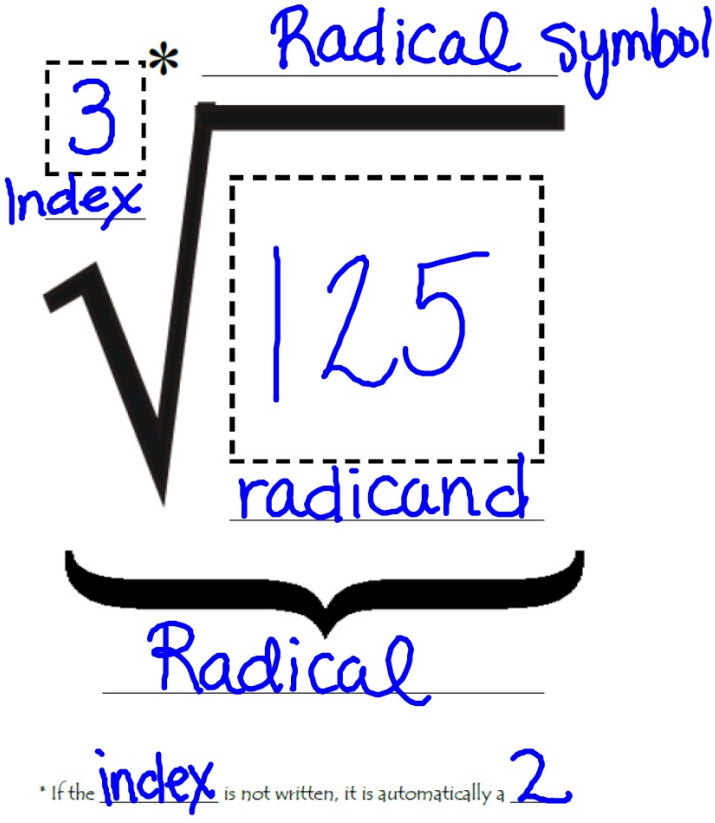
5.1.15

1. What happens when I have a number raised to a negative exponent? For example: 3^{-2}

$$\frac{1}{3^2} = \boxed{\frac{1}{9}}$$

Parts of a Radical



* If the index is not written, it is automatically a 2

For each radical, determine the index and radicand.

