

3-2 Solving Equations by Adding or Subtracting (Pages 124–128)

You can use the **subtraction property of equality** and the **addition property of equality** to change an equation into an **equivalent equation** that is easier to solve.

Subtraction Property of Equality	If you subtract the same number from each side of an equation, the two sides remain equal. For any numbers $a, b,$ and $c,$ if $a = b,$ then $a - c = b - c.$
Addition Property of Equality	If you add the same number to each side of an equation, the two sides remain equal. For any numbers $a, b,$ and $c,$ if $a = b,$ then $a + c = b + c.$

EXAMPLES

A Solve $q + 12 = 37.$

$$\begin{aligned} q + 12 &= 37 \\ q + 12 - 12 &= 37 - 12 && \text{Subtract 12 from each side.} \\ q &= 25 && \text{Check your solution by} \\ &&& \text{replacing } q \text{ with 25.} \end{aligned}$$

B Solve $k - 23 = 8.$

$$\begin{aligned} k - 23 &= 8 \\ k - 23 + 23 &= 8 + 23 && \text{Add 23 to each side.} \\ k &= 31 && \text{Check your solution.} \end{aligned}$$

PRACTICE


Solve each equation and check your solution.

- | | | |
|-------------------|---------------------|--------------------|
| 1. $a + 17 = 48$ | 2. $z + 19 = -4$ | 3. $b - (-8) = 21$ |
| 4. $y + 42 = 103$ | 5. $129 = g + 59$ | 6. $39 = h + 14$ |
| 7. $c - 17 = 64$ | 8. $j + 403 = 564$ | 9. $64 + r = 108$ |
| 10. $24 - s = 18$ | 11. $d - (-4) = 52$ | 12. $78 = f + 61$ |

Solve each equation. Check each solution.

- | | | |
|----------------------------|--------------------------|----------------------------|
| 13. $(18 + y) - 4 = 17$ | 14. $(p - 4) + 72 = 5$ | 15. $(n - 11) + 14 = 23$ |
| 16. $[k + (-2)] + 18 = 30$ | 17. $(m + 42) - 23 = 10$ | 18. $81 = [t - (-4)] + 11$ |

19. Sailing Skip sets sail from Chicago headed toward Milwaukee. Milwaukee is 74 miles from Chicago. He stops for lunch in Kenosha, which is 37 miles from Chicago. How far does he still have to sail?

 **20. Standardized Test Practice** In the high mountain plains of Colorado, the temperature can change dramatically during a day, depending upon the sun and season. On a June day, the low temperature was 14°F . If the high temperature that day was 83°F , by how much had the temperature risen?

- A** 50°F **B** 69°F **C** 70°F **D** 83°F

Answers: 1. 31 2. -23 3. 13 4. 61 5. 70 6. 25 7. 81 8. 161 9. 44 10. 6 11. 48 12. 17 13. 3 14. -63 15. 20 16. 14 17. -9 18. 66 19. 37 miles 20. B
