

# Graphing Cube Root Functions

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 24

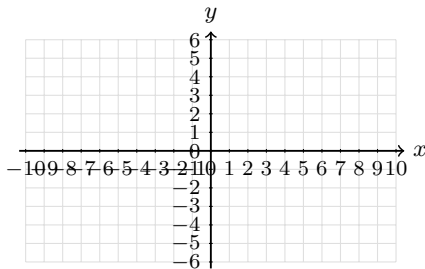
## Quick Review

A **cube root function** is built from  $f(x) = \sqrt[3]{x}$ . Unlike a square root, a cube root can use negative inputs, so the domain and range of the parent function are both all real numbers. For  $g(x) = a\sqrt[3]{x-h} + k$ , the key center point is  $(h, k)$ . Use perfect cubes such as  $-8, -1, 0, 1, 8$  to make a table. Cube-root graphs flatten near the center and keep moving left and right.

## PRACTICE

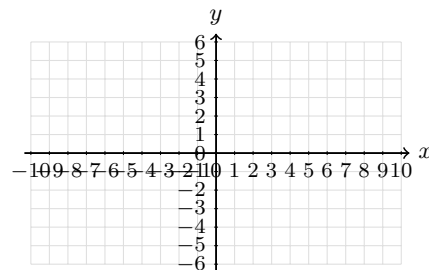
Graph each cube-root function or use the graph/table to answer.

1. Graph  $y = \sqrt[3]{x}$ . Plot the center point and the perfect-cube points.



Answer: \_\_\_\_\_

2. Graph  $y = \sqrt[3]{x-1}$ . Mark the center point clearly.



Answer: \_\_\_\_\_

3. Graph  $y = \sqrt[3]{x+2}$ . Use a table of perfect-cube steps.



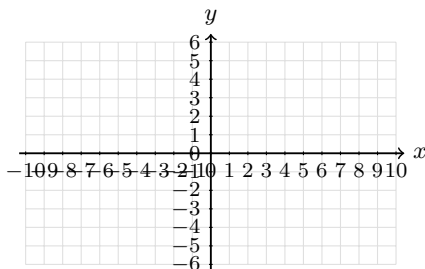
Answer: \_\_\_\_\_

4. Graph  $y = \sqrt[3]{x} + 2$ . Show the vertical shift.



Answer: \_\_\_\_\_

5. Graph  $y = -\sqrt[3]{x}$ . Make the reflected shape clear.



Answer: \_\_\_\_\_

6. Graph  $y = 2\sqrt[3]{x}$ . Use the parent graph points and stretch the outputs.



Answer: \_\_\_\_\_



7. Graph  $y = \sqrt[3]{x-2} - 1$ . Label the center point.



Answer: \_\_\_\_\_

8. Graph  $y = -\sqrt[3]{x+1} + 3$ . Show the shift and reflection.



Answer: \_\_\_\_\_

9. Complete the table for  $y = \sqrt[3]{x-2} + 1$ , then graph the points.

|     |    |   |   |   |    |
|-----|----|---|---|---|----|
| $x$ | -6 | 1 | 2 | 3 | 10 |
| $y$ |    |   |   |   |    |



Answer: \_\_\_\_\_

10. Complete the table for  $y = 3 - \sqrt[3]{x+2}$ , then graph the curve.

|     |     |    |    |    |   |
|-----|-----|----|----|----|---|
| $x$ | -10 | -3 | -2 | -1 | 6 |
| $y$ |     |    |    |    |   |



Answer: \_\_\_\_\_

11. Complete the table for  $y = 2\sqrt[3]{x} - 1$ , then graph it.

|     |    |    |   |   |   |
|-----|----|----|---|---|---|
| $x$ | -8 | -1 | 0 | 1 | 8 |
| $y$ |    |    |   |   |   |



Answer: \_\_\_\_\_

12. Complete the table for  $y = -2\sqrt[3]{x-1} + 2$ , then graph it.

|     |    |   |   |   |   |
|-----|----|---|---|---|---|
| $x$ | -7 | 0 | 1 | 2 | 9 |
| $y$ |    |   |   |   |   |



