Square and Cube Roots

The contents of this content module were developed by special educator Bethany Smith, PhD and validated by content expert Drew Polly, PhD at University of North Carolina at Charlotte under a grant from the Department of Education (PR/Award #: H373X100002, Project Officer, Susan.Weigert@Ed.gov). However, the contents do not necessarily represent the policy of the Department of Education and no assumption of endorsement by the Federal government should be made

What is a square root?

- The square root of a number is determined by dividing a number by itself
  - It is the opposite of squaring a number
  - Therefore, $\sqrt[2]{9} = 3$. To check the answer if you square (remember squaring means you multiply a number by itself) 3^2 the product is 9
  - A square root is called a Perfect Square if the square root is a whole number

$\sqrt[2]{9} = 3$ ← Perfect square

$\sqrt[2]{10} = 3.16228$ ← NOT a perfect square

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What is a cube root?

- Similar to a square root, a cube root is the value of a number when it is cubed (divided into three parts).
  - Therefore, the cube root of 27 is 3. $\sqrt[3]{27} = 3$
  - To check to see if you cubed a number correctly, cube (multiplied itself three times) the solution and see if it matches the original number

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Ideas for application

- Use manipulatives where students can physically move the decimal
- Always include multiple representation of numbers (e.g., 0.001= $\frac{1}{1000}$)
- Create personally-relevant word problems

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Making connections

- Simplifying expressions with exponents addresses the middle and high school Core Content Connectors of
  - 6.NO.1i1 Identify what an exponent represents
  - 6.NO.1i2 Solve numerical expressions involving whole number exponents
  - 8.NO.1i1 Convert a number expressed in scientific notation up to 10,000
  - H.NO.1a2 Explain the influence of an exponent on the location of a decimal point in a given number
  - H.NO.2c1 Simplify expressions that include exponents
  - H.NO.2c2 Rewrite expressions that include rational exponents

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