

Extending the Laws of Exponents

Converting: Exponentials – Radicals

Definition If p denotes an integer, r is a positive integer, and b a positive real number, then we define:

$$b^{\frac{p}{r}} = (\sqrt[r]{b})^p, \quad \rightarrow \quad b^{\frac{\text{exponent}}{\text{index}}}$$

Example Rewrite $\sqrt[3]{x^2}$ as an exponential
 $x^{\frac{\text{exponent}}{\text{index}}} = x^{\frac{2}{3}}$

Example Rewrite as $y^{\frac{4}{5}}$ as a radical
4 is the exponent, 5 is the index, $\sqrt[5]{y^4}$

Rewrite the following exponentials as radicals, do not simplify.

1. $x^{\frac{2}{5}}$

1a. $y^{\frac{1}{2}}$

2. $16^{\frac{1}{2}}$

2a. $9^{\frac{3}{2}}$

3. $(xy)^{\frac{1}{3}}$

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

4. $(5abc)^{\frac{1}{2}}$

4a. $(5a^3 b^4 c^5)^{\frac{1}{2}}$

5. $3^{\frac{1}{2}} a^{\frac{3}{2}} b^{\frac{4}{2}}$

5a. $5^{\frac{1}{3}} x^{\frac{2}{3}} y^{\frac{7}{3}}$

6. $7^{\frac{1}{3}} d^{-\frac{1}{3}}$

6a. $(a + b)^{\frac{1}{2}}$