Perfect Squares and Cubes Notes

- **Perfect Squares** are whole numbers with an exponent of _______.
- **Perfect Cubes** are whole numbers with an exponent of _______.
- A square root of a number is indicated with a radical sign: _______.
  - A square root is the ___________ (opposite) of a perfect square.
  - To find the square root, find the number when multiplied by itself that’s equal to the number under the radical symbol.
- The cubed root of a number is indicated by the following symbol: _____.
- When solving equations, use the inverse of the root to isolate the variable.
  - Examples:
    
    \[
    x^2 = 256 \quad x^2 = \frac{49}{64}
    \]
    
    \[
    x^2 = \frac{324}{400} \quad x^3 = 125
    \]
    
    \[
    x^3 = \frac{1}{216} \quad x^3 = \frac{512}{729}
    \]
Estimating Square/Cube Roots

We can use a number line to help estimate non-perfect square/cube roots.

- **Examples:**
  - Which two integers does the $\sqrt{31}$ fall between? _______
  - Which two integers does the $\sqrt{127}$ fall between? _____
  - Which two integers does the $\sqrt{75}$ fall between? _______
  - Which two integers does the $\sqrt{522}$ fall between? _______
  - Which two integers does the $\sqrt{18}$ fall between? _______

Let’s Practice: Use the number line to determine where each square and cube root belongs.

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Estimating Non-Perfect Squares

**STEP 1:** Determine the two numbers that the integer falls between.

**STEP 2:** Is it closer to the 1st number or the 2nd number?

**STEP 3:** Guess and Check - Square your estimates (Use long multiplication – no calculators!)

**STEP 4:** Which guess was the closest estimate? The closest estimate will be the number closest to your original radicand (the number under the square root symbol).

**EXAMPLES:**
- Estimate $\sqrt{5}$ to the nearest tenth.
- Estimate $\sqrt{27}$ to the nearest tenth.
- Estimate $\sqrt{14}$ to the nearest tenth.

- Which is greater: $3\pi$ or $\sqrt{83}$?

- What is the most accurate approximation of $\sqrt{52} - \sqrt{9}$?

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**PERFECT SQUARE**

is any number that shows the area of a square. The **square root** is the side length.

\[ \sqrt{16} = 4 \]

**PERFECT CUBE**

is any number that shows the volume of a cube. The **cube root** is the side length.

\[ \sqrt[3]{8} = 2 \]