Section 5.R.4 **Solving Multi-Step Linear Equations**

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Solving Equations of the Form $ax + b = c$

> ### Procedure for Solving Linear Equations that Simplify to the Form $ax + b = c$
>
> 1. Combine _____ on both sides of the equation.
>
> 2. Use the **addition principle of equality** and _____ _____ .
>
> 3. Use the **multiplication** (or **division**) **principle of equality** to _____ _____ (or _____ _____). The coefficient of the variable will become_____ .
>
> 4. Check your answer by _____ in the original equation.

▶ **Example 2**   **Solving Linear Equations of the Form $ax + b = c$**

Solve the equation: $-26 = 2y - 14 - 4y$

Solution

Exercises

Solve each equation.

1. $3x + 11 = 2$

2. $4y - 8 = -12$

3. $6x + 10 = 22$

4. $1 - 3y = 4$

5. $-5x + 2.9 = 3.5$

6. $10 + 3x - 4 = 18$

7. $14 = 9x + 5 + 8$

8. $5y - 3y + 2 = 2$

9. $\dfrac{3}{5}x + 4 = \dfrac{9}{5}$

10. $2.5x + 0.5x - 3.5 = 2.5$

Solving Equations of the Form $ax + b = cx + d$

Remember that the objective is to get the _____ with a coefficient of $+\mathbf{1}$.

Procedure for Solving Linear Equations that Simplify to the Form $ax + b = cx + d$

1. Simplify each side of the equation by _____
   and _____ on both sides of the equation.

2. Use the **addition principle of equality** and add the opposite of a _____
   _____ so that _____ are on one side and _____
   are on the other side.

3. Use the **multiplication** (or **division**) **principle of equality**_____
   _____ (or _____
   _____). The coefficient of the variable will become _____.

4. Check your answer _____ in the original equation.

▶ **Example 9** **Solving Linear Equations Involving Parentheses**

Solve the equation: $-2(5x + 13) - 2 = -6(3x - 2) - 41$

Solution

Exercises

Solve each equation.

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11. $3x + 2 = x - 8$

12. $5x + 1 = 2x - 5$

13. $14n = 3n$

14. $6y - 2.1 = y - 2.1$

15. $2(z + 1) = 3z + 3$

16. $16y + 23y - 3 = 16y - 2y + 2$

17. $x - 0.1x + 0.8 = 0.2x + 0.1$

18. $\dfrac{2}{3}x + 1 = \dfrac{1}{3}x - 6$

Conditional Equations, Identities and Contradictions

Every linear equation is a _____ equation.

Three Types of Equations

Type of Equation	Number of Solutions
Conditional	_____
Identity	_____
Contradiction	_____

▶ **Example 13**   **Determining Types of Equations**

Determine whether the equation $-2(x - 7) + x = 14 - x$ is a conditional equation, an identity, or a contradiction.

Solution

Exercises

Determine whether each equation is a conditional equation, an identity, or a contradiction.

19. $2(3x - 1) + 5 = 3$

20. $-2x + 13 = -2(x - 7)$

21. $5x + 13 = -2(x - 7) + 3$

22. $7(x - 1) = -3(3 - x) + 4x$

23. $3(x - 2) + 4x = 6(x - 1) + x$

24. $5(x + 1) = 3(x + 1) + 2(x + 1)$

25. $8x - 20 + x = -3(5 - 2x) + 3(x - 4)$

26. $5.2x + 3.4x = 0.2(x - 0.42)$