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

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

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

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

(7) $\left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n$ (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) $\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

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

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

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

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

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

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

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

2. Simplify the expressions.

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

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

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

   (d) $0.001^{\frac{2}{3}}$

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

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

3. Rationalize the denominator.

   (a) $\dfrac{\sqrt{5}}{\sqrt{3}}$

   (b) $\dfrac{5}{\sqrt[4]{5}}$

   (c) $\dfrac{3}{\sqrt[3]{9}}$

   (d) $\dfrac{\sqrt{3}}{1+\sqrt{3}}$

   (e) $\dfrac{1+\sqrt{2}}{1-\sqrt{2}}$

   (f) $\dfrac{\sqrt{x}-\sqrt{3}}{\sqrt{x}+\sqrt{3}}$