

4.3 - Equation-Solving Strategies

Key Ideas

1. Use inverse operations to group the variable terms on one side of the equation and constant terms on the other.
2. Use the lowest common denominator to eliminate fractions in the equation.
3. Expand brackets (if they exist) before isolating for the variable.
4. Always check your answer by substituting it back into the original equation to see if $LS = RS$.

Example One

Solve each equation. Verify each solution.

a) $2x - 4 = 6x + 8$

- Variables on one side, constants on the other.

$$2x - 6x = 8 + 4$$

$$\frac{-4x}{-4} = \frac{12}{-4}$$

$$x = -3$$

Check

$$2(-3) - 4 = 6(-3) + 8$$

$$-6 - 4 = -18 + 8$$

$$-10 = -10$$

$$b) \underline{5}(t - 2) = 3(3t + 1) - 2t$$

- First, expand brackets.

1. Expand brackets.

- Variables on one side, constants on the other.

$$5t - 10 = 9t + 3 - 2t$$

$$5t - 9t + 2t = 3 + 10$$

$$\frac{-2t}{-2} = \frac{13}{-2}$$

$$t = -6.5$$

Check

$$5(-6.5 - 2) = 3(3(-6.5) + 1) - 2(-6.5)$$

$$5(-8.5) = 3(-19.5 + 1) + 13$$

$$-42.5 = 3(-18.5) + 13$$

$$-42.5 = -42.5$$

Example Two

Solve each equation. Verify each solution.

$$a) \frac{r+2}{7} = \frac{2}{3}$$

- MULTIPLY EVERY TERM by the common denominator.

1. Multiply all terms by the common denominator.

- Variables on one side, constants on the other.

$$3 \cancel{21} \left[\frac{r+2}{\cancel{7}} \right] = \cancel{7} \cancel{21} \left[\frac{2}{\cancel{3}} \right]$$

$$3(r+2) = 7(2)$$

2. Expand brackets.

$$3r + 6 = 14$$

3. Collect like terms.

$$3r = 14 - 6$$

$$3r = 8$$

4. Isolate for variable.

$$\frac{3r}{3} = \frac{8}{3}, r = 2\frac{2}{3}$$

$$b) \frac{w-1}{6} = \frac{3w}{8}$$

- MULTIPLY EVERY TERM by the common denominator.

1. Multiply all terms
by common denominator.

- Variables on one side, constants on the other.

$$\cancel{48}^8 \left[\frac{w-1}{\cancel{6}} \right] = \cancel{48}^6 \left[\frac{3w}{\cancel{8}} \right]$$

$$8(w-1) = 6(3w) \quad \frac{w-1}{\cancel{6}} = \frac{3w}{\cancel{8}}$$

2. Expand the brackets.

$$8w - 8 = 18w$$

3. Isolate for variable.

$$8w - 18w = 8$$

$$\frac{-10w}{-10} = \frac{8}{-10}, w = \frac{-8}{10} = -0.8$$

Complete: p. 220 - 223 # 5, 7, 8, 11, 12ace.