

2-3 Notes

Solving Multi-Step Equations

When solving multi-step equations, we 'undo' operations by working 'backwards.' Reverse the usual order of operations as you work.

Example 1: A number is divided by 2, and then 8 is subtracted from the quotient. The result is 16. What is the number?

$$\frac{n}{2} - 8 = 16$$

$$+8 \quad +8$$

$$n = 48$$

$$2 \cdot \frac{n}{2} = 24 \cdot 2$$

Exercises

Solve each problem.

1. A number is divided by 3, and then 4 is added to the quotient.

The result is 8. Find the number.

$$\frac{n}{3} + 4 = 8$$

$$-4 \quad -4$$

$$3 \cdot \frac{n}{3} = 4 \cdot 3$$

$$n = 12$$

2. A number is multiplied by 5, and then 3 is subtracted from the product.

The result is 12. Find the number.

$$5n - 3 = 12$$

$$+3 \quad +3$$

$$5n = 15$$

$$\div 5 \quad \div 5$$

$$n = 3$$

3. Eight is subtracted from a number, and then the difference is multiplied by 2.

The result is 24. Find the number.

$$2(n - 8) = 24$$

$$2n - 16 = 24$$

$$+16 \quad +16$$

$$2n = 40$$

$$\div 2 \quad \div 2$$

$$n = 20$$

4. **CAR RENTAL** Angela rented a car for \$29.99 a day plus a one-time insurance cost of \$5.00. Her bill was \$124.96. For how many days did she rent the car?

$$\text{Cost} = 29.99d + 5.00$$

$$124.96 = 29.99d + 5$$

$$-5 \quad -5$$

$$119.96 = 29.99d$$

$$\frac{119.96}{29.99} = \frac{29.99d}{29.99}$$

$$4 = d$$

$$\text{Car rental} = 4 \text{ days}$$

2-3 Notes (continued)**Exercises**

Solve each equation. Check your solution.

1. $\frac{7}{8}p - 4 = 10$

$$\begin{array}{r} +4 \quad +4 \\ \hline \frac{8}{7}(\frac{7}{8}p) = 14 + \frac{8}{7} \end{array}$$

$$p = 16$$

3. $\frac{4b+8}{-2} = 10 \div 2$

$$\begin{array}{r} 4b+8 = -20 \\ \hline -8 \quad -8 \end{array}$$

$$\begin{array}{r} 4b = -28 \\ \hline 4 \quad 4 \end{array}$$

$$b = -7$$

2. $\frac{g}{-5} + 3 = -13$

$$\begin{array}{r} -3 \quad -3 \\ \hline \frac{g}{-5} = -16 \end{array}$$

$$\begin{array}{r} -5 \cdot \frac{g}{-5} = -16 \cdot -5 \\ \hline g = 80 \end{array}$$

$$-4 = \frac{7x-(-1)}{-8}$$

$$\begin{array}{r} 32 = 7x + 1 \\ \hline -1 \quad -1 \\ \hline 31 = 7x \\ \hline 7 \quad 7 \end{array}$$

$$x = \frac{31}{7}$$

Write an equation and solve each problem.

5. Find three consecutive integers whose sum is 96.

let $x = 1^{\text{st}}$ integer
 $x+1 = 2^{\text{nd}}$
 $x+2 = 3^{\text{rd}}$

$$x + (x+1) + (x+2) = 96$$

$$\begin{array}{r} 3x+3 = 96 \\ \hline -3 \quad -3 \end{array}$$

$$\frac{3x}{3} = \frac{93}{3}$$

$$x = 31$$

$$\begin{array}{l} 1^{\text{st}} = 31 \\ 2^{\text{nd}} = 32 \\ 3^{\text{rd}} = 33 \end{array}$$

6. Find three consecutive integers whose sum is -93.

let $x = 1^{\text{st}}$ integer
 $x+1 = 2^{\text{nd}}$
 $x+2 = 3^{\text{rd}}$

$$x + (x+1) + (x+2) = -93$$

$$\begin{array}{r} 3x+3 = -93 \\ \hline -3 \quad -3 \end{array}$$

$$\frac{3x}{3} = \frac{-96}{3}$$

$$x = -32$$

$$\begin{array}{l} 1^{\text{st}} = -32 \\ 2^{\text{nd}} = -31 \\ 3^{\text{rd}} = -30 \end{array}$$