

10.2 Start Thinking

Use a graphing calculator to graph $y = \sqrt[3]{x}$. Describe the shape of the graph. Compare the graph to that of $y = \sqrt{x}$.

Describe the domain and range of the function. Explain why the range differs from that of the function $y = \sqrt{x}$. Explain how you could use the graph of $y = \sqrt[3]{x}$ to find the side length of a cube when you know the volume.

10.2 Warm Up

Graph the function.

1. $g(x) = \frac{2}{3}\sqrt{x}$

2. $h(x) = \sqrt{x - 4}$

3. $p(x) = \sqrt{-\frac{1}{5}x}$

4. $m(x) = -\sqrt{x} + 5$

5. $g(x) = \sqrt{x - 2}$

6. $v(x) = \sqrt{\frac{x}{12}}$

10.2 Cumulative Review Warm Up

Tell whether the ordered pair is a solution to the system of linear inequalities.

1. $(-4, 1); y > 5$
 $y < x - 2$

2. $(1, -1); y \geq x - 8$
 $y \leq x - 4$

3. $(0, 0); y < -1$
 $y < x + 4$

4. $(5, -4); y \geq x - 1$
 $y \geq 8x + 1$

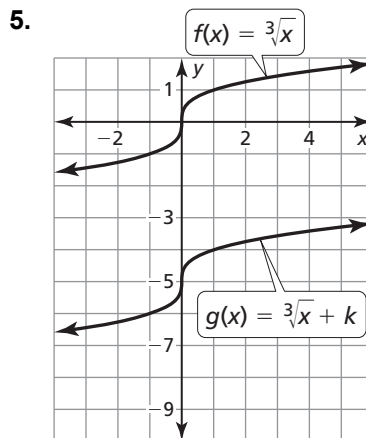
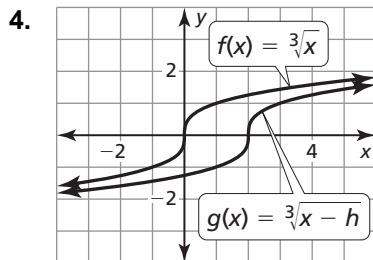
10.2

Practice A

In Exercises 1–3, graph the function. Compare the graph to the graph of $f(x) = \sqrt[3]{x}$.

1. $g(x) = \sqrt[3]{x - 3}$ 2. $g(x) = \sqrt[3]{x} + 1$ 3. $g(x) = 2\sqrt[3]{x}$

In Exercises 4 and 5, compare the graphs. Find the value of h , k , or a .

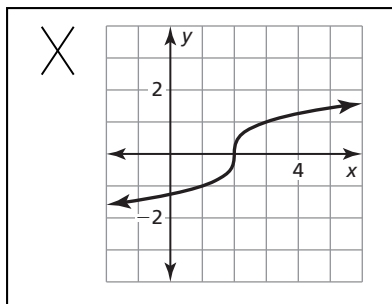


In Exercises 6–11, graph the function. Compare the graph to the graph of $f(x) = \sqrt[3]{x}$.

6. $g(x) = -\sqrt[3]{x + 1}$ 7. $g(x) = -\sqrt[3]{x} - 2$ 8. $g(x) = 4\sqrt[3]{x - 2}$
 9. $g(x) = 0.1\sqrt[3]{x + 4}$ 10. $g(x) = 2\sqrt[3]{x} + 1$ 11. $g(x) = \sqrt[3]{-x} + 3$

In Exercises 12–15, describe the transformations from the graph of $f(x) = \sqrt[3]{x}$ to the graph of the given function. Then graph the function.

12. $g(x) = \sqrt[3]{x + 2} - 3$ 13. $g(x) = \sqrt[3]{x - 3} + 1$
 14. $g(x) = -4\sqrt[3]{x - 1} - 2$ 15. $g(x) = 3\sqrt[3]{x + 6} + 2$
 16. Describe and correct the error in graphing the function $f(x) = \sqrt[3]{x} - 2$.



10.2 Practice B

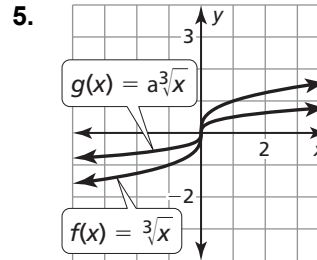
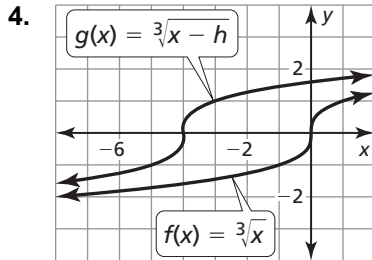
In Exercises 1–3, graph the function. Compare the graph to the graph of $f(x) = \sqrt[3]{x}$.

