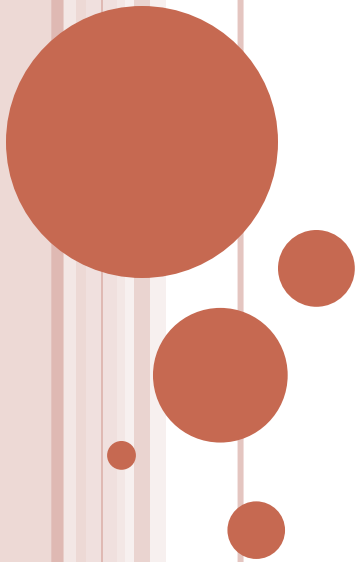


8.5 MULTIPLYING AND DIVIDING RADICAL EXPRESSIONS

Objectives

- Multiply radical expressions.
- Rationalize denominators with one radical term.
- Rationalize denominators with binomials involving radicals.
- Write radical quotients in lowest terms.



REVIEW – MULTIPLYING BINOMIALS

$$(x - 5)(3x + 2)$$

$$(2x - 7)(3y + 4)$$



EXAMPLE 1

Multiply.

○ $(2 + \sqrt{3})(1 + \sqrt{5})$

○ $(4 + \sqrt{5})(4 - \sqrt{5})$



EXAMPLE 1 (CONTINUED)

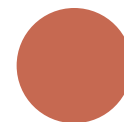
- $(\sqrt{13} - 2)^2$

- $(4 + \sqrt[3]{7})(4 - \sqrt[3]{7})$



EXAMPLE 1 (CONTINUED)

- $(\sqrt{r} + \sqrt{s})(\sqrt{r} - \sqrt{s})$



RATIONALIZE DENOMINATORS WITH ONE RADICAL TERM

- Rationalizing the denominator is the process of removing radicals from a denominator so that the denominator contains only rational numbers.
- This is done by multiplying by a form of 1.



EXAMPLE 2

Rationalize each denominator.

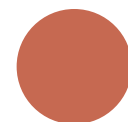
$$\frac{5}{\sqrt{11}}$$

$$\frac{5\sqrt{6}}{\sqrt{5}}$$



EXAMPLE 2 (CONTINUED)

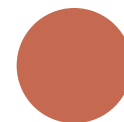
$$-\frac{8}{\sqrt{18}}$$



EXAMPLE 3

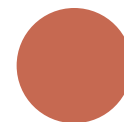
Simplify each radical.

$$-\sqrt{\frac{8}{45}}$$



EXAMPLE 3 (CONTINUED)

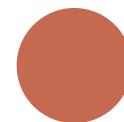
$$\sqrt{\frac{200k^6}{y^7}}$$



EXAMPLE 4

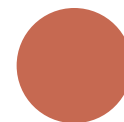
Simplify each radical.

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



EXAMPLE 4 (CONTINUED)

$$\sqrt[3]{\frac{15}{32}}$$



EXAMPLE 4 (CONTINUED)

$$\sqrt[4]{\frac{6y}{w^2}}$$



RATIONALIZE A BINOMIAL DENOMINATOR

- Recall:
- $(x - 5)$ and $(x + 5)$ are **conjugates**. We use conjugates to rationalize binomial denominators.

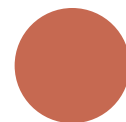


EXAMPLE 5

Simplify each radical.

○ $\frac{4}{2-\sqrt{3}}$

○ $\frac{7}{\sqrt{2}+\sqrt{13}}$



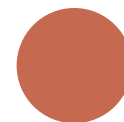
EXAMPLE 5 (CONTINUED)

$$\frac{\sqrt{3} + \sqrt{5}}{\sqrt{2} - \sqrt{7}}$$



EXAMPLE 5 (CONTINUED)

$$\frac{2}{\sqrt{k} + \sqrt{z}}$$



EXAMPLE 6

Simplify each radical.

$$\frac{24 - 36\sqrt{7}}{16}$$



EXAMPLE 6 (CONTINUED)

$$\frac{2x + \sqrt{32x^2}}{6x}$$

