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7.5: Cube Roots

LT 7.5 I can find the cube root of a number

The volume of a cube is the length of an *edge* multiplied by itself three times. Multiplying two edges of the base of a cube gives the area of the base. The area of the base times an edge (length x length x length) that is the height gives the volume. The volume can be expressed by the formula *V* = *e · e · e*, or *V* = *e*3.

If you know the volume of a cube, you can work backward to find the length of an edge. For example, suppose a cube has a volume of 8 cubic units. To find the length of an edge, you need to figure out what number multiplied by itself three times equals 8. Because 2 · 2 · 2 = 8, the edge length is 2 units. The number 2 is called the **cube root** of 8.

This cube has a volume of 8 cubic units. The length of each edge is the cube root of 8 units, which is equal to 2 units.

In general, if *V* = *e*3, then *e* is the cube root of *V*. Because 2 · 2 · 2 = 8, 2 is the cube root of 8. Because -2 · (-2) · (-2) = 8, -2 is the cube root of -8.

You can use the symbol, $\sqrt[3]{}$, to indicate cube root. For any number *N*, $\sqrt[3]{N}$ indicates the cube root of *N*. For example, $\sqrt[3]{8}$ = 2 and $\sqrt[3]{-8}$ = -2.

* How is finding the cube roots the same or different from finding square roots?
1. In this problem, use your calculator only when instructed to do so.
2. Find the edge lengths of cubes with volumes 1, 27, 64, and 125 cubic units.
3. Find the values of $\sqrt[3]{1}$, $\sqrt[3]{27}$, $\sqrt[3]{64}$, and $\sqrt[3]{125}$.
4. What is the volume of a cube with an edge length of 5 units? What is the volume of a cube with an edge length of 2.5 units?
5. Find the missing numbers.
6. $\sqrt[3]{ }$ = 5
7. $\sqrt[3]{ }$ = 2.5
8. Find *x*.
9. *x*3 = 27
10. *x*3 = -27
11. *x*3 = $\frac{1}{8}$
12. $\sqrt[3]{x}$ = 27
13. $\sqrt[3]{x}$ = -27
14. $\sqrt[3]{x}$ = $\frac{1}{8}$
15. Label above what each positive value of *x* might represent in terms of volume and length.
16. Think about what you’ve learned so far about cube roots for the following questions.
17. Between which two consecutive whole numbers does $\sqrt[3]{10}$ lie? Explain.
18. Which whole number from Part (1) above is closer to $\sqrt[3]{10}$? Explain.
19. Without using your calculator, estimate the value of $\sqrt[3]{10}$ to one decimal place.
20. Circle which is greater:
21. $\sqrt{8}$ or $\sqrt[3]{8}$
22. $\sqrt{N}$ or $\sqrt[3]{N}$