1. $g(x) = \sqrt[3]{x+4}$

2. $g(x) = \sqrt[3]{x} - 2$

3. $g(x) = \sqrt[3]{\frac{1}{3}x}$

In Exercises 4 and 5, compare the graphs. Find the value of h , k , or a .



In Exercises 6–11, graph the function. Compare the graph to the graph of $f(x) = \sqrt[3]{x}$.

6. $g(x) = -\sqrt[3]{x-3}$

7. $g(x) = 3\sqrt[3]{x+2}$

8. $g(x) = 2\sqrt[3]{x} - 5$

9. $g(x) = 0.2\sqrt[3]{x+1}$

10. $g(x) = \sqrt[3]{-4x} + 1$

11. $g(x) = \sqrt[3]{2(x-1)}$

In Exercises 12–15, describe the transformations from the graph of $f(x) = \sqrt[3]{x}$ to the graph of the given function. Then graph the function.

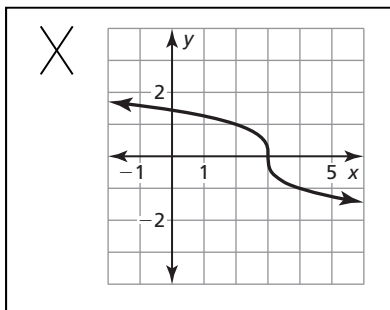
12. $g(x) = \sqrt[3]{x+4} - 2$

13. $g(x) = 5\sqrt[3]{x-2} + 3$

14. $g(x) = -\frac{1}{2}\sqrt[3]{x-3} - 2$

15. $g(x) = \frac{4}{3}\sqrt[3]{x+5} + 2$

16. Describe and correct the error in graphing the function $f(x) = -\sqrt[3]{x+3}$.

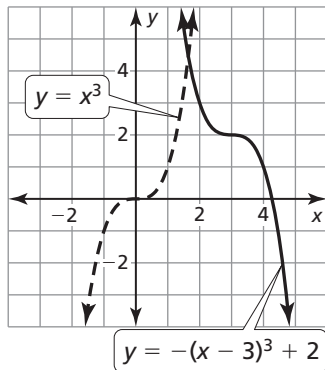


10.2 Enrichment and Extension

Graphing Cubic Functions

Example: Use transformations to graph the cubic function $y = -(x - 3)^3 + 2$.

Graph by reflecting the function $y = x^3$ in the x -axis and then shifting the graph right 3 units and up 2 units. The central point of the graph is now $(3, 2)$.



Graph the cubic function using the rules of transformations.

1. $y = -x^3$

2. $y = x^3 - 1$

3. $y = -x^3 - 5$

4. $y = \frac{1}{2}x^3 + 3$

5. $y = 2(x + 2)^3 - 3$

6. $y = 3(x - 5)^3$

7. $y = -(x - 1)^3 + 3$

8. $y = (x + 5)^3 - 4$

9. $y = \frac{(x - 2)^3}{3} + 4$

10.2 Puzzle Time

What Does A Dog Get When He Finishes Obedience School?

Write the letter of each answer in the box containing the exercise number.

Describe the transformation(s) from the graph of $f(x) = \sqrt[3]{x}$ to the graph of the given function.

1. $g(x) = \sqrt[3]{x + 5}$
2. $p(x) = \sqrt[3]{x} - 9$
3. $b(x) = \frac{1}{6}\sqrt[3]{x}$
4. $s(x) = \sqrt[3]{2x}$
5. $d(x) = \sqrt[3]{-x}$
6. $v(x) = -\sqrt[3]{x - 7}$
7. $j(x) = \sqrt[3]{-0.25x} - 6$
8. $h(x) = \frac{1}{3}\sqrt[3]{x} + 12$
9. $c(x) = -8\sqrt[3]{x} + 1$
10. $k(x) = \sqrt[3]{-\frac{1}{4}x} - 14$

Answers

- E. horizontal shrink by a factor of $\frac{1}{2}$
- A. translation 9 units down
- R. reflection in the y-axis
- E. translation 5 units left
- T. vertical shrink by a factor of $\frac{1}{6}$
- E. reflection in the x-axis; vertical stretch by a factor of 8; translation 1 unit up
- G. reflection in the y-axis; horizontal stretch by a factor of 4; translation 6 units down
- D. reflection in the y-axis; horizontal stretch by a factor of 4; translation 14 units down
- P. vertical shrink by a factor of $\frac{1}{3}$; translation 12 units up
- E. reflection in the x-axis; translation 7 units right

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