What is the difference between rational and irrational numbers? • How do you find the decimal expansion of a number?