**Translating Words into Math**

**Going Deeper**

**Essential question:** How can you write an expression from a given situation?

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**EXPLORE**

**Writing an Expression from a Model**

**A**

Diana has a collection of stamps placed in an album. Today, she put 3 more stamps in her album. Write an algebraic expression that represents the total number of stamps in the album.

Choose a variable to represent the number of stamps already in the album. Why did you choose this variable?

The bar model represents the total number of stamps in the album. Complete the bar diagram with the correct variable or number.

![Bar model diagram]

Stamps already placed in album  Stamps placed today

To find the total number of stamps, you can _________ the number already in the album and the number put in today.

Write an algebraic expression for the total number of stamps. ___________

**B**

Calvin has 4 stacks of comic books. Each stack has the same number of comic books. Write an algebraic expression that represents the total number of Calvin’s comic books.

What quantity do you need to represent with a variable? What variable will you use?

The bar model represents the total number of comic books. Complete the bar diagram with the correct variable or number.

![Bar model diagram]

To find the total number of comic books, you can _________ the number of stacks by the number in each stack.

Write an algebraic expression for the total number of comic books. ___________.

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**CC.7.EE.4**

**1-4**

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Calvin has 4 stacks of comic books. Each stack has the same number of comic books. Write an algebraic expression that represents the total number of Calvin’s comic books.

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The bar model represents the total number of comic books. Complete the bar diagram with the correct variable or number.

![Bar model diagram]

To find the total number of comic books, you can _________ the number of stacks by the number in each stack.

Write an algebraic expression for the total number of comic books. ___________.

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**Chapter 1**

**19**

**Lesson 4**
TRY THIS!

There is a tray of muffins at a bakery. An employee sold 6 of the muffins.

1a. To write an algebraic expression for the number of muffins that are left, what quantity do you need to represent with a variable? What variable will you use?

1b. Draw a model that represents this situation.

1c. Write an algebraic expression for the number of muffins that are left.

REFLECT

1d. How could you check whether the algebraic expression you wrote in 1c is correct?

Writing an Algebraic Expression

Erica earns $12 for each garden that she weeds. She already has $15 from her aunt plus $6 from her older sister. Write and simplify an algebraic expression for the total amount of money, in dollars, Erica will have if she weeds \(g\) gardens.

Think: The total amount is:

<table>
<thead>
<tr>
<th>amount for one garden ($)</th>
<th>times</th>
<th>the number of gardens</th>
<th>plus</th>
<th>amount from aunt ($)</th>
<th>plus</th>
<th>amount from sister ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>(\times)</td>
<td>(g)</td>
<td>(+)</td>
<td>15</td>
<td>(+)</td>
<td>(6)</td>
</tr>
</tbody>
</table>

12\(g\) + 15 + 6 \text{ Write the expression.}

12\(g\) + (15 + 6) \text{ Use the } \underline{\text{Commutative}} \text{ Property to group the constants.}

12\(g\) + \underline{Add.} 

An expression for the total amount of money, in dollars, Erica will have if she weeds \(g\) gardens is \underline{\underline{12g}}. 
REFLECT

2a. What key words in the problem helped you decide which operations to use in the algebraic expression? Explain.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2b. **What if...?** What if Erica did not have any money from her aunt or her sister? Write an algebraic expression for the total amount of money, in dollars, Erica would have if she weeded \(g\) gardens. _____________

TRY THIS!

2c. There are 3 episodes of a television show on each DVD. There are 6 DVDs for each season of the television show. Write and simplify an algebraic expression for the number of episodes in \(s\) seasons of the television show.

________________________________________________________________________

3. **Identifying Errors in Expressions**

Three friends equally split the cost \(c\), in dollars, of a pizza. Each friend also bought a drink for $2 and left a tip of $1. Darrell wrote and simplified an algebraic expression for the total amount, in dollars, each friend spent. His work is shown at right.

\[
3c + 2 + 1 = 3\left(\frac{c + (2 + 1)}{3}\right) = 3c + 3
\]

3a. Identify the error that Darrell made. Explain your reasoning.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3b. What is a correct algebraic expression for the total amount, in dollars, each friend spent?

