

## R.6 EXERCISES

Evaluate each expression. Write all answers without exponents.

1.  $8^{-2}$

2.  $3^{-4}$

3.  $5^0$

4.  $(-12)^0$

5.  $-(-3)^{-2}$

6.  $-(-3^{-2})$

7.  $\left(\frac{2}{7}\right)^{-2}$

8.  $\left(\frac{4}{3}\right)^{-3}$

Simplify each expression. Assume that all variables represent positive real numbers.

Write answers with only positive exponents.

9.  $\frac{3^{-4}}{3^2}$

10.  $\frac{8^9 \cdot 8^{-7}}{8^{-3}}$

11.  $\frac{10^8 \cdot 10^{-10}}{10^4 \cdot 10^2}$

12.  $\left(\frac{5^{-6} \cdot 5^3}{5^{-2}}\right)^{-1}$

13.  $\frac{x^4 \cdot x^3}{x^5}$

14.  $\frac{y^9 \cdot y^7}{y^{13}}$

15.  $\frac{(4k^{-1})^2}{2k^{-5}}$

16.  $\frac{(3z^2)^{-1}}{z^5}$

17.  $\frac{2^{-1}x^3y^{-3}}{xy^{-2}}$

18.  $\frac{5^{-2}m^2y^{-2}}{5^2m^{-1}y^{-2}}$

19.  $\left(\frac{a^{-1}}{b^2}\right)^{-3}$

20.  $\left(\frac{2c^2}{d^3}\right)^{-2}$

21.  $\left(\frac{x^6y^{-3}}{x^{-2}y^5}\right)^{1/2}$

22.  $\left(\frac{a^{-7}b^{-1}}{b^{-4}a^2}\right)^{1/3}$

Simplify each expression, writing the answer as a single term without negative exponents.

23.  $a^{-1} + b^{-1}$

24.  $b^{-2} - a$

25.  $\frac{2n^{-1} - 2m^{-1}}{m + n^2}$

26.  $\left(\frac{m}{3}\right)^{-1} + \left(\frac{n}{2}\right)^{-2}$

27.  $(x^{-1} - y^{-1})^{-1}$

28.  $(x^{-2} + y^{-2})^{-2}$

Write each number without exponents.

29.  $81^{1/2}$

30.  $27^{1/3}$

31.  $32^{2/5}$

32.  $-125^{2/3}$

33.  $\left(\frac{4}{9}\right)^{1/2}$

34.  $\left(\frac{64}{27}\right)^{1/3}$

35.  $16^{-5/4}$

36.  $625^{-1/4}$

37.  $\left(\frac{27}{64}\right)^{-1/3}$

38.  $\left(\frac{121}{100}\right)^{-3/2}$

Simplify each expression. Write all answers with only positive exponents. Assume that all variables represent positive real numbers.

39.  $2^{1/2} \cdot 2^{3/2}$

40.  $27^{2/3} \cdot 27^{-1/3}$

41.  $\frac{4^{2/3} \cdot 4^{5/3}}{4^{1/3}}$

42.  $\frac{3^{-5/2} \cdot 3^{3/2}}{3^{7/2} \cdot 3^{-9/2}}$

43.  $\frac{7^{-1/3} \cdot 7r^{-3}}{7^{2/3} \cdot (r^{-2})^2}$

44.  $\frac{12^{3/4} \cdot 12^{5/4} \cdot y^{-2}}{12^{-1} \cdot (y^{-3})^{-2}}$

45.  $\frac{6k^{-4} \cdot (3k^{-1})^{-2}}{2^3 \cdot k^{1/2}}$

46.  $\frac{8p^{-3} \cdot (4p^2)^{-2}}{p^{-5}}$

47.  $\frac{a^{4/3} \cdot b^{1/2}}{a^{2/3} \cdot b^{-3/2}}$

48.  $\frac{x^{1/3} \cdot y^{2/3} \cdot z^{1/4}}{x^{5/3} \cdot y^{-1/3} \cdot z^{3/4}}$

49.  $\frac{k^{-3/5} \cdot h^{-1/3} \cdot t^{2/5}}{k^{-1/5} \cdot h^{-2/3} \cdot t^{1/5}}$

50.  $\frac{m^{7/3} \cdot n^{-2/5} \cdot p^{3/8}}{m^{-2/3} \cdot n^{3/5} \cdot p^{-5/8}}$

Factor each expression.

51.  $12x^2(x^2 + 2)^2 - 4x(4x^3 + 1)(x^2 + 2)$

52.  $6x(x^3 + 7)^2 - 6x^2(3x^2 + 5)(x^3 + 7)$

53.  $(x^2 + 2)(x^2 - 1)^{-1/2}(x) + (x^2 - 1)^{1/2}(2x)$

54.  $9(6x + 2)^{1/2} + 3(9x - 1)(6x + 2)^{-1/2}$

55.  $x(2x + 5)^2(x^2 - 4)^{-1/2} + 2(x^2 - 4)^{1/2}(2x + 5)$

56.  $(4x^2 + 1)^2(2x - 1)^{-1/2} + 16x(4x^2 + 1)(2x - 1)^{1/2}$