Answer: \_\_\_\_\_



Scan Me

13. Use the graph. What is the center point, and how was the parent graph shifted?



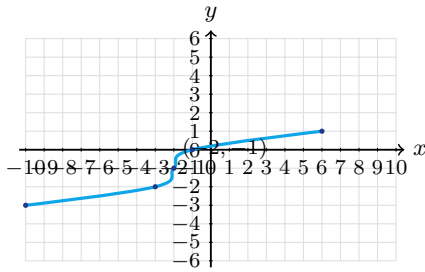
Answer: \_\_\_\_\_

14. Use the graph. Is the function increasing or decreasing? What is its center point?



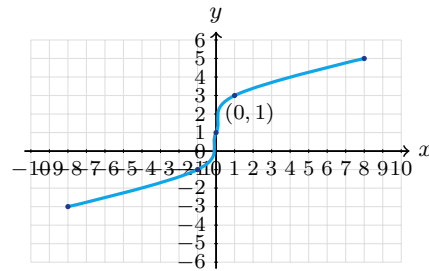
Answer: \_\_\_\_\_

15. Which equation matches the graph:  $y = \sqrt[3]{x+2} - 1$  or  $y = \sqrt[3]{x-2} - 1$ ?



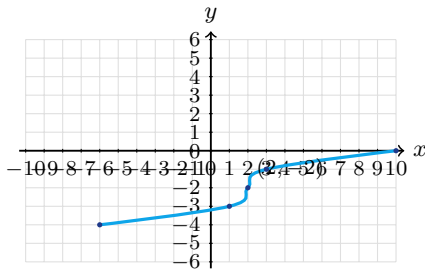
Answer: \_\_\_\_\_

16. Use the graph to find  $a$  in  $y = a\sqrt[3]{x} + 1$ .



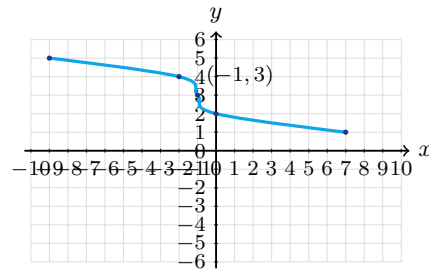
Answer: \_\_\_\_\_

17. Use the graph to write a possible equation.



Answer: \_\_\_\_\_

18. Use the graph to write a possible equation.



Answer: \_\_\_\_\_



19. A cube-root graph has center  $(-2, 1)$  and is vertically stretched by 2. Write an equation, then sketch it.



Answer: \_\_\_\_\_

20. A cube-root graph has center  $(3, -2)$  and passes through  $(4, 0)$ . Write a possible equation, then sketch it.



Answer: \_\_\_\_\_

◆ Word Problems

21. A cube has volume 216 cubic inches. Use a cube root to find the edge length.

\_\_\_\_\_

22. A storage cube has volume  $V$  cubic feet. Write a function for its side length and find the side length when  $V = 64$ .

\_\_\_\_\_

23. A model cube's volume changes from  $27 \text{ cm}^3$  to  $125 \text{ cm}^3$ . How much did the edge length change?

\_\_\_\_\_

24. The function  $r(V) = \sqrt[3]{\frac{3V}{4\pi}}$  gives the radius of a sphere from its volume. What happens to the radius when the volume becomes 8 times as large?

