

## Section 1-8 Radical Rules

PRODUCT RULE:

$${}^a\sqrt{x} \cdot {}^a\sqrt{y} = {}^a\sqrt{xy}$$

Example:

$$\sqrt{10} \cdot \sqrt{x} = \sqrt{10x}$$

QUOTIENT RULE:

$$\frac{{}^a\sqrt{x}}{{}^a\sqrt{y}} = {}^a\sqrt{\frac{x}{y}}$$

Example:

$$\frac{\sqrt{10}}{\sqrt{2}} = \sqrt{\frac{10}{2}} = \sqrt{5}$$

More directly, when determining a product or quotient of radicals and the indices (the small number in front of the radical) are the same then you can rewrite 2 radicals as 1 or 1 radical as 2.

**Simplify by rewriting the following using only one radical sign (i.e. rewriting 2 radicals as 1).**

1.  $\sqrt{3} \cdot \sqrt{12}$

2.  $\frac{\sqrt{12}}{\sqrt{3}}$

3.  $\sqrt{7x} \cdot \sqrt{2y}$

4.  $\frac{\sqrt[3]{12x^2}}{\sqrt[3]{4x}}$

**Simplify by rewriting the following using multiple radical sign (i.e. rewriting 1 radical as 2).**

5.  $\sqrt{\frac{144}{25}}$

6.  $\sqrt{\frac{x^6}{121}}$

Express each radical in simplified form.

7.  $\sqrt{48}$

P

8.  $\sqrt{450x^4y^5}$

N

9.  $\sqrt{72x^5y^6}$

O

10.  $\sqrt{300x^{12}}$

O

11.  $\sqrt{675x^4y^{11}}$

N

12.  $-\sqrt{81x^3y^8}$

A

13.  $\sqrt[3]{48x^7y^3}$

N

14.  $\sqrt[3]{81x^{10}y^3}$

I

15.  $\sqrt[3]{-27x^5}$

K

Use the letters and answers to match the answer to the riddle. **Only some answers will be used.**

**“What is an opinion without  $\pi$ ?”**

$-9xy^4\sqrt{x}$

$15x^2y^2\sqrt{2y}$

$10x^6\sqrt{3}$

$2x^2y\sqrt[3]{6x}$

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

$6x^2y^3\sqrt{2x}$

$15x^2y^5\sqrt{3y}$

**Express each radical in simplified form.**

16.  $\sqrt{6x} \cdot \sqrt{12x}$

17.  $\sqrt{18a^5} \cdot \sqrt{6a^4}$

**Simplify. Assume that all variable represent positive real numbers.**

18.  $5\sqrt{3} + \sqrt{2} - 2\sqrt{3} + 4\sqrt{2}$

19.  $\sqrt{108} + 5\sqrt{12} - 4\sqrt{44}$

20.  $2\sqrt{150} + \sqrt{18} + 3\sqrt{8} - \sqrt{24}$

21.  $y\sqrt{18} - 3\sqrt{12y^4} + 2\sqrt{8y^2}$

22.  $x\sqrt{32x^2} + 2\sqrt{18x^4}$

23.  $5\sqrt{18x^4} - 3x\sqrt{8x^2} - x^2\sqrt{2}$

24.  $2\sqrt{10}(3\sqrt{6} + 2\sqrt{5} - \sqrt{24})$

25.  $\sqrt{2x}(\sqrt{6x} + 3\sqrt{x})$

26.  $3\sqrt{6a}(\sqrt{4a} + 2\sqrt{15a^2})$

**Simplify. Assume that all variable represent positive real numbers and rationalize all denominators.**

18.  $\frac{3}{\sqrt{5}}$

19.  $\frac{6}{\sqrt{3}}$

20.  $\frac{3\sqrt{2}}{\sqrt{6}}$

21.  $\sqrt{\frac{16}{27}}$

22.  $\frac{\sqrt{12} + 8\sqrt{3} - 2\sqrt{27}}{\sqrt{2}}$

23.  $\frac{\sqrt{2}(\sqrt{12} - \sqrt{3})}{\sqrt{3}}$