

NAME \_\_\_\_\_

**Module 4** Solving Problems Using Linear Equations of One Variable  
**Lesson 1** Translating Sentences into Algebraic Equations



**independent practice**

**Write an equation to represent each sentence or situation. If no variable is given, a variable other than  $n$  may be used.**

1. Four less than a number is 21.

$$\underline{n - 4 = 21}$$

3. Twice a number divided by three is six.

$$\underline{\frac{2n}{3} = 6}$$

5. The price of a grapefruit is  $g$ . The price of six grapefruits is \$1.86.

$$\underline{6g = \$1.86}$$

7. A customer withdrew \$42 from his bank account, leaving a balance of \$211.

$$\underline{b - \$42 = \$211}$$

9. A school has 35 teachers. The number of male teachers is two-thirds the number of female teachers.

$$\underline{f + \frac{2}{3}f = 35}$$

2. The sum of a number and four is eight.

$$\underline{n + 4 = 8}$$

4. When a number is increased by 12, the result is equal to twice the number.

$$\underline{n + 12 = 2n}$$

6. Ned is 3 inches taller than his brother, who is  $b$  inches tall. The sum of their heights is 113 inches.

$$\underline{b + (b + 3) = 113}$$

8. Crystal counted out  $q$  quarters with a total value of \$9.50.

$$\underline{0.25q = \$9.50}$$

10. Paula purchased a big-screen television. She will make 18 equal monthly payments to pay a total of \$3,600.

$$\underline{18p = \$3,600}$$

## Journal

- If Frank is five years older than his brother, explain how the sum of the boys' ages can be written either as  $b + (b + 5)$  or as  $f + (f - 5)$ . What is the difference? Hint: notice the variables used in each expression.
- Explain why the expression "the difference of  $a$  and  $b$ " does not have a clear meaning.
- Explain why "the sum of  $a$  and  $b$ " can be written as  $a + b$  or  $b + a$ .
- Suppose you were discussing a homework problem on the telephone and your friend told you to write an expression for the phrase "three times a number decreased by four." What expression would you write? What expression would you write for the phrase "three times the quantity, a number decreased by four?" Explain why the expressions are different.

5. Without looking at your notes, make a list of key words for each operation (multiplication, division, addition, and subtraction). Can you add words not mentioned in this lesson?

## Cumulative Review

Solve.

- |                                       |                                                                    |
|---------------------------------------|--------------------------------------------------------------------|
| 1. $4x = 20$ $x = 5$                  | 2. $x - 5 = -3$ $x = 2$                                            |
| 3. $x - 4 = 3x + 6$ $x = -5$          | 4. $3x - 9 = -3$ $x = 2$                                           |
| 5. $x - 5 = -4x + 10$ $x = 3$         | 6. $1.2x = 60$ $x = 50$                                            |
| 7. $-3n - 2n = 6n - 22$ $n = 2$       | 8. $3x = 2(10 - x)$ $x = 4$                                        |
| 9. $3n + 4 + 4n = 5n + 2$<br>$n = -1$ | 10. $4 + 2(3 + x) = 2(x - 6) + 22$<br>infinite number of solutions |

### Possible Journal Answers

- In the expression  $b + (b + 5)$ , the variable  $b$  represents the brother's age. In the expression  $f + (f - 5)$ , the variable  $f$  represents Frank's age. Either expression is correct. Regardless of the equation used, the solver must be careful to remember what each variable stands for.
- The phrase "the difference of  $a$  and  $b$ " is ambiguous because subtraction is not commutative. Because of this ambiguity "the difference of  $a$  and  $b$ " could be written as  $a - b$  or  $b - a$ . The phrase also could imply absolute value, where  $|a - b| = |b - a|$  is the absolute difference between the two values.
- The phrase "the sum of  $a$  and  $b$ " can be translated either as  $a + b$  or  $b + a$ , because addition is commutative.
- For "three times a number decreased by four," Write  $3n - 4$ . For "three times the quantity, a number decreased by four," Write  $3(n - 4)$ . The expressions are different because in  $3n - 4$ , multiplication is done before subtraction, and in  $3(n - 4)$ , subtraction is done before multiplication.
- Accept correct listings. Possible additional expressions are
 

|                 |                |          |                 |
|-----------------|----------------|----------|-----------------|
| Multiplication  | Division       | Addition | Subtraction     |
| times           | quotient       | sum      | difference      |
| twice           | divided with   | more     | less            |
| multiplied with | into $n$ parts | added to | subtracted from |