**8th Grade Math; Unit 2 Lesson 1 Part 2 EE.2**
**Key Standards addressed in this Lesson: CC8.EE.2**
**Time allotted for this Lesson: 3 days**

## Key Concepts in Standards:

**MCC8.EE.2** Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

## Evidence of Learning:

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- find square roots and cube roots of perfect squares and perfect cubes;

## Essential Question(s):

- Why is it useful for me to know the square root of a number?

## Vocabulary: (Tier)

- **Cube Root:** If the cube root of a number $b$ is $a$ (i.e., $\sqrt[3]{b} = a$), then $a^3 = b$.
- **Perfect Square:** A number that has a rational number as its square root.
- **Exponent:** The number of times a base is used as a factor of repeated multiplication.
- **Radical:** A symbol $\sqrt{\ }$ that is used to indicate square roots.
- **Square Root:** One of two equal factors of a nonnegative number. For example, 5 is a square root of 25 because 5 • 5 = 25. Another square root of 25 is -5 because (-5) • (-5) = 25. The +5 is called the principle square root of 25 and is always assumed when the radical symbol is used.

## Concepts/Skills to Maintain:

- computation with whole numbers and decimals, including application of order of operations

## Opening: Task

- Number line Opener - attached

## Work Session:

- Use this slide show on Square Roots and Irrational Numbers by Ms. Dewey Hoffman to teach square roots, cube roots, and irrational numbers and their relationships. http://www.slideshare.net/Ms.DH/111-square-root-irrational

- **Or** open the file that says Square Root Graphic Organizer and use this GO (won't attach right, sorry!)

- Teaching example attached – optional

**Other Possible Mathematics Resources:**
**Correlated activities in Holt Course 3 Text:**

- Section 4-5 Squares & Square Roots
- Section 4-6 Estimating Square Roots

**Glencoe Algebra Study Guide and Practice Workbook**

- Section 8-5 Square Roots
- Section 8-6 Estimating Square Roots
- Worksheet attached for square/cube roots

**The Outstanding Mathematics Guide: 8th Grade Supplement**

- Perfect Squares and Cubes page 43

**Common Core Coach**

- Lesson 4

**Coach Grade 8 (GPS Version)**

- Lesson 3

**On Core Mathematics**

- Lesson 1-4

Or related sections in your school's textbook resources

Cumulative Practice on squares, cubes, and roots

**Closing:**

- TOD: Give 5 problems to work and turn in
- GA Dept. of Education Task: Exponential Exponents located on the GA Frameworks at www.georgiastandards.org

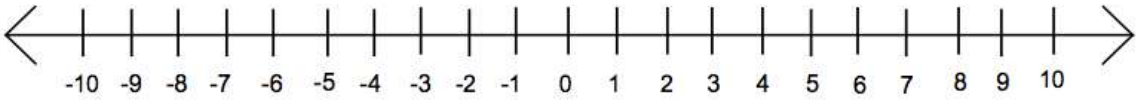
**Corresponding Task**

- **GA Dept. of Education Task: Nesting Dolls located on the GA Frameworks at www.georgiastandards.org**

**Highlight the Mathematical Practices that this lesson incorporates:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Make sense of problems and persevere in solving them | Reason abstractly and quantitatively | Construct viable arguments and critique the reasoning of others | Model with mathematics | Use appropriate tools strategically | Attend to precision | Look for and make sure of structure | Look for and express regularity in repeated reasoning |

# Think About This:




Without using your calculator, order the following numbers from least to greatest:

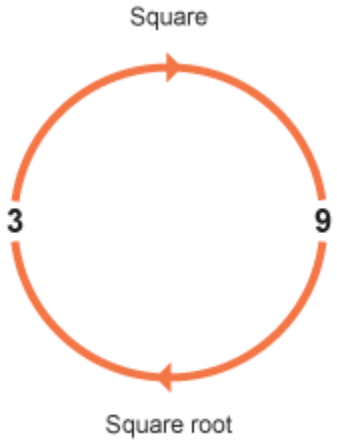
$$-\left(\tfrac{1}{2}\pi\right),\quad \sqrt[3]{30},\quad \sqrt{17},\quad -2\sqrt{2}$$

Explain your answer.

