

Unit 4: Radical Expressions & Equations

4.5 Dividing & Rationalizing Radical Expressions

Dividing radicals requires the same index. Then divide/reduce the coefficients and the radicands.

In general, $\frac{m\sqrt[k]{a}}{n\sqrt[k]{b}} = \frac{m}{n}\sqrt[k]{\frac{a}{b}}$, where k is a natural number, and m , n , a , and b are real numbers, $n \neq 0$ and $b \neq 0$. If k is even, then $a \geq 0$ and $b \geq 0$.

ex. Simplify [always ensure that final answers are in simplest radical form]

a) $\frac{\sqrt{80}}{\sqrt{5}}$

b) $\frac{-24\sqrt{40x^5}}{16\sqrt{4x^2}}$

c) $\frac{6\sqrt{10}}{15\sqrt{18}}$

d) $\frac{2\sqrt[4]{64x}}{4\sqrt[4]{2x^9}}$

Expressions are not considered to be completely simplified if they contain a radical in the denominator.

We **Rationalize The Denominator** to remove the radical from the denominator.

There are 2 cases:

Case 1: Monomial **Square Root** Denominator - multiply the numerator and the denominator by the radical term from the denominator.

ex. Simplify

a) $\frac{5}{\sqrt{3}}$

b) $\frac{\sqrt{3}}{\sqrt{2x}}$

c) $\frac{4+\sqrt{5}}{\sqrt{40}}$

d) $\frac{2\sqrt{5}}{3\sqrt{125}}$

How can we extend this idea to higher index radicals?

ex. Simplify

a) $\frac{9}{2\sqrt[3]{3}}$

b) $\frac{3-5\sqrt[4]{2}}{\sqrt[4]{2}}$

Case 2: Binomial denominator containing one or two **Square Roots** - multiply the numerator and the denominator by the **CONJUGATE** of the denominator.

Conjugates: two binomial factors whose product is the difference of two squares.

$$(a - b)(a + b)$$

State the conjugate of each binomial below. Then find the product of the conjugates.

a) $(5 + \sqrt{2})$

b) $(8 - \sqrt{7})$

c) $(5\sqrt{3} + \sqrt{5})$

ex. Simplify

a) $\frac{4}{3+\sqrt{2}}$

b) $\frac{5\sqrt{3}}{4-\sqrt{6}}$

c) $\frac{5+2\sqrt{15}}{5-\sqrt{15}}$

d) $\frac{2-\sqrt{3}}{\sqrt{2}+2\sqrt{3}}$

*NOTE: a radical expression must always be **rationalized** and in **simplest radical form**.

Practice: pg. 290/ #6, 8bc, 10, 11, 13 – 15, 17, 20

& Worksheet(211) – on sheet or separate



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