

Rationalizing the Denominator: Two Terms

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

$$\frac{6}{3-\sqrt{3}} = \frac{6}{3-\sqrt{3}} \cdot \frac{3+\sqrt{3}}{3+\sqrt{3}} = \frac{18+6\sqrt{3}}{9-\sqrt{9}} = \frac{18+6\sqrt{3}}{9-3} = \frac{6(3+\sqrt{3})}{6} = 3+\sqrt{3}$$

$$\begin{aligned} \frac{2-\sqrt{3}}{\sqrt{2}+\sqrt{6}} &= \frac{2-\sqrt{3}}{\sqrt{2}+\sqrt{6}} \cdot \frac{\sqrt{2}-\sqrt{6}}{\sqrt{2}-\sqrt{6}} = \frac{2\sqrt{2}-2\sqrt{6}-\sqrt{6}+\sqrt{18}}{\sqrt{4}-\sqrt{36}} = \frac{2\sqrt{2}-3\sqrt{6}+\sqrt{9 \cdot 2}}{2-6} = \\ &= \frac{2\sqrt{2}-3\sqrt{6}+3\sqrt{2}}{-4} = -\frac{5\sqrt{2}-3\sqrt{6}}{4} \end{aligned}$$

$$\frac{5}{x+\sqrt{7}} = \frac{5}{x+\sqrt{7}} \cdot \frac{x-\sqrt{7}}{x-\sqrt{7}} = \frac{5(x-\sqrt{7})}{x^2-7} = \frac{5x-5\sqrt{7}}{x^2-7}$$

TRY:

$$\frac{5}{\sqrt{7}-\sqrt{5}}$$

$$\frac{8}{x+\sqrt{6}}$$

Some expression can be simplified first by dividing out common factors from the numerator and the denominator.

$$\frac{21+14\sqrt{2}}{7} = \frac{7(3+2\sqrt{2})}{7} = 3+2\sqrt{2}$$

Some expressions can be simplified first before rationalizing.

$$\frac{5}{10+\sqrt{50}} = \frac{5}{10+\sqrt{25 \cdot 2}} = \frac{5}{10+5\sqrt{2}} = \frac{5}{5(2+\sqrt{2})} = \frac{1}{2+\sqrt{2}} \quad \text{Now, rationalize the denominator.}$$

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

$$\frac{6}{3-3\sqrt{2}} = \frac{6}{3(1-\sqrt{2})} = \frac{2}{1-\sqrt{2}} \quad \text{Now, rationalize the denominator.}$$

$$\frac{2}{1-\sqrt{2}} = \frac{2}{1-\sqrt{2}} \cdot \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{2+2\sqrt{2}}{1-\sqrt{4}} = \frac{2+2\sqrt{2}}{1-2} = \frac{2+2\sqrt{2}}{-1} = -(2+2\sqrt{2}) = -2-2\sqrt{2}$$

TRY:

$$\frac{6}{4-4\sqrt{2}}$$

$$\frac{x-16}{\sqrt{x}-4}$$