Algebra 2

Ch. 7 Handout 7.2

Multiplying and Dividing Radical Expressions

Dividing Radical Expressions

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers and $b \neq 0$, then $\dfrac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\dfrac{a}{b}}$.

To rationalize the denominator of an expression, rewrite it so there are no radicals in any denominator and no denominators in any radical.

1. Divide and simplify. Assume all variables are positive.

a) $\dfrac{\sqrt[3]{-81}}{\sqrt[3]{3}} = \sqrt[3]{\dfrac{-81}{3}}$ $-81 \cdot -27$

$= \sqrt[3]{-27}$

$= \boxed{-3}$

b) $\dfrac{\sqrt[3]{192x^8}}{\sqrt[3]{3}} = \sqrt[3]{\dfrac{64 \cdot 3 \, x^8}{3}}$

$\sqrt[3]{64x^8} = \sqrt[3]{64 \, x^6 \, x^2}$

$= \boxed{4x^2 \sqrt[3]{x^2}}$

1. Divide and simplify. Assume all variables are positive.

c) $\frac{\sqrt{243}}{\sqrt{27}} = \sqrt{\frac{243}{27}}$ 9

$= \sqrt{9}$

$= \boxed{3}$

d) $\frac{\sqrt{12x^4}}{\sqrt{3x}} = \sqrt{\frac{12x^4}{3x}}$ 4 x^3

$\sqrt{4x^3} = \sqrt{4x^2x}$

$= \boxed{2x\sqrt{x}}$

1. Divide and simplify. Assume all variables are positive.

e) $\dfrac{\sqrt{128x^3}}{\sqrt{2xy}} = \sqrt{\dfrac{128x^3}{2xy}}$ $\quad 64 \quad x^2$

$\sqrt{\dfrac{64x^2}{y}} = \dfrac{\sqrt{64x^2}}{\sqrt{y}} = \dfrac{8x\sqrt{y}}{\sqrt{y}\sqrt{y}}$

$\dfrac{8x\sqrt{y}}{\sqrt{y^2}} = \boxed{\dfrac{8x\sqrt{y}}{y}}$

f) $\dfrac{\sqrt[3]{270x}}{\sqrt[3]{10xy^2}} = \sqrt[3]{\dfrac{270x}{10xy^2}}$ $\quad 27$

$\sqrt[3]{\dfrac{27}{y^2}} = \dfrac{\sqrt[3]{27}}{\sqrt[3]{y^2}}\dfrac{\sqrt[3]{y}}{\sqrt[3]{y}} = \dfrac{\sqrt[3]{27y}}{\sqrt[3]{y^3}}$

$\boxed{\dfrac{3\sqrt[3]{y}}{y}}$

2. Rationalize the denominator of each expression. Assume that the variable are positive.

a) $\frac{\sqrt{3}\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{\sqrt{15}}{\sqrt{25}}$

$= \boxed{\frac{\sqrt{15}}{5}}$

b) $\sqrt[3]{\frac{7}{5}}$

$\frac{\sqrt[3]{7}}{\sqrt[3]{5}} \frac{\sqrt[3]{25}}{\sqrt[3]{25}} = \frac{\sqrt[3]{175}}{\sqrt[3]{125}}$

$\boxed{\frac{\sqrt[3]{175}}{5}}$

c) $\dfrac{\sqrt[3]{4}}{\sqrt[3]{6x}} = \sqrt[3]{\dfrac{4}{6x}} = \sqrt[3]{\dfrac{2}{3x}} = \dfrac{\sqrt[3]{2}}{\sqrt[3]{3x}} \cdot \dfrac{\sqrt[3]{9x^2}}{\sqrt[3]{9x^2}} = \dfrac{\sqrt[3]{18x^2}}{\sqrt[3]{27x^3}}$

$= \boxed{\dfrac{\sqrt[3]{18x^2}}{3x}}$

2. Rationalize the denominator of each expression. Assume that the variable are positive.

d) $\dfrac{\sqrt[4]{7x}\sqrt[4]{27}}{\sqrt[4]{3}\sqrt[4]{27}} = \dfrac{\sqrt[4]{189x}}{\sqrt[4]{81}}$

$\dfrac{\sqrt[4]{189x}}{3}$

e) $\dfrac{\sqrt[3]{x^2}\sqrt[3]{2}}{\sqrt[3]{4}\sqrt[3]{2}} = \dfrac{\sqrt[3]{2x^2}}{\sqrt[3]{8}}$

$\dfrac{\sqrt[3]{2x^2}}{2}$

3. The formula $a=\frac{d}{t^2}$ relates the acceleration a of a moving object to the distance d it moves in the time t. Solve the formula for t and rationalize the denominator.

$t^2 a = \frac{d}{t^2}(t^2)$

$\frac{a t^2}{a} = \frac{d}{a}$

$\sqrt{t^2} = \sqrt{\frac{d}{a}}$

$t = \sqrt{\frac{d}{a}}$

$t = \frac{\sqrt{d}}{\sqrt{a}}\frac{\sqrt{a}}{\sqrt{a}} = \frac{\sqrt{da}}{\sqrt{a^2}}$

$\boxed{t = \frac{\sqrt{da}}{a}}$

Assignment:

Day 2: pgs 377-379 23-36,46-54,69-75