

1. Simplify. Use absolute value symbols as needed.

a) $\sqrt[4]{162a^6b^{13}c^{19}}$ b) $\sqrt[3]{-24m^{14}n^{23}}$ c) $\sqrt{72w^5x^{11}}$

2. Simplify each. Assume that all variables are positive numbers.

a) $5\sqrt{180} + 3\sqrt{96} - 2\sqrt{20} + \sqrt{54}$ b) $\sqrt{6e^4g^3} \cdot \sqrt{12eg^9}$ c) $\frac{\sqrt[3]{250c^7r^{10}}}{\sqrt[3]{2c^2r}}$

d) $(3 - 2\sqrt{6})(4 + \sqrt{6})$ e) $(5 + \sqrt{11})(5 - \sqrt{11})$ f) $\sqrt[3]{12a^4b^7} \cdot \sqrt[3]{10a^3b^4}$

g) $\sqrt{21g^6h^7} \cdot \sqrt{35g^5h^8}$ h) $\frac{\sqrt{24j^7k^6}}{\sqrt{16j^4k^{12}}}$

3. Rationalize each denominator and simplify. Assume all variables are positive numbers.

a) $\frac{2}{\sqrt{6x^7}}$ b) $\frac{11a^5}{\sqrt[3]{7a^8b^4}}$ c) $\frac{8}{\sqrt[5]{2k^3mn^7}}$ d) $\frac{4}{7 + \sqrt{10}}$ e) $\frac{10PQ^4}{\sqrt[4]{4P^6Q^{13}}}$

4. Rewrite in radical form. a) $7a^{\frac{2}{5}}$ b) $(8b)^{\frac{1}{3}}$

5. Rewrite in exponential form. a) $\sqrt[7]{h^4}$ b) $\sqrt{5c}$

6. Simplify each. Assume that all variables are positive numbers. No decimals. Give fractional answers in reduced form.

a) $(7k^{\frac{5}{6}})^3$ b) $(4r^6)^{\frac{3}{2}}$ c) $(27n^9)^{\frac{-2}{3}}$ d) $\left(\frac{x^{\frac{-5}{2}}}{y^3}\right)^{-4}$

7. Solve each radical equation. Check for extraneous solutions.

a) $\sqrt[3]{2x-7} = \sqrt[3]{x+4}$ b) $5\sqrt{x-7} - 4 = 6$ c) $3(x+1)^{\frac{3}{5}} = 24$ d) $\sqrt{3x-2} - x = 0$
e) $\sqrt{2x+19} - 2 = x$ f) $\sqrt[3]{x-5} + 7 = 3$ g) $\sqrt{5x-26} + 4 = x$ h) $(2x-9)^{\frac{1}{2}} - 5 = 1$

1. a) $3|a||b^3|c^4 \cdot \sqrt[4]{2a^2bc^3}$ b) $-2m^4n^7 \cdot \sqrt[3]{3m^2n^2}$ c) $6w^2|x^5|\sqrt{2wx}$

2. a) $26\sqrt{5} + 15\sqrt{6}$ b) $6e^2g^6\sqrt{2e}$ c) $\sqrt[3]{125c^5r^9} = 5cr^3 \cdot \sqrt[3]{c^2}$ d) $-5\sqrt{6}$ e) 14

f) $2a^2b^3 \cdot \sqrt[3]{15ab^2}$ g) $7g^5h^7\sqrt{15gh}$ h) $\frac{j\sqrt{6j}}{2k^3}$

3. a) $\frac{\sqrt{6x}}{3x^4}$ b) $\frac{11a^2\sqrt{7^2ab^2}}{7b^2}$ c) $\frac{4\sqrt[5]{2^4k^2m^4n^3}}{kmn^2}$ d) $\frac{28-4\sqrt{10}}{39}$ e) $\frac{5 \cdot \sqrt[4]{4P^2Q^3}}{P}$

4. a) $7 \cdot \sqrt[5]{a^2}$ or $7(\sqrt[5]{a})^2$ b) $\sqrt[3]{8b} = 2 \cdot \sqrt[3]{b}$ 5. a) $h^{\frac{4}{7}}$ b) $(5c)^{\frac{1}{2}}$

6. a) $343k^{\frac{5}{2}}$ b) $8r^9$ c) $\frac{1}{9n^6}$ d) $x^{10}y^{12}$

7. a) $x = 11$ b) $x = 11$ c) $x = 31$ d) $x = 1, 2$ e) $x = 3$ f) $x = -59$
g) $x = 7, 6$ h) $x = 22.5$