

1. Evaluate $\sqrt[3]{-123}$ using a calculator. Round the result to two decimal places if appropriate.

-4.97

Simplify each expression. Assume all variables are positive.

2. $\frac{64^{-\frac{2}{5}}}{64^{-\frac{4}{5}}} = 64^{-\frac{2}{5} - (-\frac{4}{5})}$
 $= 64^{-\frac{2}{5} + \frac{4}{5}} = 64^{\frac{2}{5}}$ ok
 $= \sqrt[5]{64^2} = \sqrt[5]{2^6 \cdot 2^6} = \sqrt[5]{2^{12}} = 2 \cdot 2^{\frac{2}{5}} \sqrt[5]{2^2}$
 $= 4\sqrt[5]{4}$ Simplified

3. $\sqrt[5]{x^{10}} = x^2$

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

5. $(x^8)^{\frac{1}{4}} = x^{8(\frac{1}{4})}$
 $= x^2$

Let $f(x) = x + 7$ and $g(x) = -4x^2$. Perform the indicated operation and simplify.

6. $f(x) + g(x)$
 $x + 7 + (-4x^2)$
 $-4x^2 + x + 7$

7. $\frac{f(x)}{g(x)}$
 $\frac{x + 7}{-4x^2}$

8. $g(x) \cdot g(x)$
 $(-4x^2)(-4x^2)$
 $16x^4$

9. $g(f(6))$
 $f(6) = 6 + 7 = 13$
 $g(13) = -4(13)^2$
 $= -4(169)$
 $= -676$

10. $g(f(x))$
 $-4(x + 7)^2$
 $-4(x^2 + 14x + 49)$
 $-4x^2 - 56x - 196$

Find the inverse of the function.

11. $f(x) = -4x^7$
 $y = -4x^7$
 $x = -4y^7$
 $\frac{x}{-4} = y^7$
 $\sqrt[7]{\frac{x}{-4}} = y$

12. $f(x) = \frac{4x+5}{3}$
 $y = \frac{4x+5}{3}$
 $x = \frac{4y+5}{3}$
 $3x = 4y + 5$
 $3x - 5 = 4y$
 $\frac{3x-5}{4} = y$

13. Verify that f and g are inverse functions.

$$f(x) = \sqrt[3]{\frac{x}{8}}, \quad g(x) = 8x^3$$

$$f(g(x)) = \sqrt[3]{\frac{8x^3}{8}} = \sqrt[3]{x^3} = x \quad \checkmark$$

$$g(f(x)) = 8\left(\sqrt[3]{\frac{x}{8}}\right)^3 = 8\left(\frac{x}{8}\right) = x \quad \checkmark$$

14. A student solved $\sqrt{x+2} + 1 = \sqrt{3-x}$

and got $x = 2$ and $x = -1$. Explain

why one solution is extraneous.

$$x = 2:$$

$$\sqrt{2+2} + 1 = \sqrt{3-2}$$

$$\sqrt{4} + 1 = \sqrt{1}$$

$$2 + 1 = 1$$

$$3 \neq 1$$

2 is extraneous

Solve the equation. Be sure to check for extraneous solutions.

15. $4 = \sqrt[3]{2x+1}$

$$(4)^3 = (\sqrt[3]{2x+1})^3$$

$$64 = 2x+1$$

$$63 = 2x$$

$$\boxed{\frac{63}{2} = x}$$

16. $(x+8)^{\frac{1}{5}} + 1 = 3$

check:

$$(x+8)^{\frac{1}{5}} = 2$$

$$(24+8)^{\frac{1}{5}} + 1 = 3$$

$$\left[(x+8)^{\frac{1}{5}}\right]^5 = [2]^5$$

$$32^{\frac{1}{5}} + 1 = 3$$

$$x+8 = 32$$

$$2+1=3$$

$$\boxed{x = 24}$$

$$3=3$$

✓

17. $(9x+7)^4 = 16$

$$\left[(9x+7)^4\right]^{\frac{1}{4}} = 16^{\frac{1}{4}}$$

$$9x+7 = \pm 2$$

$$9x+7=2$$

$$9x+7=-2$$

$$9x=-5$$

$$9x=-9$$

$$x = -\frac{5}{9}$$

$$x = -1$$

check:

