# Solving Multi-Step Equations

## Additional Examples — Lesson 2-3

**1 EXAMPLE** Solve $3a + 6 + a = 90$.

| | |
|---|---|
| $4a + 6 = 90$ | Combine like terms. |
| $4a + \cancel{6} - \cancel{6} = 90 - 6$ | Subtract 6 from each side. |
| $4a = 84$ | Simplify. |
| $\frac{\cancel{4}a}{\cancel{4}} = \frac{84}{4}$ | Divide each side by 4. |
| $a = 21$ | Simplify. |

Check: $3a + 6 + a = 90$

$3(21) + 6 + 21 \stackrel{?}{=} 90$ Substitute 21 for a.

$63 + 6 + 21 \stackrel{?}{=} 90$

$90 = 90$ ✔

**2 EXAMPLE** You need to build a rectangular pen in your back yard for your dog. One side of the pen will be against the house. Two sides of the pen have a length of $x$ ft and the width will be 25 ft. What is the greatest length the pen can be if you have 63 ft of fencing?

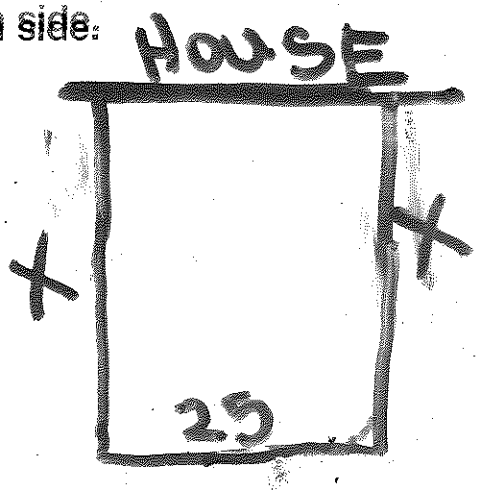
Relate: $\boxed{\text{length of side}}$ plus 25 ft plus $\boxed{\text{length of side}}$ equals amount of fencing

Define: Let $\boxed{x}$ = length of a side adjacent to the house.

Write: $\boxed{x} + 25 + \boxed{x} = 63$

| | |
|---|---|
| $x + 25 + x = 63$ | |
| $2x + 25 = 63$ | Combine like terms. |
| $2x + 25 - 25 = 63 - 25$ | Subtract 25 from each side. |
| $2x = 38$ | Simplify. |
| $\frac{2x}{2} = \frac{38}{2}$ | Divide each side by 2. |
| $x = 19$ | |

The pen can be 19 ft long.







Algebra 1; Chapter 2

**3 EXAMPLE** Solve $2(x - 3) = 8$.

| | |
|---|---|
| $2x - 6 = 8$ | Use the Distributive Property. |
| $2x \cancel{- 6} \cancel{+ 6} = 8 + 6$ | Add 6 to each side. |
| $2x = 14$ | Simplify. |
| $\frac{\cancel{2}x}{\cancel{2}} = \frac{14}{2}$ | Divide each side by 2. |
| $x = 7$ | Simplify. |

**4 EXAMPLE** Solve $\frac{3x}{2} + \frac{x}{5} = 17$.

**Method 1: Finding common denominators**

*Use $\boxed{A\%}$

| | |
|---|---|
| $\frac{3x}{2} + \frac{x}{5} = 17$ | |
| $\frac{3}{2}x + \frac{1}{5}x = 17$ | Rewrite the equation. |
| $\frac{15}{10}x + \frac{2}{10}x = 17$ | A common denominator of $\frac{3}{2}$ and $\frac{1}{5}$ is 10. |
| $\frac{17}{10}x = 17$ | Combine like terms. |
| $\frac{\cancel{10}}{\cancel{17}}\left(\frac{\cancel{17}}{\cancel{10}}x\right) = \frac{10}{\cancel{17}}(\cancel{17})$ | Multiply each side by the reciprocal of $\frac{17}{10}$, which is $\frac{10}{17}$. |
| $x = 10$ | Simplify. |

**4 EXAMPLE** (continued)

**Method 2: Multiplying to clear fractions**

$$\frac{3x}{2} + \frac{x}{5} = 17$$

$$10\left(\frac{3x}{2} + \frac{x}{5}\right) = 10(17)$$ Multiply each side by 10, a common multiple of 2 and 5.

$$10\left(\frac{3x}{2}\right) + 10\left(\frac{x}{5}\right) = 10(17)$$ Use the Distributive Property.

$$15x + 2x = 170$$ Multiply.

$$17x = 170$$ Combine like terms.

$$\frac{17x}{17} = \frac{170}{17}$$ Divide each side by 17.

$$x = 10$$ Simplify.

**5 EXAMPLE** Solve $0.6a + 18.65 = 22.85$.

$$100(0.6a + 18.65) = 100(22.85)$$ The greatest number of decimal places is two places. Multiply each side by 100.

$$100(0.6a) + 100(18.65) = 100(22.85)$$ Use the Distributive Property.

$$60a + 1865 = 2285$$ Simplify.

$$60a + 1865 - 1865 = 2285 - 1865$$ Subtract 1865 from each side.

$$60a = 420$$ Simplify.

$$\frac{60a}{60} = \frac{420}{60}$$ Divide each side by 60.

$$a = 7$$ Simplify.