Let \( R(x) = \frac{N(x)}{D(x)} \), find the values for \( x \) that makes \( R(x) \) undefined.

\[
R(x) = \frac{x - 3}{x + 7} \quad R(x) = \frac{x + 4}{x^2 - 3x - 10}
\]

Simplifying rational expressions is the same as _________________.

Simplify.

\[
\begin{align*}
\frac{8x^2}{24x} &= \frac{5x - 15}{25} \quad \frac{6x - 12}{7x - 14} \quad \frac{18x^2 + 6x}{6x^2 + 15x} \\
\frac{x^2 + 3x + 2}{x^2 - 1} &= \frac{3x^2 - 11x - 4}{x^2 - x - 12} \quad \frac{9x^2 - 6x - 3}{9x^2 - 27x + 18}
\end{align*}
\]
Simplify.
\[
\frac{6x^2 - 11x - 10}{6x^2 + x - 2} \cdot \frac{x - 4}{8 - 2x} \cdot \frac{x - 3}{3 - x}
\]

Section 6.2: Multiplying and Dividing Rational Expressions.

Directions! They are _______________________.

\[
\frac{10x + 20}{2x^2 - 3x + 1} \cdot \frac{x^2 - 1}{5x + 10} \quad \frac{x^2 + 7x + 12}{x^2 + 6x + 8} \cdot \frac{4 - x^2}{x^2 + x - 6} \quad \frac{x^2 - 16}{x^2} \div \frac{x^2 - 4x}{x^2 + 4x - 32}
\]

\[
\frac{x + 1}{x^2 - 1} \div \frac{x + 1}{x^2 - 2x + 1} \quad \frac{x^2 - 2x - 3}{x^2 - 4} \div \frac{x + 1}{x + 5} \quad \frac{x^2 - 1}{x^3 - 1} \div \frac{x + 3}{x^2 + 2x + 1}
\]
MAT 120 Chapter 6
Section 6.3 & 6.4: Add & Subtract Rational Expressions.
Perform the indicated operation and simplify if possible.

\[
\frac{4}{x} + \frac{x+3}{x} \quad \frac{3x}{x-5} + \frac{2x+1}{x-5} \quad \frac{2x^2 + 3x - 7}{2x+1} + \frac{x^2 + x - 8}{2x+1}
\]

\[
\frac{3x}{x+2} - \frac{x-5}{x+2} \quad \frac{x^2}{x-4} - \frac{x+12}{x-4}
\]

Finding the Least Common Multiples.

Find the L.C.M of ...

12 and 30 \quad 21x^3y^6 \quad 35x^8y^2

\[x^2 + 5x - 6 \quad x^2 - 1 \quad x^2 + 6x + 9 \quad x^2 - 9\]
Write equivalent fractions with the L.C.D.

\[
\frac{5}{36x^2} \quad \text{and} \quad \frac{7}{24x}
\]

\[
\frac{x+3}{x^2+5x-6} \quad \text{and} \quad \frac{x+7}{x^2-1}
\]

Perform the indicated operation and simplify if possible.

\[
\frac{5x^2}{8} + \frac{7x}{12}
\]

\[
\frac{7}{8x} - \frac{5}{12x^2}
\]

\[
\frac{2}{x} + \frac{3x}{x+5}
\]

\[
\frac{2x}{x^2-1} + \frac{1}{x^2+x}
\]
MAT 120 Chapter 6
Section 6.6: Solving Rational Equations.
Steps that must be followed to solve for the variable.
1. Identify any restrictions for the variable.

2. Clear the equation of fractions by

3. Solve for the variable.

4. Check your solutions with your calculator.

Solve for \( x \).

\[
\frac{x}{6} - \frac{x}{8} = \frac{1}{12}
\]

\[
\frac{2}{3x} + \frac{1}{x} = 10
\]

\[
x + \frac{6}{x} = -5
\]

\[
1 + \frac{3x}{x+2} = \frac{-6}{x+2}
\]
MAT 120 Chapter 6
Solve for $x$.
\[
\frac{3}{x-5} + \frac{1}{x+5} = \frac{2}{x^2 - 25}
\]
\[
\frac{3x + 2}{x - 2} + \frac{1}{x} = \frac{-2}{x^2 - 2x}
\]
\[
\frac{x}{x-1} - \frac{1}{x+1} = \frac{2}{x^2 - 1}
\]
\[
\frac{5}{x^2} - \frac{43}{x} = 18
\]
MAT 120 Chapter 6
Section 6.7: Word Problems.

* Work Principle

* Distance Problems

* Similar Triangles and Proportions

The roof of Finn and Paige's townhouse needs to be reshingled. Finn can do the job alone in 8 hr and Paige can do the job alone in 10 hr. How long will it take the two of them, working together, to reshingle the roof?

It takes Manuel 9 hr longer than Zoe to rebuild an engine. Working together, they can do the job in 20 hr. How long would it take each, working alone, to rebuild an engine?
MAT 120 Chapter 6

On her road bike, Olivia bikes 15 km/h faster than Jason does on his mountain bike. In the time it takes Olivia to travel 80 km, Jason travels 50 km. Find the speed of each bicyclist.

A Hudson River tugboat goes 10 mph in still water. It travels 24 mi upstream and 24 mi back in a total time of 5 hr. What is the speed of the current?

**Similar triangles.** Triangles $ABC$ and $XYZ$ are similar. Solve for $x$ if $x = 10$, $a = 8$, and $c = 5$. 
**Wildlife population.** To determine the number of brook trout in River Denys, Cape Breton, Nova Scotia, a team of volunteers and professionals caught and marked 1190 brook trout. Later, they captured 915 brook trout, of which 24 were marked. Estimate the number of brook trout in River Denys.

Convert 5.0 sec 40 yard dash to miles per hour.