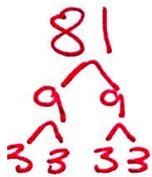


Simplify the expression without the use of a calculator. Write answers with positive exponents only.



1. $\sqrt[4]{81x^4y^7}$
 $\sqrt[4]{3 \cdot 3 \cdot 3 \cdot 3 \cdot x^4 y^7}$
 $3|x|y^4\sqrt[4]{y^3}$

2. $\sqrt[3]{-8x^3y^8z^{31}}$
 $-2xyz^{10}\sqrt[3]{y^2z}$

3. $\left(\frac{4xy^{-1}}{16xy^2}\right)^{-2}$
 $\left(\frac{16xy^2}{4xy^{-1}}\right)^2$
 $(4y^3)^2$

Simplify the following expressions. Assume variables represent positive numbers only. Rationalize the denominator if necessary.

4. $\frac{\sqrt[3]{7x} \cdot \sqrt[3]{3^2y}}{\sqrt[3]{3y^2} \cdot \sqrt[3]{3^2y}}$

$\frac{\sqrt[3]{63xy}}{\sqrt[3]{3^3y^3}}$

5. $\sqrt[3]{16x^8 \cdot 3\sqrt[3]{4x^4}}$
 $\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot x^{12}}$

$2 \cdot 2x^4$
 $4x^4$

6. $\frac{\sqrt{50x^8y^5z^2}}{\sqrt{2xyz}}$

$\sqrt{25x^7y^4z}$
 $5x^3y^2\sqrt{xz}$

7. $\frac{4(\sqrt{7}+1)}{(\sqrt{7}-1)(\sqrt{7}+1)}$

$\frac{4\sqrt{7}+4}{7-1}$

$\frac{\sqrt{7}+4}{6}$

$2 \cdot \frac{1}{3} = 2$
 $\frac{1}{6} \cdot 6 = 5$

10. $\left(\frac{1}{3^3} \cdot \frac{5}{2^6}\right)^6$
 $3^2 \cdot 2^5$
 $9 \cdot 32$

8. $\sqrt{98} + \sqrt{2}$
 $2\sqrt{49} + \sqrt{2}$

$7\sqrt{2} + \sqrt{2}$

9. $(2+\sqrt{3})(-4+3\sqrt{3})$

$-8 + 6\sqrt{3} - 4\sqrt{3} + 3(3)$
 $-8 + 2\sqrt{3} + 9$

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

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

12. $125^{-\frac{1}{3}}$

$\frac{1}{125^{1/3}}$
 $\frac{1}{\sqrt[3]{125}}$
 $\frac{1}{5}$

1. $3|x|y^4\sqrt[4]{y^3}$

2. $-2xy^2z^{10}\sqrt[3]{y^2z}$

3. $16y^6$

4. $\frac{\sqrt[3]{63xy}}{3y}$

5. $4x^4$

6. $5x^3y^2\sqrt{xz}$

7. $\frac{2\sqrt{7}+2}{3}$

8. $8\sqrt{2}$

9. $1+2\sqrt{3}$

10. 288

11. 9

12. $\frac{1}{5}$

Perform the indicated operation and state the domain. Let $f(x) = x - 1$ and $g(x) = 2x$.

13. $(f + g)(3)$
 $2 + 6 = 8$
 $f(3) = 2$
 $g(3) = 6$

14. $(f \cdot g)(x)$
 $(x-1)(2x)$
 $2x^2 - 2x$

15. $(g \circ f)(x)$
 $g(f(x))$
 $g(x-1)$
 $2(x-1)$

Find the domain restrictions, and then state the domain in set notation.

16. $f(x) = -\sqrt{2x+8} + 1$
 $2x+8 \geq 0$
 $2x \geq -8$
 $x \geq -4$

17. $f(x) = \sqrt{x+3}$
 $x+3 \geq 0$
 $x \geq -3$

18. $y = \frac{x^2 - 4}{2x - 3}$
 $2x - 3 \neq 0$
 $2x \neq 3$
 $x \neq 3/2$

Find the inverse of the function.

19. $f(x) = 2x - 4$
 $y = 2x - 4$
 $x = \frac{y+4}{2}$

20. $f(x) = x^2, x \geq 0$

$y = x^2$
 $\sqrt{x} = \sqrt{y^2}$
 $y = \sqrt{x}$

Solve the following equations. Show your work when you check for extraneous solutions.

21. $(\sqrt[3]{2x})(4)^3$
 $2x = 64$
 $x = 32$

22. $(\sqrt{3x})^2 = (\sqrt{x+6})^2$
 $3x = x + 6$
 $2x = 6$
 $x = 3$

23. $(x-3)^{3/2} - 7 = 9$
 $(x-3)^{3/2} = 16$

$(x-3)^{2/3} = [16]^{3/2}$

$x-3 = \pm 16^{3/2}$

$x-3 = \pm (\sqrt{16})^3$

$x-3 = \pm 4^3$

$x-3 = \pm 64$ $x = 3 \pm 64$

13. 8

14. $2x^2 - 2x$

15. $2x - 2$

16. Domain: $[-4, \infty)$

17. Domain: $[-3, \infty)$

18. Domain: $(-\infty, 3/2)$
 $\cup (3/2, \infty)$

19. $f^{-1}(x) = \underline{\frac{1}{2}x + 2}$

20. $f^{-1}(x) = \underline{\sqrt{x}}$

21. $x = 32$

22. $x = 3$

23. $x = 67, -61$