LESSON 3.4

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Practice with Examples

For use with pages 154–159

GOAL **Collect variables on one side of an equation and use equations to solve real-life problems**

VOCABULARY

An **identity** is a linear equation that is true for all values of the variable.

EXAMPLE 1 Collecting Variables on One Side

Solve $20 - 3x = 2x$.

SOLUTION

Think of $20 - 3x$ as $20 + (-3x)$. Since $2x$ is greater than $-3x$, collect the x-terms on the right side.

$20 - 3x = 2x$	Write original equation.
$20 - 3x + 3x = 2x + 3x$	Add $3x$ to each side.
$20 = 5x$	Simplify.
$\frac{20}{5} = \frac{5x}{5}$	Divide each side by 5.
$4 = x$	Simplify.

Exercises for Example 1

Solve the equation.

1. $5q = -7q + 6$

2. $14d - 6 = 17d$

3. $-y + 7 = -8y$

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EXAMPLE 2 Many Solutions or No Solution

a. Solve $2x + 3 = 2x + 4$.

b. Solve $-(t + 5) = -t - 5$

SOLUTION

a.

$2x + 3 = 2x + 4$	Write original equation.
$2x + 3 - 3 = 2x + 4 - 3$	Subtract 3 from each side.
$2x = 2x + 1$	Simplify.
$0 = 1$	Subtract $2x$ from each side.

The original equation has no solution, because $0 \neq 1$ for any value of x.

b.

$-(t + 5) = -t - 5$	Write original equation.
$-t - 5 = -t - 5$	Use distributive property.
$-5 = -5$	Add t to each side.

All values of t are solutions, because $-5 = -5$ is always true.
The original equation is an *identity*.

Exercises for Example 2

Solve the equation.

4. $9z - 3 = 9z$

5. $2(f - 7) = 2f - 14$

6. $n + 3 = -5n$

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EXAMPLE 3 Solving Real-Life Problems

A health club charges nonmembers $2 per day to swim and $5 per day for aerobics classes. Members pay a yearly fee of $200 plus $3 per day for aerobics classes. Write and solve an equation to find the number of days you must use the club to justify a yearly membership.

SOLUTION

Let n represent the number of days that you use the club. Then find the number of times for which the two plans would cost the same.

$2n + 5n = 200 + 3n$	Write real-life equation.
$7n = 200 + 3n$	Combine like terms.
$7n - 3n = 200 + 3n - 3n$	Subtract $3n$ from each side.
$4n = 200$	Simplify.
$\frac{4n}{4} = \frac{200}{4}$	Divide each side by 4.
$n = 50$	Simplify.

You must use the club 50 days to justify a yearly membership.

Exercises for Example 3

7. Rework Example 3 if nonmembers pay $3 per day to swim.

8. Rework Example 3 if members pay a yearly fee of $220.