3.2 Solve Two-Step Equations

Goal • Solve two-step equations.

Your Notes

IDENTIFYING OPERATIONS

Identify the operations involved in the equation $3x + 7 = 19$.

Operations performed on x	Operations to isolate x
1. Multiply by 3.	1. Subtract 7.
2. Add 7.	2. Divide by 3.

Example 1 ***Solve a two-step equation***

Solve $3x + 7 = 19$.

When solving a two-step equation, apply the inverse operations in the reverse order of the order of operations.

Solution

$3x + 7 = 19$ — **Write original equation.**

$3x + 7 - 7 = 19 - 7$ — **Subtract 7 from each side.**

$3x = 12$ — **Simplify.**

$\frac{3x}{3} = \frac{12}{3}$ — **Divide each side by 3.**

$x = 4$ — **Simplify.**

The solution is 4.

CHECK

$3x + 7 = 19$ — **Write original equation.**

$3(4) + 7 \stackrel{?}{=} 19$ — **Substitute 4 for x.**

$12 + 7 \stackrel{?}{=} 19$ — **Multiply 3 by 4.**

$19 = 19$ ✓ — **Simplify. Solution checks.**

Your Notes

Checkpoint Solve the two-step equation. Check your solution.

1. $\frac{r}{4} - 12 = -5$ $r = 28$	**2.** $7k - 14 = 42$ $k = 8$

Example 2 *Solve a two-step equation by combining like terms*

Solve $4a + 3a = 63$.

Solution

$4a + 3a = 63$	**Write original equation.**
$7a = 63$	**Combine like terms.**
$\frac{7a}{7} = \frac{63}{7}$	**Divide each side by 7.**
$a = 9$	**Simplify.**

The solution is 9.

CHECK

$4a + 3a = 63$	**Write original equation.**
$4(9) + 3(9) \stackrel{?}{=} 63$	**Substitute 9 for *a*.**
$36 + 27 \stackrel{?}{=} 63$	**Multiply 4 by 9 and 3 by 9.**
$63 = 63$ ✓	**Add. Solution checks.**

Checkpoint Solve the equation. Check your solution.

3. $5z + 4z = 36$ $z = 4$	**4.** $5b - 2b = 9$ $b = 3$

Your Notes

Example 3 ***Find an input of a function***

The output of a function is 2 more than 4 times the input. Find the input when the output is 14.

Solution

Step 1 **Write** an equation for the function. Let x be the input and y be the output.

$y =$ $4x + 2$ — **y is 2 more than 4 times x.**

Step 2 **Solve** the equation when $y = 14$.

$y =$ $4x + 2$	**Write original function.**
$14 =$ $4x + 2$	**Substitute** 14 **for** y.
$14 - 2 =$ $4x + 2 - 2$	**Subtract** 2 **from each side.**
$12 =$ $4x$	**Simplify.**
$\frac{12}{4} = \frac{4x}{4}$	**Divide each side by** 4 **.**
$3 = x$	**Simplify.**

An input of 3 produces an output of 14.

CHECK

$y =$ $4x + 2$	**Write original function.**
$14 \stackrel{?}{=} 4(3) + 2$	**Substitute** 14 **for** y **and** 3 **for** x.
$14 \stackrel{?}{=} 12 + 2$	**Multiply** 4 **and** 3 **.**
$14 = 14$ ✓	**Simplify. Solution checks.**

✔ ***Checkpoint*** **Solve the equation. Check your solution.**

5. The output of a function is 3 less than 6 times the input. Find the input when the output is 15.

$x = 3$

Homework