Solving Equations and Formulas

(Pages 166–170)

Some equations contain more than one variable. To solve an equation or formula for a specific variable, you need to get that variable by itself on one side of the equation. When you divide by a variable in an equation, remember that division by 0 is undefined.

When you use a formula, you may need to use dimensional analysis, which is the process of carrying units throughout a computation.

**Examples**

**a. Solve the formula** \( d = rt \) for \( t \).

The variable \( t \) has been multiplied by \( r \), so divide each side by \( r \) to isolate \( t \).

\[
\frac{d}{r} = \frac{rt}{r} \quad \text{or} \quad \frac{d}{r} = t
\]

Thus \( t = \frac{d}{r} \), where \( r \neq 0 \).

**b. Find the time it takes to drive 75 miles at an average rate of 35 miles per hour.**

Use the formula you found for \( t \) in Example A.

\[
t = \frac{d}{r}
\]

\[
 t = \frac{75 \text{ mi}}{35 \text{ mi} / \text{h}} = \frac{75 \text{ mi}}{35 \text{ mi} / \text{h}} = \frac{75 \text{ mi}}{35 \text{ mi} / \text{h}} = t = 2 \frac{1}{7} \text{ hours}
\]

**Try These Together**

1. Solve \( 4a + b = 3a \) for \( a \).

**HINT:** Begin by subtracting 3a from each side.

2. Solve \( \frac{c + d}{3} = 2c \) for \( c \).

**HINT:** Begin by multiplying each side by 3.

**Practice**

Solve each equation for the variable specified.

3. \( f = epd, \) for \( e \)

4. \( 12g + 31h = -8g, \) for \( h \)

5. \( y = mx + b, \) for \( b \)

6. \( v = r + at, \) for \( r \)

7. \( \frac{3x + y}{c} = 4, \) for \( c \)

8. \( \frac{5xy + n}{2} = -6, \) for \( y \)

9. \( m + n + 2p = 3, \) for \( m \)

10. \( 6y + z = bc - 2y, \) for \( y \)

11. \( 3x - 4y = 7, \) for \( y \)

12. \( s = \frac{n}{2}(a + t), \) for \( n \)

13. \( v = \frac{4}{3}r, \) for \( r \)

14. \( W = mgh, \) for \( g \)

15. \( PV = nRT, \) for \( V \)

16. \( G = F - D, \) for \( D \)

17. \( 6t + 62s = \frac{1}{2}(3t - 42s), \) for \( t \)

18. \( 3c + 5d = 7d - 6c, \) for \( d \)

19. **Standardized Test Practice**

Four ninths of a number \( c \) increased by 4 is 18 less than one eighth times another number \( d \). Solve for \( c \).

\[
\begin{align*}
\text{A} & : c = 9 \frac{9}{32}d + 31 \frac{1}{2} \\
\text{B} & : c = 4 \frac{4}{72}d + 4 \frac{4}{72} \\
\text{C} & : c = 9 \frac{9}{32}d - 49 \frac{1}{2} \\
\text{D} & : c = 4 \frac{4}{72}d - 31 \frac{1}{2}
\end{align*}
\]

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