



## Connect and Reflect

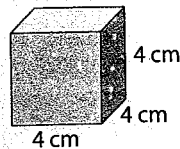
### Key Ideas

You can determine the cube of a number by modelling with cubes or using a formula.

$$\begin{aligned}V &= s^3 \\ &= 4^3 \\ &= 64 \text{ cm}^3\end{aligned}$$

You can determine the cube root of a number by modelling with cubes or using a formula.

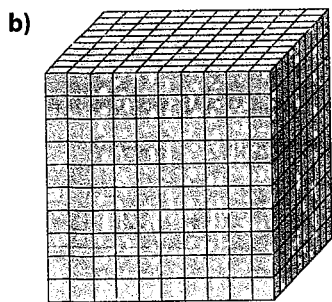
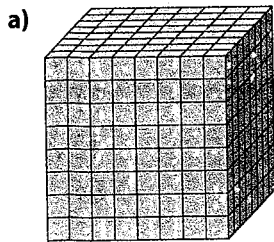
$$\begin{aligned}s &= \sqrt[3]{V} \\ &= \sqrt[3]{64} \\ &= 4\end{aligned}$$



### Practise

For help with #1 to #6, refer to Example 1 on page 73.

1. Sketch or build a model to determine  $6^3$ .
2. Use the models to determine the side length and volume of each cube.



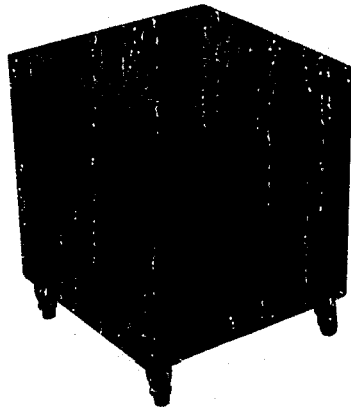
3. Describe how to model finding the cube of 7.
4. Sketch or build a model to determine the cube root of 64.
5. Explain how you can use cubes to determine the cube root of a perfect cube. Use drawings or linking cubes to help you.
6. a) What is the cube root of 729?  
b) Describe how to construct a cube that could be used to determine the cube root of 729.

For help with #7 and #8, refer to Example 2 on page 74.

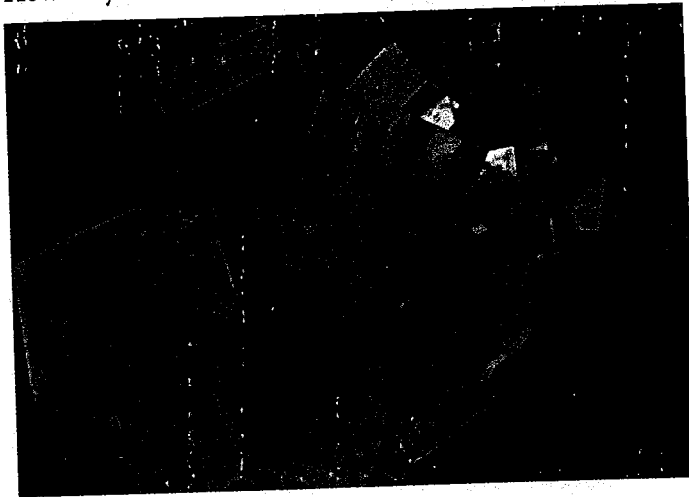
7. What is  $7^3$ ? Describe the strategy you used and explain why you used that approach.
8. a) Use three strategies to determine  $\sqrt[3]{2197}$ .  
b) Which strategy do you prefer to use? Why?

**Apply**

9. If each edge of this storage cube is 50 cm, what is the volume of the cube?  
Explain your thinking.



10. If a salt crystal has a volume of  $1 \text{ mm}^3$ , what is the length of each edge?  
How do you know?

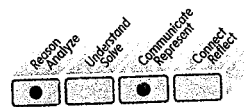


11. **Competency Check** Place the following in numerical order from least to greatest. Explain your strategy.

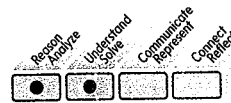
- A the cube root of 27
- B 2 cubed
- C  $\sqrt[3]{1000}$
- D  $\sqrt[3]{729}$
- E  $11^3$
- F  $1^3$

12. What is the difference between a squared number and a cubed number?

13. The volume of a cube is  $27 \text{ cm}^3$ . What is the area of the square base?



14. Without using a calculator, prove whether 1728 is a perfect cube.
15. Is it true that cubes of odd numbers are always odd? Explain your reasoning.
16. Roman is buying a crate of oranges so he can make fresh-squeezed orange juice for breakfast. The crate does not say how many oranges are inside. He can see that it is a cube and that there are 8 layers of oranges. How many oranges are in the crate?



### Extend

17. If a cube has a surface area of  $1350 \text{ cm}^2$ , what is its volume?
18. A cube has a side length of  $\frac{3}{4}$ . What is its volume?
19. What is the side length of a cube that can be made with  $294 \text{ cm}^2$  of cardboard? What assumptions have you made?
20. Estimate the cube root of the following.
- $\sqrt[3]{10}$
  - $\sqrt[3]{100}$
  - $\sqrt[3]{1000}$
  - $\sqrt[3]{10\,000}$
21. Estimate the cube root of the following.
- $\sqrt[3]{9}$
  - $\sqrt[3]{12}$
  - $\sqrt[3]{21}$
  - $\sqrt[3]{90}$
22. How many four-digit perfect cubes are there?
23. You have the following five digit cards. Arrange them to form a perfect cube. Is there more than one way to arrange them?

