## Math 8
Lesson S4: Cube Roots of Perfect Cubes

A **perfect cube** is a number created by cubing a whole number (or multiplying a whole number by itself three times). They are also known as cube numbers. Perfect cubes are related to the **volume** of a cube (length x width x height).

Examples of perfect cubes:

We can use different ways to show that a number is a perfect cube.
- Diagram: 27 is a perfect cube because we can draw a cube with a volume of 27 cube units.

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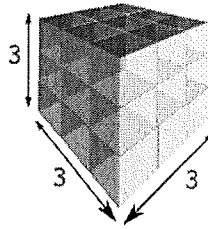
- Symbols: $27 = 3 \times 3 \times 3 = 3^3$
- Words: "three cubed is 27"

  3   3

A **cube root** is the number that is multiplied by itself three times to create a perfect cube. It is written with a **radical**: $\sqrt[3]{}$.

Finding the **cube root** of a number is the **inverse** (opposite) of **cubing** a number; they undo each other.

It can also be said that the **cube root** is the **side length** of a cube and a **cube number** is the **volume** of a cube.

So, $4^3 = 3 \times 3 \times 3 = 27$ → 27 _is the cube_ of 3

and $\sqrt[3]{27} = 3$ because $27 \div 3 \div 3 = 3$ → 3 _is the cube root_ of 27.

Example: Find the **cube** of 8.

Example: Find the **cube root** of 8.

Perfect   Cubes Operations

Developing

Write the cube for each number.

1) $1^3 =$ _____   2) $4^3 =$ _____   3) $7^3 =$ _____

4) $6^3 =$ _____   5) $2^3 =$ _____   6) $10^3 =$ _____

Write the cube for each number.

7) $3^3 =$ _____   8) $9^3 =$ _____   9) $10^3 =$ _____

10) $6^3 =$ _____   11) $2^3 =$ _____   12) $5^3 =$ _____

Write the cube for each number.

13) $1^3 =$ _____   14) $9^3 =$ _____   15) $2^3 =$ _____

16) $8^3 =$ _____   17) $3^3 =$ _____   18) $5^3 =$ _____

Perfect   Cubes Operations

Developing

Write the cube root for each number.

1) $\sqrt[3]{1}$ = _____

2) $\sqrt[3]{125}$ = _____

3) $\sqrt[3]{64}$ = _____

4) $\sqrt[3]{729}$ = _____

5) $\sqrt[3]{27}$ = _____

6) $\sqrt[3]{343}$ = _____

Write the cube root for each number.

7) $\sqrt[3]{343}$ = _____

8) $\sqrt[3]{1}$ = _____

9) $\sqrt[3]{512}$ = _____

10) $\sqrt[3]{729}$ = _____

11) $\sqrt[3]{216}$ = _____

12) $\sqrt[3]{125}$ = _____

Write the cube root for each number.

13) $\sqrt[3]{1000}$ = _____

14) $\sqrt[3]{512}$ = _____

15) $\sqrt[3]{125}$ = _____

16) $\sqrt[3]{64}$ = _____

17) $\sqrt[3]{8}$ = _____

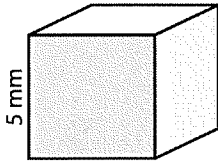18) $\sqrt[3]{729}$ = _____

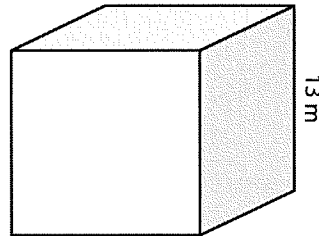Math-Aids.Com

Volume - Cube

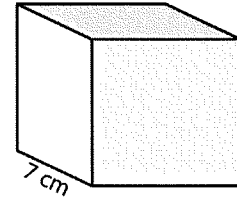### A) Find the volume of each cube.

1)

5 mm

Volume = _____

2)

13 m

Volume = _____

3)

7 cm

Volume = _____

B) Find the volume of each cube from the given side length.

4) side length = 8 cm

Volume = _____

5) side length = 20 mm

Volume = _____

6) side length = 11 mm

Volume = _____

7) side length = 3 m

Volume = _____

8) The length of each side of a cubical wooden block is 15 cm. What is the volume of the block?

_____

Cubes and Cube Roots (A)

Instructions: Find the cube root or cube of each integer.

$\sqrt[3]{1728}$ = $\sqrt[3]{343}$ = $\sqrt[3]{1}$ = $\sqrt[3]{2197}$ =

$\sqrt[3]{64}$ = $\sqrt[3]{1000}$ = $\sqrt[3]{729}$ = $\sqrt[3]{125}$ =

$\sqrt[3]{512}$ = $\sqrt[3]{2744}$ = $\sqrt[3]{1331}$ = $\sqrt[3]{4096}$ =

$\sqrt[3]{8}$ = $\sqrt[3]{3375}$ = $\sqrt[3]{216}$ = $\sqrt[3]{27}$ =

9^3 = 15^3 = 12^3 = 3^3 =

1^3 = 14^3 = 8^3 = 5^3 =

13^3 = 6^3 = 2^3 = 4^3 =

11^3 = 10^3 = 7^3 = 16^3 =

Proficient

Volume - Cube
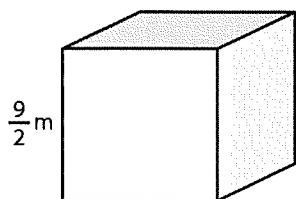
A) Find the volume of each cube.

1)

$\frac{9}{2}$ m
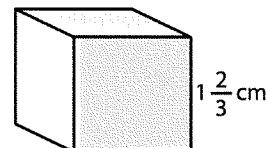
Volume = _____

2)

$\frac{2}{9}$ mm

Volume = _____

3)

$1\frac{2}{3}$ cm
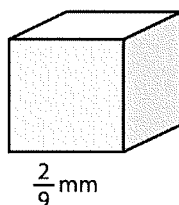
Volume = _____

B) Find the volume of each cube from the given side length.

4) side length = $1\frac{1}{4}$ m

Volume = _____

5) side length = $\frac{3}{5}$ mm

Volume = _____

6) side length = $\frac{7}{6}$ cm

Volume = _____

7) side length = $\frac{5}{8}$ m

Volume = _____

8) How much space does a $\frac{1}{4}$-m cubical gift box have?

_____