Grade: 8 FCPS 2025-2026 Math Grade 8 Topic 1

8th Grade Topic 1: Real Numbers	Estimate Time Frame: 24 days
Essential Standards: 8.NS.1, 8.NS.2, 8.EE.2, 8.EE.1, 8.EE.3 Supporting Standard: 8.EE.4 Assessment Resource: enVision Topic 1 and Formative Assessment Lesson **(FAL):** Applying Properties of Exponents and Estimating Length Using Scientific Notation	

FCPS Supporting Links	Additional Supporting Links
Pacing Guide 8th Grade Topic 1 Standards Resource with Sample Formative Assessments enVision 8th Grade Topic 1 Standards Crosswalk Resource FCPS P-12 Mathematics Guidance Document FCPS Achievement & Trauma-Informed Strategies in the Classroom	Kentucky Academic Standards KSA Blueprint Target of the Standards - conceptual, procedural & application Three-Reads Routine Notice and Wonder Routine **MILC Resources Topic 1: Real Numbers** ***enVision Teacher Guide: page 2A to 2D for specific Topic 1 Focus-Coherence-Rigor***

Big Ideas
Know that not all numbers are rational, and approximate them by rational numbers. Work with integer exponents.

Essential Questions	Common Preconceptions/Misconceptions
What are real numbers? How are real numbers used to solve problems? How can approximations of irrational numbers be used to compare the size of irrational numbers? Where do rational numbers and irrational numbers belong within *the entire* Number System? What is their importance? Where in real life do we use very large and tiny numbers?	Rational/Irrational Numbers - distinguish between an irrational repeating pattern (1.010110111) and a rational repeating digits (1.12121212) Exponent Rules - Thinking 4^3 is 4 x 3 versus 4x4x4 Square and Cube Roots- Radical vs Division Symbol and Inverse Operation of a square root squares a number. Scientific Notation - counting place values (significant digits) rather than zeros only.

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Standards for Mathematical Practices	Kentucky Interdisciplinary Literacy Practices (KILP)
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.** **MP.8. Look for and express regularity in repeated reasoning.** ***enVision Teacher Guide: page 2E for specific Topic 1 Math Practice suggestions***	1. Recognize that text is anything that communicates a message. 2. Employ, develop, and refine schemas to understand and create text. 3. View literacy experiences as transactional, interdisciplinary, and transformational. 4. Utilize receptive and expressive language arts to better understand self, others, and the world. 5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks. **6. Collaborate with others to create new meaning.** **7. Utilize digital resources to learn and share with others.** **8. Engage in specialized, discipline-specific literacy practices.** **9. Apply high-level cognitive processes to think deeply and critically about text.** 10. Develop a literacy identity that promotes lifelong learning. *Incorporating texts into math instruction fosters interdisciplinary learning for a more engaging educational experience.*

Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Know that there are numbers that are not rational and approximate them by rational numbers		
KY.8.NS.1 Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational. ❑Conceptual ❑ **Procedural** ❑ Application Clarifications: Emphasis is placed on how all rational numbers can be written as an equivalent decimal. The end behavior of the decimal determines the classification of the number.	We are learning to understand real numbers. • I can classify numbers. • I can determine if a decimal is terminating or repeating. • I can determine if a square is perfect or imperfect. • I can identify whether a number is rational or irrational.	• Topic 1 Lesson 1-1 & 1-2 • Topic 1: Let's Investigate! Distinctive Decimals (replaces example 1 from lesson 1-2) • enVision Language Support Handbook

Coherence KY.7.NS.2→ KY.8.NS.1→ KY.HS.N.3 **MP.2, MP.6, KILP.2, KILP.6**		
KY. 8.NS.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., π2). ☐ **Conceptual** ☐ **Procedural** ❑ Application Clarifications: For example, by shortening the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. Coherence KY.8.NS.2→ KY.HS.N.3 **MP.2, MP.7, MP.8, KILP.5, KILP.8**	We are learning to use rational numbers to approximate irrational numbers. ● I can describe a perfect square. ● I can list perfect squares. ● I can use perfect squares to approximate irrational numbers. ● I can estimate the value of expressions that include irrational numbers. ● I can plot rational and irrational numbers (approximately) on a number line.	● Topic 1 Lesson 1-3 ● Topic 1: Let's Investigate! How Many More from 0 to 4? (replaces Lesson 1-3 and should span 2 days) ● enVision Language Support Handbook
Cluster: Work with radicals and integer exponents.		

