The more that you read, the more things you will know.
The more that you learn, the more places you'll go.
-Dr. Seuss

Know the following Laws of Exponents and Radicals.
Let a, b, m, n be real numbers. Then:

(1) $a^0 = 1$ (when $a \neq 0$)

(2) $a^m \cdot a^n = a^{m+n}$

(3) $\frac{a^m}{a^n} = a^{m-n}$ (when $a \neq 0$)

(4) $(a^m)^n = a^{m \cdot n}$

(5) $(a \cdot b)^n = a^n \cdot b^n$

(6) $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ (when $b \neq 0$)

(7) $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$ (when $a, b \neq 0$)

(8) $a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$

(9) $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$

(10) $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

1. Simplify the expressions so that they have only positive exponents.

   (a) $\frac{x^{-1}y^2}{y^3x^{-2}}$

   Solution: $\frac{x}{y}$

   (b) $\frac{(x^3y^{-2})^6}{(y^{-5}x^{-2})^{-3}}$

   Solution: $\frac{x^{12}}{y^{27}}$

   (c) $\frac{(x^2y^{-3})^{-2}}{(y^{-3}x^{-2})^2}$

   Solution: y^{12}

   (d) $\frac{x^4y^2}{x^{-3}} \div \frac{x^3y^{-2}}{y^5}$

   Solution: x^4y^9

   (e) $\left(\frac{x^{-2}}{x^{-3}}\right)^{-4}$

   Solution: $\frac{1}{x^4}$

   (f) $(x^{-1} + y^{-1})^{-1}$

   Solution: $\frac{xy}{x+y}$

2. Simplify the expressions.

(a) $\sqrt[3]{\dfrac{8}{27}}$
Solution: $\dfrac{2}{3}$

(b) $32^{\frac{3}{5}}$
Solution: 8

(c) $(-32)^{\frac{3}{5}}$
Solution: -8

(d) $0.001^{\frac{2}{3}}$
Solution: $.01$

(e) $\dfrac{(2^{\frac{1}{3}})^{\frac{2}{5}}}{\sqrt[5]{2}}$
Solution: $\dfrac{1}{2^{\frac{1}{15}}}$

(f) $\dfrac{x^{\frac{1}{3}}y^{\frac{1}{2}}}{\sqrt[3]{x^2y}}$
Solution: $\dfrac{1}{x^{\frac{1}{3}}y^{\frac{1}{6}}}$

(g) $(xyz + zyx + yxz)^3$
Solution: $27x^3y^3z^3$

(h) $(-8)^{\frac{5}{3}}$
Solution: -32

(i) $(-8)^{-\frac{5}{3}}$
Solution: $-\dfrac{1}{32}$

(j) $\dfrac{(2x^2+3)^{-\frac{5}{4}}(2x^2+3)^{\frac{5}{4}}(x^2+1)^{-\frac{1}{4}}}{(x^2+1)^{\frac{7}{4}}}$
Solution: $\dfrac{1}{(x^2+1)^2}$