

Accuplacer Study Modules

TOPIC: Rationalizing Denominators – Square Roots

Khan Academy Link: <https://www.khanacademy.org/math/algebra-home/algebra/rational-exponents-and-radicals/simplify-radical-expressions/v/simplifying-square-roots-1>

Sample Problem #1: Rationalize the denominator $\frac{3}{2\sqrt{5}}$

A fraction is not considered to be in its simplest form unless there are not radicals in the denominator. If a square root is in the denominator, all you need to do is multiply the numerator and denominator of the fractions by the square root and its radicand. This creates a perfect square radicand in the denominator which simplifies to a whole number.

$\frac{3}{2\sqrt{5}}$	Original problem
$\frac{3}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$	Multiply the numerator and denominator by $\sqrt{5}$
$\frac{3\sqrt{5}}{2\sqrt{25}}$	Perform multiplication
$\frac{3\sqrt{5}}{2 \cdot 5} = \frac{3\sqrt{5}}{10}$	Simplify the denominator

Sample Problem #2: Rationalize the denominator $\frac{5}{7+\sqrt{2}}$

If the denominator is in binomial form, you must multiply the numerator and denominator by the *conjugate* of the denominator. This means to multiply by the same binomial, but with the opposite sign.

$\frac{5}{7+\sqrt{2}}$	Original problem
$\frac{5}{7+\sqrt{2}} \cdot \frac{7-\sqrt{2}}{7-\sqrt{2}}$	Multiply the numerator and denominator by conjugate of $7+\sqrt{2}$
$\frac{35-5\sqrt{2}}{49+7\cancel{\sqrt{2}}-7\cancel{\sqrt{2}}-\sqrt{4}}$	Perform multiplication
$\frac{35-5\sqrt{2}}{47}$	Simplify the denominator

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Instructions: Rationalize each denominator.

1. $\frac{5}{3\sqrt{11}}$

2. $\frac{4}{2\sqrt{7}}$

3. $\frac{7}{6-\sqrt{3}}$

4. $\frac{4+\sqrt{2}}{2-\sqrt{5}}$