$$\left(9\left(-\frac{5}{9}\right)+7\right)^4 = 16$$

$$(5+7)^4 = 16$$

$$2^4 = 16$$

$$16 = 16 \quad \checkmark$$

check

$$(9(-1)+7)^4 = 16$$

$$(-9+7)^4 = 16$$

$$(-2)^4 = 16$$

$$16 = 16 \quad \checkmark$$

19. According to Kepler's third law of planetary motion, the function $p = 0.199a^{\frac{3}{2}}$ relates a planet's orbital period p (in days) to the length a (in millions of kilometers) of the orbit's minor axis. The orbital period of Mars is about 1.88 years. What is the length of the orbit's minor axis?

$$1.88 \text{ years} \times \frac{365 \text{ days}}{\text{year}} = 686.2 \text{ days}$$

$$p = 0.199a^{\frac{3}{2}}$$

$$686.2 = 0.199a^{\frac{3}{2}}$$

$$\frac{686.2}{0.199} = \frac{0.199a^{\frac{3}{2}}}{0.199}$$

$$3448 = a^{\frac{3}{2}}$$

$$\left(3448\right)^{\frac{2}{3}} = \left(a^{\frac{3}{2}}\right)^{\frac{2}{3}}$$

$$228 = a$$

answer:

228 million km

Name KEY

Ch. 6 Practice Test - No calculator

1. Evaluate: $\sqrt[3]{-64}$

-4

2. Evaluate: $\sqrt[3]{125}$

5

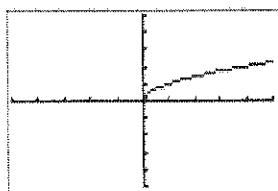
3. Evaluate: $(-27)^{\frac{2}{3}}$

$(\sqrt[3]{-27})^2 = (-3)^2 = 9$

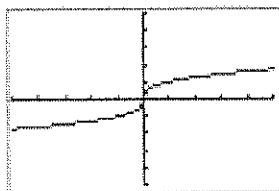
For each function, complete the following.

- Identify the basic shape. (Choose from A, B, C, or D below.)
- State whether the graph is steeper, flatter, or the same as the parent graph.
- Identify any horizontal shift. Specify left or right. If none, write "none."
- Identify any vertical shift. Specify up or down. If none, write "none."
- State the domain and range.

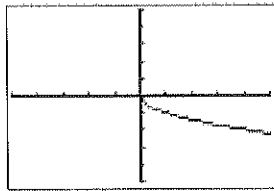
A



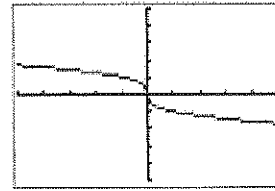
B



C



D



4. $y = \frac{3}{4}\sqrt[3]{x-7} + 1$

a. Basic shape B

b. Flatter Steeper Same
(circle one)

c. Horizontal Shift 7 right

d. Vertical Shift 1 up

e. Domain All real #'s

Range All real #'s

5. $y = -\frac{1}{2}\sqrt[3]{x}$

a. Basic shape D

b. Flatter Steeper Same
(circle one)

c. Horizontal Shift none

d. Vertical Shift none

e. Domain All real #'s

Range All real #'s

6. $y = \frac{3}{2}\sqrt{x+5} - 9$

a. Basic shape A

b. Flatter Steeper Same
(circle one)

c. Horizontal Shift 5 left

d. Vertical Shift 9 down

e. Domain $x \geq -5$

Range $y \geq -9$

7. Rewrite $8^{\frac{3}{7}}$ using radical notation.

$\sqrt[7]{8^3}$

8. Rewrite $\sqrt{15^7}$ using rational exponent notation.

$15^{\frac{7}{2}}$