



**Learning Objective:** To solve equations with pronumerals and algebraic fractions.

## Equations with Algebraic Fractions

**To solve an equation that contains one fraction:**

- Take all constant terms to one side by performing inverse operations
- Multiply both sides of the equation by the denominator
- Solve the resulting equation

### Examples

Solve for x

$$\boxed{4 \times} \frac{2x+3}{4} = 2 \quad \boxed{\times 4}$$

$$2x+3=8$$

$$\boxed{-3} \quad \boxed{-3}$$

$$2x=5$$

$$\boxed{\div 2} \quad \boxed{\div 2}$$

$$\therefore x = \frac{5}{2}$$

Solve for t

$$\frac{3t}{2} - 4 = 2 \quad \boxed{+4} \quad \boxed{+4}$$

$$\boxed{2 \times} \frac{3t}{2} = 6 \quad \boxed{\times 2}$$

$$3t = 12$$

$$\boxed{\div 3} \quad \boxed{\div 3}$$

$$\therefore t = 4$$

Solve for the pronumeral.

$$4h + 5 = 2h - 6$$

$$8 - 3h = 3h - 6$$

$$2h - 4 = 4 - 2h$$

$$8 - 5d = 4 - 7d$$

Solve for the pronumeral.

$$\frac{8t}{6} - 4 = 6$$

$$\frac{6t}{4} - 5 = 7$$

$$\frac{s}{3} - 7 = 4$$

$$\frac{3b}{5} - 9 = 5$$



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## Solving One-step and Two-step Equations

**To simplify an expression with grouping symbols:**

- Expand the expression in grouping symbols by multiplying the term outside the grouping symbols by each term inside.
- Collect like terms if possible.

**To solve a linear equation:**

- Isolate the pronumeral by performing the inverse operation to both sides of the equation.

**Example:**

**Simplify**

$$\begin{aligned} 5(3a - 2) - 2a &= (5 \times 3a) + (5 \times -2) - 2a \\ &= (15a - 2a) - 10 \\ &= 13a - 10 \end{aligned}$$

**Solve for x**

$$3x + 10 = 22$$

$$\boxed{-10} \quad \boxed{-10}$$

$$3x = 12$$

$$\boxed{\div 3} \quad \boxed{\div 3}$$

$$\therefore x = 4$$

**Solve for y**

$$\boxed{6 \times} \frac{5y}{6} = 10 \quad \boxed{\times 6}$$

$$5y = 60$$

$$\boxed{\div 5} \quad \boxed{\div 5}$$

$$\therefore y = 12$$

**Solve for the pronumeral.**

$$4h + 5 = 2h - 6$$

$$\begin{aligned} 4h + 5 &= 2h - 6 \\ 4h - 2h + 5 &= -6 \\ 2h &= -6 + 5 \\ 2h &= -1 \\ h &= -1 / 2 \\ h &= -0.5 \end{aligned}$$

$$8 - 3h = 3h - 6$$

$$\begin{aligned} 8 - 3h &= 3h - 6 \\ 8 + 6 - 3h &= 3h \\ 14 - 3h &= 3h \\ 14 &= 3h + 3h \\ 14 &= 6h \\ h &= 14 / 6 \\ h &= 7 / 3 \\ h &= 2.3 \end{aligned}$$

$$2h - 4 = 4 - 2h$$

$$\begin{aligned} 2h - 4 &= 4 - 2h \\ 2h + 2h - 4 &= 4 \\ 4h - 4 &= 4 \\ 4h &= 4 + 4 \\ 4h &= 8 \\ h &= 8 / 4 \\ h &= 2 \end{aligned}$$

$$8 - 5d = 4 - 7d$$

$$\begin{aligned} 8 - 5d &= 4 - 7d \\ 8 - 5d + 7d &= 4 \\ 8 + 2d &= 4 \\ 2d &= 4 - 8 \\ 2d &= -4 \\ d &= -4 / 2 \\ d &= -2 \end{aligned}$$

**Solve for the pronumeral.**

$$\frac{8t}{6} - 4 = 6$$

$$\begin{aligned} \frac{8t}{6} - 4 &= 6 \\ \frac{8t}{6} &= 6 + 4 \\ \frac{8t}{6} &= 10 \\ 8t &= 10 \times 6 \\ 8t &= 60 \\ t &= 60 / 8 \\ t &= 7.5 \end{aligned}$$

$$\frac{6t}{4} - 5 = 7$$

$$\begin{aligned} \frac{6t}{4} - 5 &= 7 \\ \frac{6t}{4} &= 7 + 5 \\ \frac{6t}{4} &= 12 \\ 6t &= 12 \times 4 \\ 6t &= 48 \\ t &= 48 / 6 \\ t &= 8 \end{aligned}$$

$$\frac{s}{3} - 7 = 4$$

$$\begin{aligned} \frac{s}{3} - 7 &= 4 \\ \frac{s}{3} &= 4 + 7 \\ \frac{s}{3} &= 11 \\ s &= 11 \times 3 \\ s &= 33 \end{aligned}$$

$$\frac{3b}{5} - 9 = 5$$

$$\begin{aligned} \frac{3b}{5} - 9 &= 5 \\ \frac{3b}{5} &= 5 + 9 \\ \frac{3b}{5} &= 14 \\ 3b &= 14 \times 5 \\ 3b &= 70 \\ b &= 70 / 3 \\ b &= 23.3 \end{aligned}$$