

2.3 Solving Multi-Step Equations

Solutions

Solve each equation and check your solutions.	
<p>1. $3x + 5 = 38$ Check:</p> $\begin{array}{r} \underline{-5} \quad \underline{-5} \\ 3x = 33 \\ \frac{3x}{3} = \frac{33}{3} \\ x = 11 \end{array}$ <p style="margin-left: 100px;"> $3x + 5 = 38$ $3 \cdot 11 + 5 = 38 ?$ $33 + 5 = 38 ?$ $38 = 38 ? \text{ Yes}$ </p> <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">{11}</div>	<p>2. $-5a + 4 = 19$ Check:</p>
<p>3. $2x - 3 = -21$ Check:</p> $\begin{array}{r} \underline{+3} \quad \underline{+3} \\ 2x = -18 \\ \frac{2x}{2} = \frac{-18}{2} \\ x = -9 \end{array}$ <p style="margin-left: 100px;"> $2x - 3 = -21$ $2 \cdot -9 - 3 = -21 ?$ $-18 - 3 = -21 ?$ $-21 = -21 ? \text{ Yes}$ </p> <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">{-9}</div>	<p>4. $-4x - 7 = 1$ Check:</p>
<p>5. $17 = 3x + 5$ Check:</p> $\begin{array}{r} \underline{-5} \quad \underline{-5} \\ 12 = 3x \\ \frac{12}{3} = \frac{3x}{3} \\ x = 4 \end{array}$ <p style="margin-left: 100px;"> $17 = 3x + 5$ $17 = 3 \cdot 4 + 5 ?$ $17 = 12 + 5 ?$ $17 = 17 ? \text{ Yes}$ </p> <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">{4}</div>	<p>6. $-2 = 2x + 16$ Check:</p>
<p>Answers: 1. {11}; 3. {-9}; 5. {4}</p>	

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<p>7. $5 - 4x = -6$</p> $\begin{array}{r} \underline{-5} \quad \underline{-5} \\ -4x = -11 \\ \underline{-4x} \quad \underline{-11} \\ -4 = -4 \\ x = \frac{11}{4} \end{array}$ <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;"> $\left\{ \frac{11}{4} \right\}$ </div>	<p>Check:</p> $\begin{array}{l} 5 - 4x = -6 \\ 5 - 4 \cdot \frac{11}{4} = -6? \\ 5 - 11 = -6? \\ -6 = -6? \text{ Yes} \end{array}$
<p>9. $-x - 5.6 = 3.2$</p> $\begin{array}{r} \underline{+5.6} \quad \underline{+5.6} \\ -x = 8.8 \\ -1 \cdot -x = -1 \cdot 8.8 \\ x = -8.8 \end{array}$ <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;"> $\{-8.8\}$ </div>	<p>Check:</p> $\begin{array}{l} -x - 5.6 = 3.2 \\ -(-8.8) - 5.6 = 3.2? \\ 8.8 - 5.6 = 3.2? \\ 3.2 = 3.2? \text{ Yes} \end{array}$
<p>11. $7x - 3 = 5x - 7$</p> $\begin{array}{r} \underline{-5x} \quad \underline{-5x} \\ 2x - 3 = -7 \\ \underline{+3} \quad \underline{+3} \\ 2x = -4 \\ \frac{2x}{2} = \frac{-4}{2} \\ x = -2 \end{array}$ <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;"> $\{-2\}$ </div>	<p>Check:</p> $\begin{array}{l} 7x - 3 = 5x - 7 \\ 7 \cdot -2 - 3 = 5 \cdot -2 - 7? \\ -14 - 3 = -10 - 7? \\ -17 = -17? \text{ Yes} \end{array}$
<p>8. $4 - x = -2$</p>	<p>Check:</p>
<p>10. $-y - 5.9 = -3$</p>	<p>Check:</p>
<p>Answers: 7. $\left\{ \frac{11}{4} \right\}$; 9. $\{-8.8\}$; 11. $\{-2\}$</p>	

