

$x^A \cdot x^B = x^{A+B}$
 $(x^A)^B = x^{A \cdot B}$
 $\frac{x^A}{x^B} = x^{A-B}$

Base #'s Match

$x^2 \cdot x^3 = x^5$
base #'s match
 $x^2 \cdot y^3$

$(x \cdot y)^A = x^A \cdot y^A$
 $\left(\frac{x}{y}\right)^A = \frac{x^A}{y^A}$
 $\sqrt{x \cdot y} = \sqrt{x} \cdot \sqrt{y}$
 $\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$

Exponents Match

Rule for Rational Exponents: $\sqrt[B]{x^A} = x^{\frac{A}{B}}$

$\sqrt{x^1} = x^{\frac{1}{2}}$
 $5\sqrt{x^3} = x^{\frac{3}{5}}$ ← exponent
 not $\frac{3}{5}x$ or $x + \frac{3}{5}$
 $\sqrt{5^4} = 5^{\frac{4}{2}} = 5^2 = 25$
 $\sqrt[3]{5^4} = 5^{\frac{4}{3}}$

ex $\frac{24^{\frac{1}{2}}}{6^{\frac{1}{2}}}$

Exponents Match

$\left(\frac{24}{6}\right)^{\frac{1}{2}}$
 \downarrow
 $(4)^{\frac{1}{2}}$
 \downarrow
 $\sqrt{4}$
 \downarrow
 2

$\frac{\sqrt{10}}{\sqrt[5]{10}}$
 Bases Match
 $\frac{10^{\frac{1}{2}}}{10^{\frac{1}{5}}}$
 \downarrow
 $10^{\frac{1}{2} - \frac{1}{5}}$
 \downarrow
 $10^{\frac{5-2}{10}}$
 \downarrow
 $10^{\frac{3}{10}}$ OR $\sqrt[10]{10^3}$

$(\sqrt[3]{2} \cdot \sqrt[2]{2})^6$
 Bases Match
 $(2^{\frac{1}{3}} \cdot 2^{\frac{1}{2}})^6$
 \downarrow
 $(2^{\frac{5}{6}})^6$
 \downarrow
 $2^{\frac{5}{6} \cdot 6}$
 \downarrow
 2^5 OR 32

$\frac{2}{2} \cdot \frac{1}{3} + \frac{1}{2} \cdot \frac{3}{3}$
 \downarrow
 $\frac{2}{6} + \frac{3}{6}$
 \downarrow
 $\frac{5}{6}$

$(2^{\frac{1}{3}})^2 \cdot (2^{\frac{1}{2}})^2$
 \downarrow
 $2^{\frac{2}{3}} \cdot 2^1$
 \downarrow
 $2^{\frac{2}{3} + 1}$
 \downarrow
 $2^{\frac{5}{3}}$

$(x^4)^2 \cdot (x^{10})^2 \rightarrow x^{14}$
 $(x^2)^{14}$

Combine Like Terms:
 • exponents same
 • base #'s same

$\frac{1}{5} - \frac{2}{10}$
 $\frac{2}{10} - \frac{2}{10}$