KY.EE.2 Use square root and cube root symbols to represent solutions to equations of x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. **Conceptual** **Procedural** ❑ Application Clarifications: Students do not prove that these are the only solutions, but instead use informal methods, such as guessing and checking. Since √p is defined to mean the positive solution to the equation $x2 = p$ (when it exists), it is not correct to say (as is common) √64 = ±8 Coherence KY.8.EE.2→ KY.HS.A.12 **MP.5, KILP.6, KILP.8**	We are learning to evaluate square roots and cube roots. • I can find the square root by finding the factor whose square equals that number. • I can find the cube root by finding the factor whose cube equals that number. • I can understand why some square roots are irrational. We are learning to solve equations using square roots and cube roots. • I can use square roots to solve equations involving squares (x^2). • I can use cube roots to solve equations involving cubes (x^3).	• Topic 1 Lesson 1-4 • Brainingcamp Task Lesson 1-4 Tiling a Square Surface • Topic 1 Lesson 1-5 • enVision Language Support Handbook
KY.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. **Conceptual** **Procedural** ❑ Application 	Name	Product of Powers	Quotient of Powers	Power of a Product	Power of a Quotient	Power of a Power	Negative Exponent
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Property	$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$(a \cdot b)^n = a^n \cdot b^n$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$(a^m)^n = a^{mn}$	$a^{-n} = \frac{1}{a^n}$ | Coherence KY.8.EE.1→ KY.HS.N.1 **MP.3, MP.7, MP.8, KILP.1, KILP.9**	We are learning about the properties of exponential integers. • I can know and use properties of exponents to write equivalent expressions. • I can know and use the Product of Powers Property when multiplying powers with the same base. • I can know and use the Quotient of Powers property when dividing powers with the same base. • I can know and use the Power of a Quotient property when dividing exponential expressions with the same exponent and different bases. • I can know and use the Power of Products Property when multiplying exponential expressions with the same exponent and different bases. • I can know and use the Power of a Power	• Topic 1 Lesson 1-6 • Topic 1 Lesson 1-7 • MILC - Exponent Card Sort (after 1-7) • enVision Language Support Handbook • Formative Assessment Lesson (FAL): Applying Properties of Exponents

	property. • I can use the negative exponent property to rewrite expressions with negative exponents.	
KY.8.EE.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 times 10^8 and the population of the world as 7 times 10^9, and determine that the world population is more than 20 times larger. **Conceptual** **Procedural** ❑ Application Clarifications**:** Students conceptualize why a number could be written in scientific notation and the benefits of doing so, and connect the exponent rules learned earlier to the methods of writing a quantity in scientific notation. Coherence KY.8.EE.3→ KY.HS.N.6 **MP.3, MP.5, MP.6, KILP.1, KILP.4, KILP.9** *Supporting Standard KY.8.EE.4*	We are learning to use powers of 10 to estimate and write quantities. • I can estimate huge and tiny quantities by rounding. • I can write the rounded number as a single digit times a power of 10. • I can write large or tiny quantities in real-world situations using scientific notation. • I can determine how many times greater a number written in scientific notation is to another number.	• Topic 1 Let's Investigate! Massive Moments of Magnitude (do before Lesson 1-8) • ❗ Topic 1 Lesson 1-8 merged with Topic 1 Lesson 1-9 • 3-Act Task: Hard Working Organs • enVision Language Support Handbook • Formative Assessment Lesson (FAL): Estimating Length Using Scientific Notation

Attending to the Standards for Mathematical Practice

Students construct mathematical arguments and reasoning, emphasized as students learn the properties of exponents (MP.3).
Students reason $5^3 \cdot 5^2 = (5 \cdot 5 \cdot 5) \cdot (5 \cdot 5) = 5^5$. Through numerous experiences working with exponents, students generalize the properties of exponents (MP.7) before using them fluently.
Students notice if calculations are repeated (MP.8) and look for general methods and shortcuts.
Students expand their exponent work as they perform operations with numbers expressed in scientific notation, including problems with decimal and scientific notation (MP.2, MP.7, MP.8).
Students compare and interpret scientific notation quantities in the context of the situation, recognizing that the powers of 10 indicated in quantities expressed in scientific notation follow the rules of exponents shown previously (MP.3).

Supporting Standards

KY.8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notations that have been generated by technology. **MP, 2, MP.5, MP.6**

Choose appropriate units for real-life situations and note how the technology denotes scientific notation. **Lesson 1-10**

Conceptual **Procedural** ❑ Application

Vocabulary

approximation - An inexact representation of something still close enough to be useful.
combine like terms - An algebraic expression with terms having the same variable raised to the same exponents.
base - The bottom of a plane figure or three-dimensional figure
cubic root - A cube root of a number, denoted ∛(x) or x^1/3, is a number such that a^3 = x.
integer exponents - Exponents that only have integer values.
irrational numbers - A number that cannot be expressed as the ratio of two integers.
powers - A number that indicates the operation of repeated multiplication.
rational numbers - A number that can be expressed as the ratio of two integers.
real number - The combined set of rational numbers and irrational numbers.
repeating decimals - When a common fraction is written as a decimal by dividing the numerator by the denominator, the result is a repeating decimal if a digit or block of digits repeats endlessly as the remainder. Also called: non-terminating, unending, infinite, and periodic.
scientific notation - A method for writing extremely large or small numbers in which the number is shown as the product of two factors.
square root - The square root of x is the number that, when multiplied by itself, gives the number x.
terminating decimals - A decimal is terminating if its repeating digit is 0. When a common fraction is written as a decimal by dividing the numerator by the denominator, the result is a finite decimal if the remainder is zero.

*****Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. This example is not comprehensive.
** Mathematical Practices (A.MP. 1- 8) should be evidenced at some point throughout each unit, depending on the explored tasks. It is important to note that MP. 2 should support learning in every lesson.
******* Modeling Standards: Modeling is best interpreted not as a collection of isolated topics but rather to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a

star symbol (★). The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to *all* standards in that group.