



3.3 Solving Multi-Step Equations

Each week for 7 weeks a store reduced the price of a DVD player by \$8.99. The original price was \$329.00. Jalissa wants a DVD player but has saved only \$295.00. How long does she have to wait to purchase the DVD player?

$$\begin{array}{r}
 329 - 8.99x \\
 -329 \\
 \hline
 -8.99x = -34 \\
 \frac{-8.99x}{-8.99} = \frac{-34}{-8.99} \\
 x = 3.78 \\
 x = 4 \text{ weeks}
 \end{array}$$

Notes:

Procedure for Solving
a Two-Step Equation

1. Undo any indicated additions or subtractions.
2. Undo any indicated multiplications or divisions involving the variable.

Problem-Solving Strategies

draw a diagram

make a table or chart

make a model

guess and check

check for hidden assumptions

use a graph

solve a simpler/similar problem

eliminate the possibilities

look for a pattern

act it out

list the possibilities

identify subgoals

3.3 In-Class Examples

1. A school cafeteria sells more garden salads than soup but not as much as pizza. Fewer sandwiches are sold than soup. Order the lunch items from the most popular to the least popular.

P
G
S
Sa

2. Arin bought a winter coat for \$6 less than half its original price. Arin paid \$65 for the coat. what was the original price? = c

$$\begin{aligned} \frac{1}{2}c - 6 &= 65 \\ +6 & \quad +6 \\ 2 \cdot \frac{1}{2}c - 71 &= 122 \\ c &= \$142 \end{aligned}$$

3. Solve.

$$a. \frac{t}{3} + 11 = 29$$

$$\begin{aligned} & -11 \quad -11 \\ b. \frac{t}{3} &= 18 \cdot 3 \\ t &= 54 \end{aligned}$$

$$c. \frac{2}{3}a - 14 = 61$$

$$\begin{aligned} & +14 \quad +14 \\ \frac{2}{3} \cdot \frac{3}{2} a &= 75 \cdot \frac{3}{2} \\ a &= \frac{225}{2} = 112\frac{1}{2} \end{aligned}$$

$$e. \frac{3b + 1}{2} = -25 \cdot 2$$

$$\begin{aligned} 3b + 1 &= -50 \\ -1 \quad -1 \\ 3 \frac{b}{3} &= \frac{-51}{3} \\ b &= -17 \end{aligned}$$

$$b. \frac{x}{5} - 17 = 3$$

$$\begin{aligned} & +17 \quad +17 \\ 5 \cdot \frac{x}{5} &= 20 \cdot 5 \\ x &= 100 \end{aligned}$$

$$d. 12 = \frac{(2 - 3x) \cdot 4}{4}$$

$$\begin{aligned} 48 &= 2 - 3x \\ -2 \quad -2 \\ 46 &= \frac{-3x}{-3} \quad X = \frac{-46}{3} \end{aligned}$$

$$f. \frac{5 + 2x}{8} = 14 \cdot 8$$

$$\begin{aligned} 5 + 2x &= 112 \\ -5 \quad -5 \\ \frac{2x}{2} &= \frac{107}{2} \\ x &= \frac{107}{2} \end{aligned}$$

Solving Multi-Step Equations

Solve each equation. Then check your solution.

1. $5x + 3 = 23$ **4**

3. $19 = 3y - 5$ **8**

5. $8 - 5w = -37$ **9**

7. $0.4m - 3 = -1$ **5**

9. $\frac{n}{3} - 8 = -2$ **18**

11. $13 = \frac{w}{-3} - 4$ **-51**

13. $\frac{3}{4}x - 7 = 8$ **20**

15. $-17 = -32 - \frac{3}{8}f$ **-25**

17. $-14 = \frac{s+12}{-6}$ **72**

2. $4 = 3a - 14$ **6**

4. $6 - 5c = -29$ **7**

6. $42 = \frac{18}{-18} - 4v$ **-6**

8. $3.2e + 2.6 = -23$ **-8**

10. $\frac{x}{-4} + 5 = 1$ **16**

12. $-7 = \frac{c}{-6} + 12$ **114**

14. $-12 = 6 + \frac{2}{5}y$ **-27**

16. $8 - \frac{3}{8}k = -4$ **32**

18. $\frac{u+12}{-4} = 5$ **-32**

Define a variable, write an equation, and solve each problem. Then check your solution.

19. Find two consecutive odd integers whose sum is 116.
- 57, 59**

20. Find two consecutive even integers whose sum is 126.
- 62, 64**

$$\begin{aligned} x + x + 2 &= 116 \\ 2x + 2 &= 116 \\ -2 & \\ 2x &= 114 \\ \frac{2x}{2} &= \frac{114}{2} \\ x &= 57, 59 \end{aligned}$$

$$\begin{aligned} x + x + 2 &= 126 \\ 2x + 2 &= 126 \end{aligned}$$

21. Find three consecutive odd integers whose sum is 117.
- 37, 39, 41**

22. Find two consecutive even integers whose sum is 217.
- no solution**

$$\begin{aligned} 24) \quad x + x + 2 + x + 4 &= 396 \\ 3x + 6 &= 396 \end{aligned}$$

$$\begin{aligned} 16) \quad 8 - \frac{3}{8}k &= -4 \\ -8 & \\ -8 - \frac{3}{8}k &= -84 \\ -\frac{3}{8}k &= -76 \\ \frac{-3}{3} \cdot \frac{-8}{8}k &= \frac{-76 \cdot -8}{3} \\ k &= 32 \end{aligned}$$

$$\begin{aligned} 8) \quad 3.2e + 2.6 &= -23.0 \\ -2.6 & \\ 3.2e &= -25.6 \\ \frac{3.2e}{3.2} &= \frac{-25.6}{3.2} \\ e &= -8 \end{aligned}$$

$$\begin{aligned} 14) \quad -12 &= +6 + \frac{2}{5}y \\ -6 & \\ -6 &= \frac{2}{5}y \\ \frac{-6 \cdot 5}{2} &= \frac{2 \cdot 5}{2}y \\ -27 &= y \end{aligned}$$

Can the sum of two consecutive even integers ever equal the sum of two consecutive odd integers?

$$3 + 5 = 8$$

$$1 + 3 = 4$$

$$0 + 2$$
$$7 + 9 = 16$$

no!