

Solving fractional equations

To solve fractional equations

1. “Get rid of the denominators”
2. “Solve like a normal equation”

Get rid of the denominators

1. Choose the common denominator for the equation.
2. Multiply **EVERY TERM** in the equation by the lowest common denominator.

Examples

1. Solve: $\frac{2x}{5} + 1 = \frac{13}{5}$

The LCM is 5, so I multiply **every term** by 5

$$\frac{2x}{5} + 1 = \frac{13}{5}$$

$$\frac{\cancel{5} \cdot 2x}{\cancel{5}} + 5 \cdot 1 = \frac{\cancel{5} \cdot 13}{\cancel{5}}$$

$$2x + 5 = 13$$

$$2x = 13 - 5$$

$$x = 4$$

Remember to multiply **every term** by 5, including the 1.

2. Solve: $\frac{x}{3} - \frac{2x}{5} = \frac{-7}{15}$

The LCM is 15, so I multiply every term by 15

$$\frac{\overset{5}{\cancel{15}} \cdot x}{\cancel{3}} - \frac{\overset{3}{\cancel{15}} \cdot 2x}{\cancel{5}} = \frac{\cancel{15} \cdot (-7)}{\cancel{15}}$$

$$5x - 6x = -7$$

$$-x = -7$$

$$x = 7$$

3. Solve: $\frac{5}{x+2} = \frac{1}{x}$

The common denominator is $x(x+2)$. Multiply **every term** by $x(x+2)$:

$$\frac{5}{x+2} = \frac{1}{x}$$

$$x(x+2) \frac{5}{x+2} = x(x+2) \frac{1}{x}$$

$$x \cdot \cancel{(x+2)} \frac{5}{\cancel{x+2}} = \cancel{x} \cdot (x+2) \frac{1}{\cancel{x}} \quad (x \neq 0 \text{ and } x+2 \neq 0)$$

$$5x = x + 2$$

$$5x - x = 2$$

$$4x = 2$$

$$x = \frac{2}{4} = \frac{1}{2} = 0.5$$

$$x=0.5$$

Since this problem is in the form of a **proportion**, it can also be solved by using "**cross multiply**". (*In a proportion, the product of the means equals the product of the extremes.*)

$$\frac{5}{x+2} = \frac{1}{x}$$

$$5 \cdot x = (x + 2) \cdot 1$$

$$5x = x + 2$$

$$5x - x = 2$$

$$4x = 2$$

$$x = \frac{2}{4} = \frac{1}{2} = 0.5$$

EXERCISES

1. Solve for each variable, leave the answer as a fraction.

$$a. \quad 3x + \frac{x}{2} = \frac{3x}{2}$$

$$i. \quad 2 \cdot (3\omega + 4) + 5 \cdot (3\omega - 5) = 3 \cdot (\omega - 7) + 8$$

$$b. \quad \frac{x}{4} - 2x = -2x$$

$$j. \quad \frac{2 \cdot (\chi + 1)}{3} - \frac{\chi}{2} = \frac{\chi + 2 \cdot (\chi + 2)}{6} - \frac{\chi}{3}$$

$$c. \quad \frac{-2x}{5} - 2x + \frac{x}{3} = -x$$

$$k. \quad \frac{\alpha + 3}{2} - \frac{2 \cdot (\alpha + 1)}{3} = \alpha - 5$$

$$d. \quad -5x - \frac{4x}{3} + x = -2(x + 3)$$

$$l. \quad -2x + 7 = x + 3(x + 1)$$

$$e. \quad 3 \cdot (x + 4) + \frac{5x}{2} = \frac{3x}{2}$$

$$m. \quad \frac{2 + x}{3} - \frac{x + 1}{2} = x + \frac{3x + 1}{6}$$

$$f. \quad \frac{\alpha + 3}{2} = \alpha - 5$$

$$n. \quad 5(x - 3) + 2x = 7x - 4$$

$$o. \quad 1 - \frac{x}{4} - \frac{2 - x}{3} = \frac{x}{6}$$

$$g. \quad \frac{\alpha + 3}{2} - \frac{2 \cdot (\alpha + 1)}{3} = \alpha - 5$$

$$p. \quad \frac{-4}{x-1} = \frac{-5}{x+1}$$

$$h. \quad \frac{5}{x+1} = \frac{-5}{x}$$

$$q. \quad \frac{-4(2-x)}{x-1} = -\frac{2}{3}$$