Breaking Down a Mathematics Standard

Number & Quantity

KAS: KY.HS.N.1

What is the domain/conceptual category/big idea? The Real Number System

Standards for Mathematical Practice

MP.1. Make sense of problems and persevere in solving them.	MP.5. Use appropriate tools strategically.
MP.2. Reason abstractly and quantitatively.	MP.6. Attend to precision.
MP.3. Construct viable arguments and critique the reasoning of others.	MP.7. Look for and make use of structure.
MP.4. Model with mathematics.	MP.8. Look for and express regularity in repeated reasoning.

Cluster: What is the broader understanding that the standard plays a role in building? Extend the properties of exponents to rational exponents.

Standards

- Identify the ~~target of the standard~~:
  - o conceptual understanding
  - o ~~procedural skill/fluency~~
  - o application

Consider how the target of the standard will have an impact on instruction and assessment. (For more information, refer to p. 7, 10 and 15 of *KAS for Mathematics*.) Conceptual Understanding: understanding mathematical concepts, operations and relations. More than knowing isolated facts and methods → students should make sense of why a mathematical idea is important and the kinds of contexts in which it is useful. Allows students to connect prior knowledge to new ideas & concepts

- What key mathematics should students know and be able to do?
  - extend properties of exponents to rational exponents
  - express radicals in terms of rational exponents

Clarifications

- What are the specific representations/strategies that will need to be considered when planning instruction?
  - powers/roots can be expressed as a single rational exponent where the numerator is the power and the denominator is the root index → limit single roots to those that can be expressed as a rational exponent with a numerator of 1.
- What are the possible misconceptions that will need to be addressed during instruction?
  - students may mix up powers & root indices
  - mistakenly treating exponents as multiplication / mistaken models of how exponents work

Coherence: Previous Grade → Current Standard → Upcoming Grade

- How does this standard build off of prior learning? In Grade 8 students were expected to know and apply properties of integer exponents to generate equivalent numerical expressions. (KY.8.EE.1)
- How does this standard support future learning? As mentioned in the clarifications KY.HS.N.2 builds off KY.HS.N.1 by extending student understanding to situations where numerator is not 1.
- How does this standard connect to other standards (or even other clusters or domains)? This may also be useful in KY.HS.A.17.b as students are using the structure of an equation to determine an efficient strategy for finding a solution, if one exists.

Attending to the Standards for Mathematical Practice

- How are students engaging in the mathematical practices as they learn this content? (For more information, refer to p. 12-15 of *KAS for Mathematics*.)

MP 2: Students make sense of quantities & their relationships in problem situations, knowing & flexibly using different properties of operations & objects.

MP 7: Students discern a pattern/structure within expressions with rational exponents