

## 3-1

 NAME \_\_\_\_\_ DATE \_\_\_\_\_  
**Solving Equations with Addition and Subtraction** (Pages 144–149)

You can add or subtract the same number on each side of an equation and the result is an **equivalent equation**. Equivalent equations have the same solution.

<b>Addition Property of Equality</b>	For any numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a + c = b + c$ .
<b>Subtraction Property of Equality</b>	For any numbers $a$ , $b$ , and $c$ , if $a = b$ , then $a - c = b - c$ .
<b>Solving Equations</b>	To <b>solve an equation</b> means to get the variable (with a coefficient of 1) by itself on one side of the equation. You can do this by undoing what has been done to the variable, using the properties of equality.

**EXAMPLES**

**A** Solve  $x - \frac{2}{3} = \frac{1}{3}$ .

The number  $\frac{2}{3}$  has been subtracted from  $x$ . The opposite of subtracting  $\frac{2}{3}$  is adding  $\frac{2}{3}$ . Add  $\frac{2}{3}$  to each side of the equation.  $x - \frac{2}{3} + \frac{2}{3} = \frac{1}{3} + \frac{2}{3}$  is an equivalent equation. Simplify to obtain  $x = 1$ .  
 Check: Is  $1 - \frac{2}{3} = \frac{1}{3}$ ? Yes.  
 The solution is 1.

**B** Solve  $9 + y = 13$ .

Write an equivalent equation by subtracting 9 from each side of the original equation.  
 $9 + y - 9 = 13 - 9$ , so  $y = 4$ .  
 Check: Does  $9 + 4 = 13$ ? Yes.  
 The solution is 4.

**Try These Together**

1. Solve  $a + (-8) = 17$ .

HINT: Add 8 to each side.

2. Solve  $b - (-18) = 4$ .

HINT: This equation is equivalent to  $b + 18 = 4$ .

**PRACTICE**

Solve each equation. Check your solution.

3.  $11 - c = -16$

4.  $5.4 = d + 6.2$

5.  $e - (-23) = 31$

6.  $4.8 + f = 9.6$

7.  $g - (-20) = 11$

8.  $14 = h - 21$

9.  $-2.8 = j + (-5.1)$

10.  $-12 + k = -19$

11.  $m + (-8) = \frac{1}{2}$

12. **Age** Minya is 30 years younger than her mom, and the sum of their ages is 58. How old is Minya?



13. **Standardized Test Practice** If the low temperature for the day is  $-14^\circ\text{F}$  and the high is  $22^\circ\text{F}$ , by how much did the temperature increase?

**A**  $8^\circ\text{F}$

**B**  $18^\circ\text{F}$

**C**  $28^\circ\text{F}$

**D**  $36^\circ\text{F}$

Answers: 1. 25 2. -14 3. 27 4. -0.8 5. 8 6. 4.8 7. -9 8. 35 9. 2.3 10. -7 11.  $8\frac{1}{2}$  12. 14 13. D