

Quotient Property of Radicals

Product Property

$$\sqrt{ab} = \sqrt{b} \cdot \sqrt{a}$$

$$\sqrt{4} \cdot \sqrt{3} = \sqrt{12} \rightarrow \sqrt{12}$$

$$\sqrt{7} \cdot \sqrt{3} = \sqrt{21} \quad \sqrt{4} \sqrt{3} \rightarrow 2\sqrt{3}$$

Quotient Property

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

$$\sqrt{\frac{3}{4}} \rightarrow \frac{\sqrt{3}}{\sqrt{4}} \rightarrow \frac{\sqrt{3}}{2}$$

$$\sqrt{\frac{12}{27}} \rightarrow \frac{\sqrt{12}}{\sqrt{27}} \rightarrow \frac{\sqrt{4} \sqrt{3}}{\sqrt{9} \sqrt{3}} \rightarrow \frac{2}{3}$$

$$\sqrt{\left(\frac{12}{27}\right)}$$

Never leave a Radical
IN THE DENOMINATOR

Rationalizing The Denominator

Quotient Property
Rationalize Denom.

Take Denominator and multiply
Numerator & Denominator by Denom
itself

$$\frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \rightarrow \frac{5\sqrt{2}}{2}$$

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

$$\frac{\sqrt{3}}{\sqrt{27}}$$

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

$$\frac{4}{\sqrt{9}} = \frac{4}{3}$$

Quotient

$$\frac{\sqrt{3} \cdot \sqrt{27}}{\sqrt{27} \cdot \sqrt{27}} = \frac{\sqrt{3} \sqrt{27}}{27} \rightarrow \frac{\sqrt{3} \cdot \sqrt{3} \cdot \sqrt{9}}{27}$$

PROP.

$$= \frac{3 \cdot 3}{27} = \frac{9}{27} = \frac{1}{3}$$

7th grade

$$\frac{\sqrt{4} \cdot \sqrt{5}}{4\sqrt{5} \cdot \sqrt{5}} = \frac{2\sqrt{5}}{4 \cdot 5} = \frac{2\sqrt{5}}{20} = \frac{\sqrt{5}}{10}$$

$$\frac{(-3 - \sqrt{2})\sqrt{17}}{3\sqrt{17} \cdot \sqrt{17}} = \frac{-3\sqrt{17} - \sqrt{34}}{3 \cdot 17}$$

$$\sqrt{17}(-3 - \sqrt{2}) \rightarrow -3\sqrt{17} - \sqrt{34}$$

$$\frac{-3\sqrt{17} - \sqrt{34}}{51}$$

$$\frac{4\sqrt{2} \cdot \sqrt{5}}{3\sqrt{5} \cdot \sqrt{5}} = \frac{4\sqrt{10}}{15}$$

Rationalizing the
Denominator

Quotient Property of Radicals

Product Property

$$\sqrt{4} \cdot \sqrt{5} = \sqrt{20}$$

$$\sqrt{20} = \sqrt{4} \sqrt{5} \rightarrow 2\sqrt{5}$$

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

Quotient Prop.

$$\sqrt{\frac{12}{27}} \rightarrow \frac{\sqrt{12}}{\sqrt{27}} \rightarrow \frac{\sqrt{4} \sqrt{3}}{\sqrt{9} \sqrt{3}} = \frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$$

Prop Prop

$$\sqrt{\left(\frac{12}{27}\right)} = .666$$

$$\frac{\sqrt{9}}{\sqrt{25}} \rightarrow \frac{3}{5}$$

$$\frac{\sqrt{4}}{\sqrt{36}} \rightarrow \frac{2}{6} = \frac{1}{3}$$

*We never want to have a radical in the denominator

Rationalizing the Denominator

$$\frac{3}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} \rightarrow \frac{3\sqrt{12}}{12} = \frac{3\sqrt{4} \cdot \sqrt{3}}{12}$$

$$\frac{3 \cdot 2\sqrt{3}}{12} \rightarrow \frac{6\sqrt{3}}{12} = \frac{\sqrt{3}}{2}$$

$$\frac{\sqrt{15}}{\sqrt{12}} \rightarrow \frac{\sqrt{3} \sqrt{5}}{\sqrt{3} \sqrt{4}}$$

$$\frac{\sqrt{4}}{2\sqrt{12}} \rightarrow \frac{2}{2\sqrt{4} \sqrt{3}} \rightarrow \frac{2}{4\sqrt{3}}$$

$$\frac{2}{4\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{5}}{4 \cdot 5} = \frac{2\sqrt{5}}{20}$$

$$\Rightarrow \frac{\sqrt{5}}{10}$$

$$\frac{-3\sqrt{2}}{3\sqrt{17}} \cdot \frac{\sqrt{17}}{\sqrt{17}} \rightarrow \frac{-3\sqrt{34}}{51}$$

\swarrow \searrow
 $\rightarrow 3 \cdot 17$

$$\frac{-\sqrt{34}}{17}$$

$$\frac{(-3-\sqrt{2})(\sqrt{17})}{3\sqrt{17} \cdot \sqrt{17}}$$

$$\frac{\sqrt{17}(-3-\sqrt{2})}{3 \cdot 17}$$

$$\frac{-3\sqrt{17} - \sqrt{34}}{3 \cdot 17} = \frac{-3\sqrt{17} - \sqrt{34}}{51}$$

$$\frac{\sqrt{3} + 3\sqrt{5}}{2\sqrt{8}}$$

$$\frac{\sqrt{3} + 3\sqrt{5}}{2\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} \rightarrow \frac{\sqrt{24} + 3\sqrt{40}}{2 \cdot 8} = \frac{\sqrt{4}\sqrt{6} + 3\sqrt{4}\sqrt{10}}{16}$$

$$\sqrt{8}(\sqrt{3} + 3\sqrt{5})$$

$$\sqrt{24} + 3\sqrt{40}$$

$$\frac{2\sqrt{6} + 6\sqrt{10}}{16}$$

$$\frac{\sqrt{6} + 3\sqrt{10}}{8}$$

Conjugate

$$\frac{3}{\sqrt{5}+3} \cdot \frac{\sqrt{5}-3}{\sqrt{5}-3} \Rightarrow \frac{3\sqrt{5}-9}{-4}$$

$$3(\sqrt{5}-3) = 3\sqrt{5}-9$$

$$5 - 3\sqrt{5} + 3\sqrt{5} - 9 = \frac{9-3\sqrt{5}}{4}$$

$$\frac{2-\sqrt{3}}{-2-\sqrt{5}} \cdot \frac{-2+\sqrt{5}}{-2+\sqrt{5}} \Rightarrow \frac{4-5}{-1}$$

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

$$-4 + 2\sqrt{5} + 2\sqrt{3} - \sqrt{15}$$

$$-1$$

$$4 - 2\sqrt{5} - 2\sqrt{3} + \sqrt{15}$$

$$\frac{-4+\sqrt{2}}{-1-2\sqrt{5}} \cdot \frac{-1+2\sqrt{5}}{-1+2\sqrt{5}}$$

$$4 - 8\sqrt{5} - \sqrt{2}\sqrt{5} + 2$$

$$1 - 4\sqrt{5}$$

$$1 - 20 = -19$$

$$\frac{\sqrt{2}}{\sqrt{96}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{192}}$$

$$\frac{\sqrt{2}}{8} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2}{8\sqrt{2}} = \frac{1}{4\sqrt{2}}$$

$$\frac{3+\sqrt{2}}{\sqrt{96}} \cdot \frac{\sqrt{96}}{\sqrt{96}}$$