\_\_\_\_\_



## Answer Keys

1.  $(-8, -2), (0, 0)$   
 $(8, 2)$

2.  $(-7, -2), (1, 0)$   
 $(9, 2)$

3.  $(-10, -2), (-2, 0)$   
 $(6, 2)$

4.  $(-8, 0), (0, 2)$   
 $(8, 4)$

5.  $(-8, 2), (0, 0)$   
 $(8, -2)$

6.  $(-8, -4), (0, 0)$   
 $(8, 4)$

7.  $(-6, -3), (2, -1)$   
 $(10, 1)$

8.  $(-9, 5), (-1, 3)$   
 $(7, 1)$

9.  $(-6, -1), (2, 1)$   
 $(10, 3)$

10.  $(-10, 5), (-2, 3)$   
 $(6, 1)$

11.  $(-8, -5), (0, -1)$   
 $(8, 3)$

12.  $(-7, 6), (1, 2)$   
 $(9, -2)$

13.  $(1, 2)$ ; right 1, up 2

14. decreasing;  $(0, 1)$

15.  $y = \sqrt[3]{x+2} - 1$

16.  $a = 2$

17.  $y = \sqrt[3]{x-2} - 2$

18.  $y = -\sqrt[3]{x+1} + 3$

19.  $y = 2\sqrt[3]{x+2} + 1$

20.  $y = 2\sqrt[3]{x-3} - 2$

21. 6 in

22.  $s(V) = \sqrt[3]{V}$ ; 4 ft

23. 2 cm

24. the radius doubles

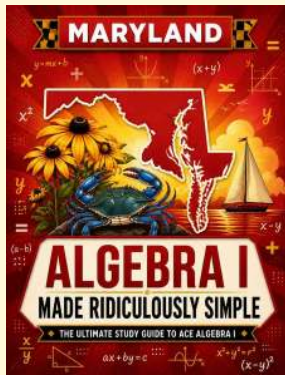
### Step-by-Step Tutor Notes

- Use inputs  $-8, -1, 0, 1, 8$  because their cube roots are  $-2, -1, 0, 1, 2$ .
- The expression  $x - 1$  shifts the parent graph right 1, so the center point is  $(1, 0)$ .
- Writing  $x + 2$  as  $x - (-2)$  shows a shift left 2, so the center is  $(-2, 0)$ .
- Work one inverse operation at a time and keep both sides balanced. Adding 2 outside the cube root moves each parent-graph point up 2 units. After simplifying, the answer is  $(-8, 0), (0, 2)$   
 $(8, 4)$ .
- The negative sign changes every output to its opposite, creating a reflection over the  $x$ -axis.
- Use the clue in the question first, then let the arithmetic finish the job. The coefficient 2 doubles every  $y$ -value from the parent cube-root graph. So the answer is  $(-8, -4), (0, 0)$   
 $(8, 4)$ .
- The center point is  $(2, -1)$ . From there, use horizontal changes  $-8, -1, 0, 1, 8$ .
- The center point is  $(-1, 3)$ . The negative sign makes the graph decrease from left to right.
- These inputs make the radicand  $-8, -1, 0, 1, 8$ , so the cube roots are easy to plot.
- Move carefully through the arithmetic; one clean operation usually unlocks the next one. The radicands are  $-8, -1, 0, 1, 8$ . Subtract each cube root from 3. After simplifying, the answer is  $(-10, 5), (-2, 3)$   
 $(6, 1)$ .
- Move carefully through the arithmetic; one clean operation usually unlocks the next one. Find the cube root first, multiply by 2, then subtract 1. After simplifying, the answer is  $(-8, -5), (0, -1)$   
 $(8, 3)$ .
- The center is  $(1, 2)$ . The coefficient  $-2$  reflects the graph and doubles the vertical changes.
- The middle point of the cube-root shape is  $(1, 2)$ , so the parent graph moved right 1 and up 2.
- The graph falls as  $x$  increases, and its center point is the labeled middle point  $(0, 1)$ .
- Focus on the main idea of the problem, then simplify carefully. The center point is  $(-2, -1)$ , so the inside must be  $x + 2$ . So the answer is  $y = \sqrt[3]{x+2} - 1$ .
- From the center  $(0, 1)$  to  $(1, 3)$ , a 1-unit cube-root output became a 2-unit rise.
- The center point is  $(2, -2)$  and the graph uses the parent scale, so shift right 2 and down 2.
- The center point is  $(-1, 3)$ , and the graph decreases, so the cube root has a negative coefficient.
- The center gives  $x + 2$  and  $+1$ . A vertical stretch by 2 puts the coefficient 2 outside.
- From the center to  $(4, 0)$ , the cube-root input changes by 1 and the output rises 2, so the coefficient is 2.
- Set up the model from the story, then calculate carefully. Volume is  $s^3 = 216$ . Taking the cube root gives  $s = 6$  inches.
- The edge length is the cube root of the volume. Since  $4^3 = 64$ , the side length is 4 ft.
- The original edge is  $\sqrt[3]{27} = 3$  cm and the new edge is  $\sqrt[3]{125} = 5$  cm, so it increased by 2 cm.
- Cube root functions turn an 8-times volume change into a 2-times radius change because  $\sqrt[3]{8} = 2$ .



Scan Me

## Want a Full Algebra 1 Textbook? Try Our Maryland MCAP Made Simple Book!



### Maryland MCAP Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook  
Plain-English explanations, guided practice, and  
review support.



Scan Me

Full Lessons Inside

Concepts  
Practice  
Mastery

**Important:** All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

#### 5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for MCAP test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

Start your practice journey!

#### 6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

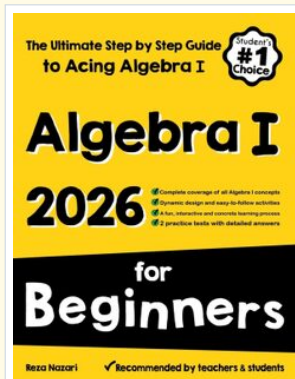
Take your practice to the next level!

#### 7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

Go all the way with comprehensive practice!

### STUDENT FAVORITE • Master Algebra I From the Ground Up



- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra  
Journey Today! →

### Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

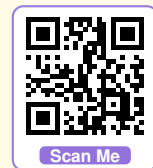
PDF EDITION



Scan Me

Instant download • any device

PAPERBACK



Scan Me

Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

[EffortlessMath.com/product/algebra-i-for-beginners](https://EffortlessMath.com/product/algebra-i-for-beginners)