Algebra II: Properties of Square Roots and Radical Expressions

**Product Rule:**
\[ \sqrt{ab} = \sqrt{a} \sqrt{b} \]

Examples: \( \sqrt{24} \), \( \sqrt{8\sqrt{4}} \), \( \sqrt{64} \)

**Quotient Rule**
\[ \sqrt[\frac{a}{b}] = \frac{\sqrt{a}}{\sqrt{b}}, \quad b \neq 0 \]

Examples: \( \sqrt[\frac{81}{16}] \), \( \sqrt[\frac{125}{27}] \), \( \sqrt[\frac{16}{2}] \)

Write the first 16 perfect squares:

Why is there no real number answer to the square root of a negative number?

**Directions:** Simplify the following radical expressions

\[ \sqrt{36} \]

\[ \sqrt{-25} \]

\[ \sqrt{50} \]

\[ \sqrt{27} \]
\[
\sqrt{125x^2}
\]

\[
\sqrt{2x^3} \sqrt{6x}
\]

\[
\sqrt{1} \\
\sqrt{81}
\]

\[
\sqrt{121} \\
\sqrt{9}
\]

\[
\frac{\sqrt{200x^3}}{\sqrt{10x^{-1}}}
\]

\[
7 \sqrt{3} + 6 \sqrt{3}
\]

\[
6 \sqrt{14x} - 8 \sqrt{14x}
\]

\[
3 \sqrt{50x} - 4 \sqrt{8x}
\]

\[
3 \sqrt{8} - \sqrt{32} + 3 \sqrt{72} - \sqrt{75}
\]
Rationalizing the Denominator

Rationalizing the denominator is an operator designed to __________________________.

It is done by multiplying the expression by the number ____________.

If the denominator has one term, then ____________________________.

If the denominator has two terms, then ____________________________.

Example: a denominator with one term:

\[
\frac{13}{\sqrt{5}}
\]

Example: a denominator with two terms:

\[
\frac{7}{5 + \sqrt{3}}
\]

Directions: Simplify the following radical expressions by rationalizing the denominator

\[
\frac{5}{\sqrt{3}} \quad \quad \quad \quad \quad \frac{8}{4 + \sqrt{5}}
\]

\[
\frac{6}{\sqrt{12}} \quad \quad \quad \quad \quad \frac{13}{3 + \sqrt{11}}
\]