Exercises [A-2]

1. When $x = \frac{1}{4}$, evaluate (a) $2x^{-1}$; (b) $(2x)^{-1}$; (c) $(2x^{\frac{1}{2}})^{-4}$.
2. Evaluate: (a) 2^{-3}; (b) $100^{\frac{1}{2}}$; (c) $16^{-\frac{3}{4}}$; (d) $(\frac{1}{4})^{-\frac{1}{2}}$.
3. Evaluate: (a) $3^0 \div 3^{-2}$; (b) $2^{-3} \div 2$; (c) $10^{\frac{3}{4}} \div 10^{\frac{3}{4}}$.
4. Simplify: (a) $(16p^4q^2)^{\frac{1}{2}}$; (b) $(27a^3b^{-6})^{\frac{1}{3}}$; (c) $\left(\frac{a^4}{4b^2}\right)^{-\frac{3}{2}}$.
5. Evaluate $(x^{\frac{1}{2}} + y^{\frac{1}{2}})^2$ when $x = 9$ and $y = 4$.
6. Using the values $x = 4$, $y = 3$, show that $(x^2 + y^2)^{-\frac{1}{2}}$ is not equal to $x^{-1} + y^{-1}$.
7. When $x = \frac{4}{9}$, evaluate (a) $9x^{\frac{1}{2}}$; (b) $(9x)^{-\frac{1}{2}}$; (c) $4x^{-\frac{3}{2}}$.
8. Simplify: (a) $(2a^{-\frac{3}{4}})^4$; (b) $(4x^{-6})^{\frac{1}{2}}$; (c) $(8x^{-\frac{3}{4}})^{-\frac{2}{3}}$.
9. Evaluate $(x^{\frac{1}{3}} - y^{\frac{1}{3}})^3$ when $x = 27$ and $y = 8$.
10. Simplify: (a) $(4x)^{\frac{1}{2}} \cdot (9x)^{-\frac{1}{2}}$; (b) $(4x^4)^{\frac{3}{2}} \div (4x^{-4})^{-\frac{1}{2}}$.
11. Evaluate: $(\frac{2}{5})^{-2} - (\frac{8}{27})^{-\frac{2}{3}}$.
12. Find the value of x for which $2x^{\frac{1}{2}} = \frac{1}{2}$.
13. Find the value of x for which $3x^{-3} = -24$.
14. If $2x^{-1} = 8$, find the value of $3x^{-\frac{1}{2}}$.
15. Solve: (a) $4x^{-\frac{2}{3}} = 16$; (b) $(3x)^{\frac{3}{4}} = 8$.
16. Simplify: $(-\frac{1}{8}a^{-6}b^{12})^{-\frac{1}{3}}$.
17. Simplify: $(3x^{-\frac{1}{2}})^2 \cdot (2x^{-\frac{3}{3}})^{-3}$.
18. Evaluate $[(2x)^{-1} + x^{\frac{1}{2}}]^{-1}$ when $x = \frac{1}{4}$.

Simplify:

19. (a) $\dfrac{x^{-1}}{2x^{-2}}$; (b) $\dfrac{4 - x^{-2}}{2 - x^{-1}}$.

20. (a) $\dfrac{x^{\frac{1}{2}} \cdot x^{\frac{1}{6}}}{x^{-\frac{1}{3}}}$; (b) $\dfrac{x^{\frac{3}{2}} - x^{-\frac{3}{2}}}{x^{-\frac{3}{2}}}$.

21. Show that $(x + y)^{-1} \cdot \left(\dfrac{x^{-1} + y^{-1}}{x^{-1}}\right)$ may be reduced to y^{-1}.
22. Express in simplest radical form: $(12\frac{1}{2})^{\frac{1}{2}} - (4\frac{1}{2})^{\frac{1}{2}}$.
23. From the four numbers $16^{-\frac{1}{4}}$, $3^{\frac{1}{2}}$, $8^{-\frac{2}{3}}$, $(-1)^{-3}$ select (a) one that is negative; (b) one that is irrational; (c) one that is the square of one of the others.
24. If $y = x^2$, and $x^3t = 8$, show that $y = 4t^{-\frac{2}{3}}$. Find the value of y in simplest radical form when $t = 2$.
25. If $x^{\frac{1}{2}} + y^{\frac{1}{2}} = 4(x^{\frac{1}{2}} - y^{\frac{1}{2}})$, find the ratio of x to y.
26. Show that $(a^{\frac{1}{2}}b^{-2}c^{\frac{1}{4}})^{-2} \cdot (\frac{1}{2}a^{-1}b^2c^{\frac{1}{2}})^{-3}$ may be simplified to
$$\frac{8a^2}{b^2c^2}.$$
27. Evaluate $\dfrac{a^{-2} - a^{-1}}{2a^{-2}}$ when $a = \frac{3}{4}$.
28. In evaluating $3^{\frac{1}{2}} + 3^{\frac{1}{2}} + 3^{\frac{1}{2}}$, a student treated the expression as though it were $3^{\frac{1}{2}} \cdot 3^{\frac{1}{2}} \cdot 3^{\frac{1}{2}}$, and so obtained the result $3^{\frac{3}{2}}$. (a) Is the procedure valid? (b) Is the result correct?
29. Evaluate: (a) $\dfrac{2^{-1}}{2^{-1}} - \dfrac{2^{-1}}{3^{-1}}$; (b) $\dfrac{2^{-1}}{2^{-1} - 3^{-1}}$.
30. Show that $\dfrac{a^2 - a^{-2}}{(a^{\frac{1}{2}} + a^{-\frac{1}{2}})(a^{\frac{1}{2}} - a^{-\frac{1}{2}})}$ may be simplified to the form $a + \dfrac{1}{a}$.

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1. a. 8
   b. 2
   c. 1
2. a. $\frac{1}{8}$
   b. 10
   c. $\frac{1}{8}$
   d. 2
3. a. 9
   b. $\frac{1}{16}$
   c. 1
4. a. $4p^2q$
   b. $\frac{3a}{b^2}$
   c. $\frac{8b^3}{a^6}$
5. 25
7. a. 6
   b. $\frac{1}{2}$
   c. $\frac{27}{2}$
8. a. $\frac{16}{a^3}$
   b. $\frac{2}{x^{\frac{3}{2}}}$
   c. $\frac{x^{\frac{1}{2}}}{4}$
9. 1
10. a. $\frac{2}{3}$
    b. $16x^4$
11. 4
12. $x = \frac{1}{16}$
13. $x = -\frac{1}{2}$
14. 6
15. a. $x = \pm\frac{1}{8}$
    b. $x = 5\frac{1}{3}$
16. $-\frac{2a^2}{b^4}$
17. $\frac{9x}{8}$
18. $\frac{2}{5}$
19. a. $\frac{x}{2}$
    b. $\frac{2x + 1}{x}$
20. a. x
    b. $x^3 - 1$
22. $\sqrt{2}$
23. a. $(-1)^{-3}$
    b. $3^{\frac{1}{2}}$
    c. $8^{-\frac{2}{3}}$
24. $y = 2\sqrt[3]{2}$
25. $\frac{25}{9}$
27. $\frac{1}{8}$
28. a. No. b. Yes
29. a. $-\frac{1}{2}$. b. 3