1. Solve and state any restrictions. \[
\frac{x+4}{x-2} = \frac{x}{1} \]

\[1(x+4) = x(x-2)\]

\[x+4 = x^2-2x\]

\[0 = x^2-3x-4\]

\[0 = (x+1)(x-4)\]

\[x = -1, 4\]

2. Simplify and state any restrictions. \[
\frac{2x^2+7x+3}{x^2-3x-10} \cdot \frac{x^2-4}{2x^2-3x-3}\]

or If unchanged, \[
\frac{(2x+1)(x+3)(x-2)}{(x+2)(x-5)(2x-3)(x+1)}\]

\[x \neq -2, 5, 3/2, -1\]

3. Simplify and state any restrictions. \[
\frac{4x^2-7x-2}{x^2-x-2} \div \frac{4x+1}{x^2+2x+1}\]

\[\frac{4x^2-7x-2}{x^2-x-2} \cdot \frac{x^2+2x+1}{4x+1}\]

\[\frac{(4x+1)(x-2)(x+1)(x+1)}{(x+1)(x-2)(x+4x+1)}\]

\[x \neq -1, 2, -1/4\]
4. Simplify and state any restrictions.

\[ \text{LCM} = x(x+2)(x+4) \]

\[ \frac{1}{(x+2)(x+4)} + \frac{x}{x(x+2)(x+4)} \]

\[ \frac{x+4+x^2}{x(x+2)(x+4)} \]

\[ x \neq 0, -2, -4 \]

5. Simplify and state any restrictions.

\[ \frac{x+3}{6x^2-11x+5} - \frac{1}{6x^2-5x} \]

\[ \frac{(6x-5)(x-1)}{x(6x-5)(x-1)} \]

\[ \frac{(x+3)x}{x(6x-5)(x-1)} - \frac{1(x-1)}{x(6x-5)(x-1)} \]

\[ \frac{x^2+3x-x+1}{x(6x-5)(x-1)} \]

\[ \frac{x^2+2x+1}{x(6x-5)(x-1)} = \frac{(x+1)(x+1)}{x(6x-5)(x-1)} \]

\[ x \neq 0, 5/6, 1 \]

6. Solve and state any restrictions.

\[ \frac{1}{x+2} + \frac{3}{x-2} = \frac{5}{x^2-4} \]

\[ \frac{1(x+2)(x-2)}{(x+2)} + \frac{3(x+2)(x-2)}{(x-2)} = \frac{5}{(x+2)(x-2)} \]

\[ 1(x-2) + 3(x+2) = 5 \]

\[ x-2 + 3x+6 = 5 \]

\[ 4x+4 = 5 \]

\[ 4x = 1 \Rightarrow x = \frac{1}{4} \]
7. Solve and state any restrictions. \[
\frac{5}{x+1} - \frac{3}{x+1} = \frac{1}{x+1}
\]

\[
\text{\text{LCM} } = x+1
\]

\[
\text{\text{Multiply by \text{LCM}}}
\]

\[
\frac{5}{(x+1)} - \frac{3}{(x+1)} = \frac{1}{(x+1)}
\]

\[
5 - 3 = 1
\]

\[
2 \neq 1
\]

\[
\emptyset = \text{no solution}
\]

For problems #8-11, match the graph with the appropriate description.

\[\text{D}\] 8. A population of fish that increases and then levels off.

\[\text{B}\] 9. An insect population that dies out.

\[\text{C}\] 10. The length of a ticket line as the rate at which people arrive in line increases.

\[\text{A}\] 11. The wind speed during a day that is initially calm, becomes windy, and then is calm again.