Objective: Cube and Cube Roots

Definitions
1. cube - ______________________________
   _______________________________________________________________________

2. cube root - ______________________________
   _______________________________________________________________________

VIC #1
The opposite of cube root is ________________.

\[ 5^3 = \square \quad \rightarrow \quad \sqrt[3]{125} = \square \]

The opposite of cube is ________________.

\[ \sqrt[3]{27} = \square \quad \rightarrow \quad 3^3 = \square \]

Perfect Cubes (Why are they called perfect cubes?)

\[
\begin{align*}
1^3 &= \square \\
2^3 &= \square \\
3^3 &= \square \\
4^3 &= \square \\
5^3 &= \square \\
6^3 &= \square \\
7^3 &= \square \\
8^3 &= \square \\
9^3 &= \square \\
10^3 &= \square \\
\end{align*}
\]

Examples

1. \( \sqrt[3]{8} = \square \)
2. \( \sqrt[3]{64} = \square \)
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VIC #2
What about negative numbers? What is the $\sqrt[3]{-27}$?

Can you find the cube root of a negative number? Why or why not?

VIC #3
You can also find the cube root of fractions and decimals.

Examples:

1. $\sqrt[3]{\frac{1}{8}} = \text{___________}$
2. $\sqrt[3]{0.125} = \text{___________}$

3. $\sqrt[3]{\frac{8}{27}} = \text{___________}$
4. $\sqrt[3]{0.008} = \text{___________}$

VIC #4
Sometimes, cube roots are not whole numbers. In those situations, you will need to decide what two integers each cube root falls between and then estimate the value.

Examples:

1. $\sqrt[3]{44}$
   - What two integers does $\sqrt[3]{44}$ fall between?
   - What is the approximate value of $\sqrt[3]{44}$?

2. $\sqrt[3]{115}$
   - What two integers does the $\sqrt[3]{115}$ fall between?
   - What is the approximate value of the $\sqrt[3]{115}$?
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Practice:
Find the cube root of each number. Round to the tenths place if necessary.

1. $\sqrt[3]{125} = \underline{5}$

2. $\sqrt[3]{250} = \underline{6.5}$

3. $\sqrt[3]{-64} = \underline{-4}$

4. $\sqrt[3]{0.512} = \underline{0.8}$

5. $\sqrt[3]{\frac{27}{216}} = \underline{0.5}$

6. $\sqrt[3]{-\frac{1}{8}} = \underline{-0.5}$

Tell what two integers each cube root falls between.

7. $\sqrt[3]{90} = \underline{4-5}$

8. $\sqrt[3]{500} = \underline{7-8}$

Solve
9. A cube has a volume of 125 ft$^3$. What is the length of one side of the cube?

10. Mr. Smith calculated the volume of two cubes.
    - Cube J had a volume of 343 cm$^3$.
    - Cube K had a volume of 27 cm$^3$.

    What is the difference in the measures of the side lengths of cube J and cube K?

11. Linda makes an ice cube having a volume of $\frac{8}{64}$ cubic inch. What is the side length of the ice cube?

12. A square has an area of 64 square units. A cube has a volume of 64 cubic units. What is the difference in the side length of the square and the length of one edge of the cube?