

Section 7.4: Multiplying and Dividing Radical Expressions

Objectives:

- * Use the distributive property to multiply radical expressions.
- * Determine the product of conjugates.
- * Simplify quotients involving radicals by rationalizing the denominators.

$$(5\sqrt{x^3}) (-x\sqrt{4x}) \div (3x\sqrt{x})$$

Rule for Multiplying and Dividing Radical Expressions

$$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$$

and

$$\sqrt[n]{a} \div \sqrt[n]{b} = \sqrt[n]{\frac{a}{b}}$$

① EXAMPLE

Multiply and simplify.

a) $\sqrt{6} \cdot \sqrt{2}$

b) $\sqrt[3]{6} \cdot \sqrt[3]{16}$

c) $\sqrt{5}(2 + \sqrt{3})$

d) $\sqrt{6}(\sqrt{12} - \sqrt{3})$

② EXAMPLE

Perform the indicated operation and simplify the answer.

a) $(2\sqrt{7} - 3)(\sqrt{7} + 2)$

b) $(2 - \sqrt{x})(1 + \sqrt{x})$

c) $(3 - \sqrt{x})(3 + \sqrt{x})$

The conjugate of $\sqrt{a} + \sqrt{b}$ is $\sqrt{a} - \sqrt{b}$

The conjugate of $\sqrt{a} - \sqrt{b}$ is $\sqrt{a} + \sqrt{b}$

③ EXAMPLE

Determine the conjugate of each expression and multiply the expression by it.

a) $2 + \sqrt{7}$

b) $3 - \sqrt{5}$

c) $2\sqrt{3} + \sqrt{x}$

④ EXAMPLE

Rationalize the denominators and simplify.

a) $\frac{\sqrt{3}}{1 - \sqrt{5}}$

b) $7 \div (x - \sqrt{3})$

c) $\frac{5\sqrt{2}}{3\sqrt{2} + \sqrt{6}}$

d) $\frac{2 - \sqrt{3}}{\sqrt{2} + \sqrt{7}}$