# Algebra 2

## ELG HS.N.1: **Extend the properties of exponents to rational exponents.**

## Vertical Progression:

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|---|---|
| **8th Grade** | **8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.**<br>o **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, and convert a decimal expansion which repeats eventually into a rational number.<br>o **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., $\pi^2$). |
| **Algebra 1** | **ELG.MA.HS. N.2 Use properties of rational and irrational numbers.**<br>o **N-RN.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. |
| **Algebra 2** | **ELG.MA.HS.N.1 Extend the properties of exponents to rational exponents.**<br>o **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<br>o **N-RN.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents. |

## Students will demonstrate command of the ELG by:

- Applying the properties of exponents to simplify algebraic expressions with rational exponents.
- Rewriting exponential expressions in radical form.
- Rewriting radical expressions in exponential form.
- Applying the order of operations and properties of exponents when simplifying expressions with radicals and/or exponents and recognizing when an expression is fully simplified.
- Describing what the parts of the rational exponent represent when rewriting in radical form.

## Vocabulary:

- exponent
- index number
- integer
- radical
- radicand
- rational exponent

## Sample Instructional/Assessment Tasks:

1) **Standard(s): N-Q.1**

**Source:** North Carolina DPI

**Item Prompt:**

Using what you know about properties of exponents, simplify:

1. $(16^{\frac{1}{4}})^3$
2. $(\sqrt[4]{81})$
3. $(\sqrt[5]{32})^4$

**Correct Answer:**

1. 8
2. 3
3. 16

2) **Standard(s): N-Q.2**

**Source:** SBAC

**Item Prompt:**

- For items 1a – 1e, determine whether each equation is True or False.

| | | | |
|---|---|---|---|
| 1a. | $\sqrt{32} = 2^{\frac{5}{2}}$ | (T) True | (F) False |
| 1b. | $16^{\frac{3}{2}} = 8^2$ | (T) True | (F) False |
| 1c. | $4^{\frac{1}{2}} = \sqrt[4]{64}$ | (T) True | (F) False |
| 1d. | $2^8 = \left(\sqrt[3]{16}\right)^6$ | (T) True | (F) False |
| 1e. | $\left(\sqrt{64}\right)^{\frac{1}{3}} = 8^{\frac{1}{6}}$ | (T) True | (F) False |

**Correct Answers:**

1a. T; 1b. T; 1c. F; 1d. T; 1e. F