Pre-Calculus 11
Chapter 5: Radical Expressions and Equations

5.2 Multiplying and Dividing Radical Expressions (II)

Having examined how to multiply radicals, we will now look at dividing radical expressions.

When dividing radical expressions, first divide coefficients then divide radicands.

Note:

1. You can only divide radicals that have the same index. $\sqrt[n]{}$

2. When dividing radicals containing variables, ensure restrictions are stated.

3. A radical is in simplest form when the denominator does not contain a radical.

Example: Simplify.

a) $\dfrac{\sqrt{60}}{\sqrt{5}}$

$= \sqrt{12}$

$= 2\sqrt{3}$

b) $\dfrac{-8\sqrt{18}}{12\sqrt{2}}$

$= -\dfrac{2}{3}\sqrt{9}$

$= -\dfrac{2 \cdot 3}{3}$

$= -2$

c) $\dfrac{\sqrt{24x^2}}{\sqrt{3x}}$

$= \sqrt{8x}$

$= 2\sqrt{2x}, x > 0$

Example: Rationalize each denominator. Simplify completely.

a) $\frac{30}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{30\sqrt{5}}{5}$

$= 6\sqrt{5}$

b) $\frac{2}{3\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$

$= \frac{2\sqrt{7}}{3 \cdot 7}$

$= \frac{2\sqrt{7}}{21}$

c) $\frac{-\sqrt{18}}{\sqrt{5a}}$

$= -\frac{3\sqrt{2}}{\sqrt{5a}} \cdot \frac{\sqrt{5a}}{\sqrt{5a}}$

$= -\frac{3\sqrt{10a}}{5a}, \ a > 0$

d) $\frac{\sqrt{2}+3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{\sqrt{10}+3\sqrt{5}}{5}$

e) $\frac{4\sqrt{11}}{\sqrt[3]{6}}$

Note:

$\sqrt[3]{6} \cdot \sqrt[3]{6} \neq 6$

$\boxed{\text{but } \sqrt[3]{6} \cdot \sqrt[3]{6} \cdot \sqrt[3]{6} = 6}$

$\frac{4\sqrt{11}\left(\sqrt[3]{6}\right)^2}{\sqrt[3]{6} \cdot \sqrt[3]{6} \cdot \sqrt[3]{6}}$

$= \frac{4\sqrt{11}\left(\sqrt[3]{6}\right)^2}{6}$

$= \frac{2\sqrt{11}\left(\sqrt[3]{6}\right)^2}{3}$

f) $\frac{\sqrt{50m^3}}{\sqrt{35m}}$

$= \frac{5m\sqrt{2m}}{\sqrt{35m}}$

$= \frac{5m\sqrt{2}}{\sqrt{35}} \cdot \frac{\sqrt{35}}{\sqrt{35}}$

$= \frac{5m\sqrt{70}}{35}$

$= \frac{m\sqrt{70}}{7}, \ m > 0$