Adapted from Illustrative Mathematics – 8.EE.2 & 8.NS.2 Irrational Numbers on the Number Line

## Square root

The opposite of squaring a number is called finding the **square root**.




**Example**

The square root of 16 is 4 (because $4^2 = 4 \times 4 = 16$)

The square root of 25 is 5 (because $5^2 = 5 \times 5 = 25$)

The square root of 100 is 10 (because $10^2 = 10 \times 10 = 100$)

What is the square root of 4?

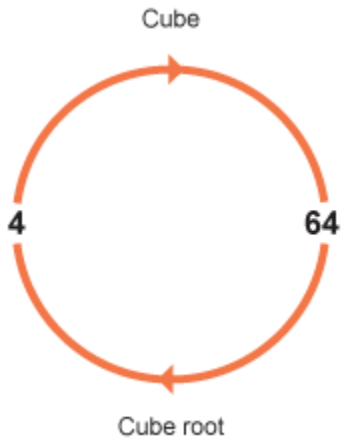
$2 \times 2 = 4$, so 2 is the square root of 4.

The symbol '√ ' means square root, so
√ 36 means 'the square root of 36', and
√ 81 means 'the square root of 81'

You will also find a square root key on your calculator.

## Cube root

The opposite of cubing a number is called finding the cube root.




**Example**

The cube root of 27 is 3 (because 3 × 3 × 3 = 27)

The cube root of 1000 is 10 (because 10 × 10 × 10 = 1000)

What is the cube root of 8?

2 × 2 × 2 = 8, so 2 is the cube root of 8.

Name:_____ Date:_____

The **square** of a number is the number times itself.

$5^2 = 5 \times 5 = 25$

The **cube** of a number is the number multiplied twice by itself.

$5^3 = 5 \times 5 \times 5 = 125$


Write the **square** or **cube** of each number.

| | | | |
|---|---|---|---|
| A. $4^2 =$ | $4 \times 4 = 16$ | $9^2 =$ | $3^3 =$ |
| B. $6^3 =$ | | $7^2 =$ | $15^3 =$ |
| C. $10^3 =$ | | $5^3 =$ | $14^2 =$ |
| D. $20^2 =$ | | $24^3 =$ | $19^3 =$ |
| E. $8^3 =$ | | $13^2 =$ | $48^2 =$ |
| F. $17^2 =$ | | $25^3 =$ | $37^2 =$ |

Write the **square** root.

| | | | | | |
|---|---|---|---|---|---|
| G. 36 = $6^2$ | 64 = | 81 = | 25 = | 324 = | 529 = |
| H. 100 = | 49 = | 4 = | 16 = | 121 = | 1,600 = |
| I. 400 = | 225 = | 625 = | 144 = | 900 = | 2,500 = |

Write the **cube** root.

| | | | | | |
|---|---|---|---|---|---|
| J. 125 = $5^3$ | 1,000 = | 64 = | 27 = | 8 = | 216 = |
| K. 512 = | 1,728 = | 2,744 = | 343 = | 8,000 = | 6,859 = |

**Simplify the following:**

1. $\sqrt{49}$
2. $\sqrt[3]{27}$
3. $\sqrt{81}$
4. $\sqrt[3]{8}$
5. $\sqrt{25}$
6. $\sqrt{121}$
7. $\sqrt[3]{64}$
8. $\sqrt{16}$
9. $\sqrt{169}$
10. $\sqrt[3]{125}$
11. $\sqrt{36}$
12. $\sqrt{64}$
13. $\sqrt{100}$
14. $\sqrt{144}$
15. $\sqrt[3]{216}$
16. $\sqrt[3]{343}$
17. $\sqrt[3]{1000}$
18. $\sqrt[3]{512}$