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<p>13. $8x - 6 = 10x$</p> $\begin{array}{r} \underline{-8x} \quad \underline{-8x} \\ -6 = 2x \\ \underline{-6} = \underline{2x} \\ \underline{2} = \underline{2} \\ x = -3 \end{array}$ <p>Check:</p> $\begin{array}{l} 8x - 6 = 10x \\ 8 \cdot -3 - 6 = 10 \cdot -3? \\ -24 - 6 = -30? \\ -30 = -30? \text{ Yes} \end{array}$ <p style="text-align: center;">{-3}</p>	<p>14. $8x - 3 = 9x$</p> <p>Check:</p>
<p>15. $4 - x = 4x - 11$</p> $\begin{array}{r} \underline{+x} \quad \underline{+x} \\ 4 = 5x - 11 \\ \underline{+11} \quad \underline{+11} \\ 15 = 5x \\ \underline{15} = \underline{5x} \\ \underline{5} = \underline{5} \\ x = 3 \end{array}$ <p>Check:</p> $\begin{array}{l} 4 - x = 4x - 11 \\ 4 - 3 = 4 \cdot 3 - 11? \\ 1 = 12 - 11? \\ 1 = 1? \text{ Yes} \end{array}$ <p style="text-align: center;">{3}</p>	<p>16. $7 - 3x = 4x + 14$</p> <p>Check:</p>
<p>17. $-x + 5 + 4x = 23$</p> $\begin{array}{r} -x + 4x + 5 = 23 \\ 3x + 5 = 23 \\ \underline{-5} \quad \underline{-5} \\ 3x = 18 \\ \underline{3x} = \underline{18} \\ \underline{3} = \underline{3} \\ x = 6 \end{array}$ <p>Check:</p> $\begin{array}{l} -x + 5 + 4x = 23 \\ -6 + 5 + 4 \cdot 6 = 23? \\ -1 + 24 = 23? \\ 23 = 23? \text{ Yes} \end{array}$ <p style="text-align: center;">{6}</p>	<p>18. $3x + 2 + 7x = 42$</p> <p>Check:</p>
<p>Answers: 13. {-3}; 15. {3}; 17. {6}</p>	

Solve each equation.

$$\begin{aligned} 19. \quad 3(2x + 1) - 5 &= 22 \\ 6x + 3 - 5 &= 22 \end{aligned}$$

$$\begin{aligned} 6x - 2 &= 22 \\ \underline{+2} \quad \underline{+2} \end{aligned}$$

$$6x = 24$$

$$\frac{6x}{6} = \frac{24}{6}$$

$$x = 4$$

{4}

$$20. \quad 5(3x - 1) + 5 = -60$$

$$21. \quad 2(3x - 1) = -2(4x - 3) + 9x$$

$$6x - 2 = -8x + 6 + 9x$$

$$6x - 2 = -8x + 9x + 6$$

$$6x - 2 = x + 6$$

$$\underline{-x} \quad \underline{-x}$$

$$\begin{aligned} 5x - 2 &= 6 \\ \underline{+2} \quad \underline{+2} \end{aligned}$$

$$5x = 8$$

$$\frac{5x}{5} = \frac{8}{5}$$

$$x = \frac{8}{5}$$

{ $\frac{8}{5}$ }

$$22. \quad 2(x - 3) = -2(3x - 1) + 5x + 1$$

$$23. \quad 5x - (3x - 4) = -2$$

$$5x + -(3x + -4) = -2$$

$$5x + -3x + 4 = -2$$

$$\begin{aligned} 2x + 4 &= -2 \\ \underline{-4} \quad \underline{-4} \end{aligned}$$

$$2x = -6$$

$$\frac{2x}{2} = \frac{-6}{2}$$

$$x = -3$$

{-3}

$$24. \quad 5 = 4x - (x - 1)$$

Answers: 19. {4}; 21. { $\frac{8}{5}$ }; 23. {-3}