Core Content

Cluster Title: Extend the properties of exponents to rational exponents.
Standard N.RN.1: Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. (For example, we define $5^{\frac{1}{3}}$ to be the cube root of 5 because we want $\left(5^{1/3}\right)^3 = 5^{(1/3)\cdot 3}$ to hold, so $\left(5^{1/3}\right)^3$ must equal 5.)
Concepts and Skills to Master
• Define the meaning of a rational exponent.

Supports for Teachers

Critical Background Knowledge	
• Properties of integer exponents. (8.EE.1) • Familiarity with radical notation. (8.EE.2)	
Academic Vocabulary	
rational exponent, radical, radicand, index, *n*th root	
Suggested Instructional Strategies	**Resources**
• Relate rational exponents to integer and whole number exponents. • Teach with N.RN. 2.	
Sample Formative Assessment Tasks	
Skill-Based Task: What is $8^{(1/3)}$?	**Problem Task:** See N.RN.2.

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Core Content

Cluster Title: Extend the properties of exponents to rational exponents.
Standard N.RN.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents.
Concepts and Skills to Master
• Convert radical notation to rational exponent notation, and vice-versa. • Extend the properties of integer exponents to rational exponents and use them to simplify expressions.

Supports for Teachers

Critical Background Knowledge	
• Properties of integer exponents. (8.EE.1) • Familiarity with radical notation. (8.EE.2) • Know the relationship between radical notation and rational exponent notation. (II.N.RN.1)	
Academic Vocabulary	
rational exponent, radical, radicand, index, *n*th root	
Suggested Instructional Strategies	**Resources**
• Compare contexts where radical form is preferable to rational exponents and vice versa.	
Sample Formative Assessment Tasks	
Skill-Based Task Compute $\sqrt[3]{25} \cdot \sqrt{5^3}$. What is the area of a rectangle with a length $\sqrt{7}$ and a width $\sqrt[3]{7}$?	**Problem Task** What is $\sqrt{\sqrt[3]{x}}$? What is $\sqrt[n]{\sqrt[m]{\sqrt[p]{x}}}$?

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