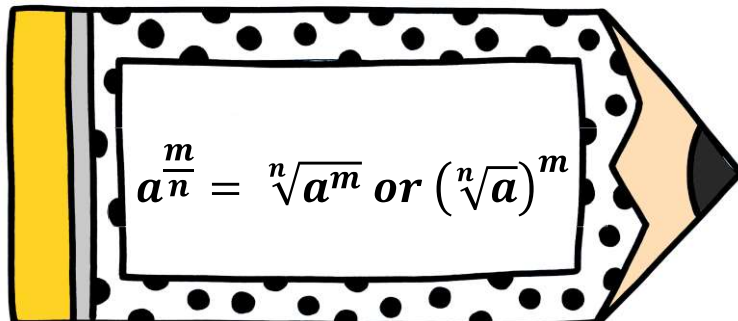
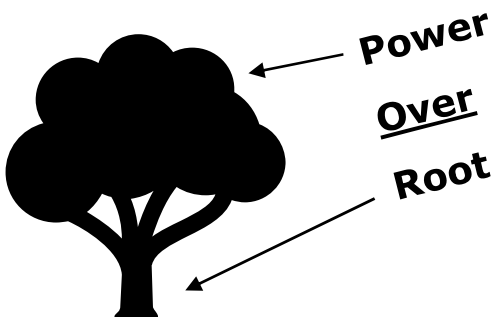


# Notes: Rational Exponents and Radical Expressions

Sometimes \_\_\_\_\_ exponents are used to represent powers of numbers or variables. The numerator of the fraction,  $m$ , represents the \_\_\_\_\_, the denominator,  $n$ , represents the \_\_\_\_\_. The denominator of the exponent must be positive.



Think of a tree!



Rewrite each exponent expression as a radical.

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

2.  $9^{\frac{1}{2}}$

3.  $x^{\frac{2}{3}}$

Rewrite each radical expression as a rational exponent.

4.  $\sqrt[3]{z^2}$

5.  $\sqrt[3]{c^{-5}}$

6.  $\sqrt{6}$

All your exponent rules apply to rational exponents as well! Simplify each expression.

7.  $4^{\frac{1}{2}}$

8.  $\sqrt[3]{2^6}$

9.  $(\sqrt{x})^2$

**10.**  $36^{\frac{1}{2}}$

**11.**  $(4x^2)^{\frac{1}{2}}$

**12.**  $(3x^{\frac{3}{4}})^4$

**13.**  $\frac{(-4x)^3}{(49^{\frac{1}{2}}x)^2}$

**14.**  $(64x^3)^{\frac{5}{3}}$

**15.**  $\frac{(16x^6)^{\frac{1}{2}}}{(3^{\frac{3}{2}}x)^2}$

## Challenge!

**16.**  $(4x^2)^{-\frac{5}{2}}$

**17.**  $\frac{(9x^2)^{\frac{3}{2}}}{(-3^{\frac{1}{2}}x^2)^4}$

**18.**  $\frac{(\sqrt[3]{16})^{\frac{3}{2}}x^{\frac{1}{2}}}{(2^{\frac{5}{3}}x)^3x^{\frac{1}{2}}}$

Remember to use your order of operations!

# A. Rational Exponents and Radical Expressions

## Level 2

Rewrite each exponent expression as a radical.

1.  $x^{\frac{3}{2}}$

2.  $64^{\frac{1}{2}}$

3.  $z^{\frac{4}{3}}$

Rewrite each radical expression as a rational exponent. Write answers using positive exponents.

4.  $\sqrt[7]{x^4}$

5.  $\sqrt[2]{a^{-8}}$

6.  $\sqrt{10}$

All your exponent rules apply to rational exponents as well! Simplify each expression using your exponent rules. Leave answers as simplified square roots, if necessary. ★

7.  $81^{\frac{1}{2}}$

8.  $\sqrt[3]{27^2}$

9.  $(\sqrt{y})^4$

10.  $32^{\frac{1}{2}}$  ★

11.  $(25x^{-6})^{\frac{1}{2}}$

12.  $(4x^{\frac{7}{3}})^{-3}$

13.  $\frac{(-2xy)^3}{(64^{\frac{1}{2}}xy^3)^2}$

14.  $(5x^0)^{\frac{3}{2}}$  ★

15.  $\frac{(2^{\frac{6}{2}}x^6)^{\frac{4}{3}}}{(3^{\frac{1}{2}}x^{-3})^{-4}}$