$\sqrt{24}$ index: 2 Radicand: 24

$\sqrt[4]{128n^8}$ Index: 4 Radicand: $128n^8$

$\sqrt[3]{16xy}$ I=3 R=16xy

$\sqrt[6]{448x^7y^7}$ I=6 R=$448x^7y^7$

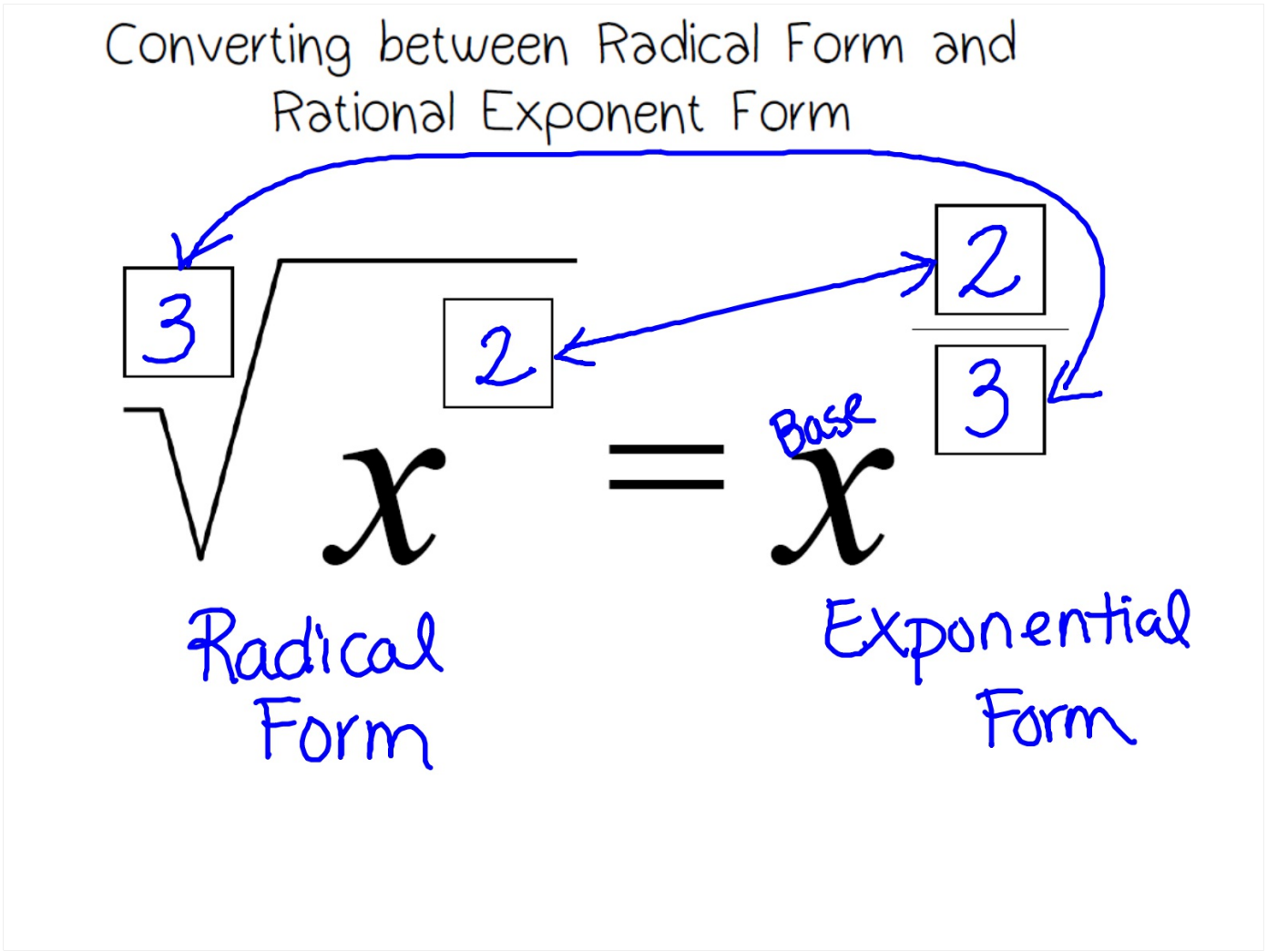
$\sqrt{512x^2}$ I=2 R=$512x^2$

$\sqrt[3]{1000}$ I=3 R=1000

$\sqrt{512}$ I=2, R=512

$\sqrt{98k}$ I=2 R=98k

$\sqrt[3]{-162}$ I=3 R=-162


Converting between Radical Form and Rational Exponent Form
3
2
$\sqrt{x}$
=
Base
x
2
3
Radical Form
Exponential Form

Rewrite the expression using Radical Notation.
Then simplify if possible.

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

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

$\sqrt[2]{9^1}$

$\sqrt{9}$

3

2) $8^{\frac{2}{3}}$

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

$\sqrt[3]{64}$

4

3) $x^{\frac{3}{5}}$

$\sqrt[5]{x^3}$

Rewrite the expression using Rational Exponent Notation

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

4) $\sqrt[5]{13}$

$13^{\frac{1}{5}}$

1.7

5) $\sqrt[3]{25}$

$25^{\frac{1}{3}}$

2.9

6) $\left(\sqrt[2]{7}\right)^5$

$7^{\frac{5}{2}}$

129.6

Product Rule with Rational Exponents

$$a^m \cdot a^n = a^{m+n}$$

7) $x^{\frac{1}{5}} \cdot x^{\frac{3}{5}}$

$\frac{1}{5} + \frac{3}{5}$

$x^{\frac{4}{5}}$

8) $\sqrt[4]{x} \cdot \sqrt[3]{x^2}$

$x^{\frac{1}{4}} \cdot x^{\frac{2}{3}}$

$\frac{1}{4} + \frac{2}{3}$

$x^{\frac{11}{12}}$

$\frac{3}{3} \cdot \frac{1}{4} + \frac{2}{3} \cdot$

$\frac{3}{12} + \frac{8}{12}$

Quotient Rule with Rational Exponents

$$\frac{a^m}{a^n} = a^{m-n}$$

9) $\dfrac{x^{\frac{7}{10}}}{x^{\frac{6}{10}}}$

$x^{\frac{7}{10}-\frac{6}{10}}$

$x^{\frac{1}{10}}$

10) $\dfrac{\sqrt[6]{x^5}}{\sqrt[6]{x^2}} = \dfrac{x^{\frac{5}{6}}}{x^{\frac{2}{6}}}$

$x^{\frac{5}{6}-\frac{2}{6}}$

$x^{\frac{3}{6}} = x^{\frac{1}{2}}$

Power Rule with Rational Exponents

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

11) $\left(x^{\frac{3}{5}}\right)^{\frac{1}{2}}$

$x^{\frac{3}{5} \cdot \frac{1}{2}}$

$x^{\frac{3}{10}}$

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

$x^{\frac{3}{4} \cdot \frac{2}{3}}$

$x^{\frac{6}{12}} = x^{\frac{1}{2}}$

Negative and Zero Rules with Rational Exponents

$$a^{-n} = \left(\frac{1}{a}\right)^n \qquad a^0 = 1$$

13) $\left(\frac{4}{9}\right)^{\frac{-3}{2}}$

$\left(\frac{9}{4}\right)^{\frac{3}{2}}$

$\frac{27}{8}$

14) $\left(x^{\frac{3}{4}}\right)^0 = 1$