

# INTERMEDIATE ALGEBRA

GPS # 33

7.3 OPERATIONS ON RADICAL EXPRESSIONS II

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## Useful Guidelines:

\* To rationalize denominator with one radical term:

Multiply both the numerator and the denominator by that radical term in the denominator.

For example:  $\frac{3}{\sqrt{5}} = \frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$

\* To rationalize denominator with binomials involving radicals:

Multiply both the numerator and the denominator by the conjugate of the denominator.

For example:  $\frac{3}{4+\sqrt{5}} = \frac{3}{(4+\sqrt{5})} \cdot \frac{(4-\sqrt{5})}{(4-\sqrt{5})} = \frac{3(4-\sqrt{5})}{16-5} = \frac{3(4-\sqrt{5})}{11}$

Rationalize the denominator in each expression. Assume all variables represent positive real numbers.

1. a)  $\frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2}$

b)  $\frac{12 \cdot \sqrt{7}}{\sqrt{7} \cdot \sqrt{7}} = \frac{12\sqrt{7}}{7}$

c)  $\frac{\sqrt{3}}{\sqrt{11}} = \frac{\sqrt{3}}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}} = \frac{\sqrt{33}}{11}$

d)  $-\sqrt{\frac{13}{x}} = -\frac{\sqrt{13}}{\sqrt{x}} = \frac{-\sqrt{13x}}{x}$

e)  $\sqrt[3]{\frac{27}{2}} = \frac{\sqrt[3]{27}}{\sqrt[3]{2}} = \frac{3}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{2} \cdot \sqrt[3]{2} \cdot \sqrt[3]{2}}{\sqrt[3]{2} \cdot \sqrt[3]{2} \cdot \sqrt[3]{2}} = \frac{3\sqrt[3]{4}}{2}$

f)  $-\sqrt[4]{\frac{16}{y}} = \frac{-\sqrt[4]{16}}{\sqrt[4]{y}} = \frac{-2}{\sqrt[4]{y} \cdot \sqrt[4]{y} \cdot \sqrt[4]{y} \cdot \sqrt[4]{y}} = \frac{-2\sqrt[4]{y^3}}{y}$

Rationalize the denominator in each expression. Assume all variables represent positive real numbers and no denominators are 0.

2. a)  $\frac{8}{3-\sqrt{5}} \cdot \frac{(3+\sqrt{5})}{(3+\sqrt{5})} = \frac{24+8\sqrt{5}}{9-5} = \frac{24+8\sqrt{5}}{4} = 6+2\sqrt{5}$   
*2 terms diff. of sq.*

b)  $\frac{4}{\sqrt{3}-\sqrt{2k}} \cdot \frac{(\sqrt{3}+\sqrt{2k})}{(\sqrt{3}+\sqrt{2k})} = \frac{4\sqrt{3}+4\sqrt{2k}}{3-2k} = \frac{4\sqrt{3}+4\sqrt{2k}}{3-2k}$

c)  $\frac{\sqrt{2}-\sqrt{3}}{\sqrt{4}+\sqrt{3}} \cdot \frac{(\sqrt{4}-\sqrt{3})}{(\sqrt{4}-\sqrt{3})} = \frac{2\sqrt{2}-2\sqrt{3}-\sqrt{6}+3}{4-3} = 2\sqrt{2}-2\sqrt{3}-\sqrt{6}+3$

d)  $\frac{(3+\sqrt{2x})}{(\sqrt{3}-\sqrt{2x})} \cdot \frac{(\sqrt{3}+\sqrt{2x})}{(\sqrt{3}+\sqrt{2x})} = \frac{3\sqrt{3}+2x+\sqrt{6x}+3\sqrt{2x}}{3-2x}$