Things to Know

- To solve a rational equation, multiply each side of the equation by the LCD. Solve the resulting equation. Exclude any solutions which make the denominator zero.
Algebraic symbol manipulation: Problem type 2

Solve the following equation for $F$.

\[ q \cdot C = \frac{5}{9}(F - 32) \cdot q \]

\[ 9C = 5F - 160 \]

\[ 9C + 160 = 5F \]

\[ \frac{9C + 160}{5} = \frac{5F}{5} \]

\[ \frac{9}{5} C + 32 = F \]

Solve the following equation for $m_2$.

\[ s^2 F = \frac{G m_1 m_2}{s^2} \]

\[ s^2 F = \frac{G m_1 m_2}{s^2} \]

\[ \frac{s^2 F}{G m_1} = m_2 \]

\[ \frac{s^2 F}{G m_1} = m_2 \]
Solving a rational equation that simplifies to a linear equation: Problem type 1

Solve for $x$.

\[
x \cdot 4 = -\frac{6}{x} \cdot x
\]

Simplify your answer as much as possible.

\[
\frac{4x}{4} = -\frac{6}{4}
\]

\[
x = -\frac{3}{2}
\]
Solving a rational equation that simplifies to a linear equation: Problem type 2

Solve for \( x \).

\[ 4 = -\frac{5}{x+8} \]

Simplify your answer as much as possible.

\[ \frac{4(x+8)}{x+8} = -\frac{5}{x+8} \]

\[ 4x + 32 = -5 \]

\[ -32 \quad -32 \]

\[ 4x = -37 \]

\[ x = -\frac{37}{4} \]
Solving a rational equation that simplifies to a linear equation: Problem type 3

Solve for \( u \).

\[
\frac{2}{u+4} = -\frac{7}{2u+8} + \frac{1}{1}
\]

If there is more than one solution, separate them with commas.

\[
\frac{2}{u+4} \cdot 2(u+4) = -\frac{7}{2(u+4)} \cdot 2(u+4) + 1 \cdot 2(u+4)
\]

\[
4 = -7 + 2u + 8
\]

\[
4 = 2u + 1
\]

\[
-3 = 2u
\]

\[
\frac{3}{2} = u
\]
Solving a rational equation that simplifies to a linear equation: Problem type 4

Solve for $z$.

$LCD = z$

Simplify your answer as much as possible.

$\frac{z}{4} - \frac{z}{z} = \frac{3}{z} \cdot z$

$4z - 5 = 3$

$LCD = z$

$4z = 8$

$z = 2$
Solving a rational equation that simplifies to a quadratic equation: Problem type 1

Solve for $y$.

\[
3 + \frac{7}{y-7} = \frac{7}{(y+2)(y-7)}
\]

If there is more than one solution, separate them with commas.

\[
3(y-7)(y+2) + \frac{7}{y-7} \cdot (y-7)(y+2) = \frac{7}{(y+2)(y-7)}
\]

\[
3(y^2 - 5y - 14) + 7y + 14 = 7
\]

\[
3y^2 - 15y - 42 + 7y + 14 = 7
\]

\[
3y^2 - 8y - 28 = 7
\]

\[
y^2 - \frac{8y}{3} - \frac{28}{3} = \frac{7}{3}
\]

\[
y^2 - \frac{8y}{3} = \frac{21}{3}
\]

\[
y^2 - \frac{8y}{3} - \frac{21}{3} = 0
\]

\[
3y^2 - 8y - 35 = 0
\]

\[
(3y + 7)(y - 5) = 0
\]

\[
3y + 7 = 0 \quad \text{or} \quad y - 5 = 0
\]

\[
y = \frac{-7}{3} \quad \text{or} \quad y = 5
\]
Solving a rational equation that simplifies to a quadratic equation:
Problem type 2

Solve for $x$.

$$\frac{x-1}{x-6} = \frac{x+7}{x+6} - 1$$

If there is more than one solution, separate them with commas.

$$\frac{(x-6)(x+6)}{x-6} \cdot \frac{(x-1)}{x+6} = \frac{(x+7)(x-6)(x+6)}{x+6} - 1 \cdot \frac{(x-6)(x+6)}{x+6}$$

$$\frac{x^2+5x-6}{x-6} = \frac{x^2+4x-42}{x+6} - \frac{x^2+36}{x+6}$$

$$x^2+5x-6 = x-6$$

$$x^2+5x-6 = x-6$$

$$-x + 6 \quad -x + 6$$

$$x^2+4x = 0$$

$$x(x+4) = 0$$

$$x = 0 \quad \text{or} \quad x+4 = 0$$

$$x = -4$$
Solving a rational equation that simplifies to a quadratic equation: Problem type 3

Solve for \( u \).

\[
\frac{8}{u^2 - 4u - 5} = -\frac{2u}{u + 1}
\]

If there is more than one solution, separate them with commas.

\[
\frac{8}{(u-5)(u+1)} = -\frac{2u}{u+1}
\]

\[
8 = -2u^2 + 10u
\]

\[
2u^2 - 10u + 8 = 0
\]

\[
2(u^2 - 5u + 4) = 0
\]

\[
2(u - 4)(u - 1) = 0
\]

\[
u - 4 = 0 \text{ or } u - 1 = 0
\]

\[
u = 4 \quad u = 1
\]