Radical Numbers

1. Radical Notation: $a^{1/n} = \sqrt[n]{a}$

Examples:

2. Radical Notation: $a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})_m$

Examples:

3. Evaluating: $\sqrt{a^n}$

a) If **n** is **odd**, then $\sqrt[n]{a^n} = a$

Example:

$$\sqrt[3]{-5^3} = -5$$

b) If **n** is even, then $\sqrt[n]{a^n} = |a|$ Example:

$$\sqrt{-3^2} = |-3| = 3$$

c) If a is positive, then $\sqrt[n]{a^n} = a$ Examples:

 $\sqrt[3]{5^3} = 5$ and $\sqrt[4]{5^4} = 5$

Spring 2019



4. Rules for Radicals

a) Product Rule:
$$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$$

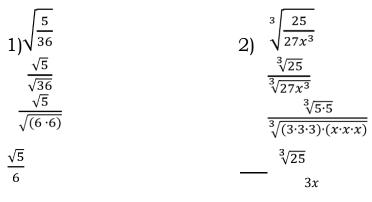
The product of two radicals is the radical of the product.

Examples:

b) Quotient Rule: $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{\frac{a}{b}}}{\sqrt[n]{b}} \quad (b \neq 0)$

The radical of a quotient is the quotient of the radicals.

Examples:



c) Power Rule: $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

The root of the radical of a radical is the product of their roots.

Examples:



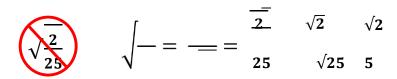
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5. Rules for Simplifying Radicals

a) No factor under the radical can have a higher power than the root.

$$\sqrt[3]{7^5}$$
 $\sqrt[3]{7^5} = \sqrt[3]{7^3 \cdot 7^2} = 7\sqrt[3]{7^2}$

b) No fractions allowed under the radical.



c) No radicals allowed in the <u>denominator</u> (rationalize the denominator).

$$5x$$

$$\sqrt{4 \cdot 3}$$

$$5x$$

$$2\sqrt{3}$$

$$\sqrt{3}$$

$$\sqrt{3}$$

$$\sqrt{3}$$

$$5x\sqrt{3}$$

$$2\sqrt{3} \cdot 3$$

$$5\sqrt{3} x$$

$$-$$

$$-$$

 $5\sqrt{3} x$

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