________________________________________________________________________

3c. What does the expression \(3c\) represent in the context of this situation?
Each student in Ms. Walter’s class has 9 days to read a library book. She suggests that the students read the same number of pages each day.

1. To write an algebraic expression for the number of pages a student should read each day, what quantity do you need to represent with a variable? What variable will you use?

2. Draw a model that represents this situation.

3. What is an algebraic expression for the number of pages a student should read each day? __________

4. A paint set costs $8, and a paintbrush costs $2. Write and simplify an algebraic expression for the number of groups of one paint set and one paintbrush an art teacher can buy if he has s dollars to spend.

5. Mr. Parker has 2 coupons, each for $3 off his grocery bill. Write and simplify an algebraic expression for the amount, in dollars, Mr. Parker will pay if he uses both coupons when buying groceries worth g dollars.

6. **Error Analysis** To rent a bike, there is a basic fee of $9 plus an additional charge of $5 per hour. Terry wrote the expression $9 + \frac{h}{5}$ to represent the total cost of renting a bike for $h$ hours. What error did she make? What is a correct expression for the total cost of renting a bike for $h$ hours?

7. Give an example of a real-world situation that could be represented by the algebraic expression $4n – 25$. 

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Chapter 1 Lesson 4
Write each phrase as an algebraic expression.

1. 125 decreased by a number

2. 359 more than $z$

3. the product of a number and 35

4. the quotient of 100 and $w$

5. twice a number, plus 27

6. 12 less than 15 times $x$

7. the product of $e$ and 4, divided by 12

8. $y$ less than 18 times 6

9. 48 more than the quotient of a number and 64

10. 500 less than the product of 4 and a number

11. the quotient of $p$ and 4, decreased by 320

12. 13 multiplied by the amount 60 minus $w$

13. the quotient of 45 and the sum of $c$ and 17

14. twice the sum of a number and 600

15. There are twice as many flute players as there are trumpet players in the band. If there are $n$ flute players, write an algebraic expression to find out how many trumpet players there are.

16. The Nile River is the longest river in the world at 4,160 miles. A group of explorers traveled along the entire Nile in $x$ days. They traveled the same distance each day. Write an algebraic expression to find each day’s distance.

17. A slice of pizza has 290 calories, and a stalk of celery has 5 calories. Write an algebraic expression to find out how many calories there are in $a$ slices of pizza and $b$ stalks of celery.

18. Grant pays 10¢ per minute plus $5 per month for telephone long distance. Write an algebraic expression for $m$ minutes of long-distance calls in one month.
Write the correct answer.

1. Employers in the United States allocate \( n \) fewer vacation days than the 25 days given by the average Japanese employer. Write an algebraic expression to show the number of vacation days given U.S. workers.

\[
\text{Vacation Days} = 25 - n
\]

3. A cup of cottage cheese has 26 grams of protein. Write an algebraic expression for the amount of protein in \( s \) cups of cottage cheese.

\[
\text{Protein in cottage cheese} = 26s
\]

2. There are 112 members in the Somerset Marching Band. They will march in \( r \) equal rows. Write an algebraic expression for the number of band members in each row.

\[
\text{Band members per row} = \frac{112}{r}
\]

4. Every morning Sasha exercises for 20 minutes. She exercises \( k \) minutes every evening. Next week she will double her exercise time at night. Write an algebraic expression to show how long Sasha will exercise each day next week.

\[
\text{Exercise time next week} = 2(20 + k)
\]

Choose the letter for the best answer.

5. One centimeter equals 0.3937 inches. Which algebraic expression shows how many inches are in \( c \) centimeters?

\[
\text{Inches in cm} = 0.3937c
\]

6. In 1957, the Soviet Union launched Sputnik 1, the first satellite to orbit Earth. It circled Earth every 1.6 hours for 92 days, then burned up. If the satellite traveled \( m \) miles per hour, which algebraic expression shows the length of the orbit?

\[
\text{Length of orbit} = 92 \times 1.6m
\]

7. Gina’s heart rate is 70 beats per minute. Which algebraic expression shows the number of beats in \( h \) hours?

\[
\text{Beats in hours} = 70h
\]

8. The Harris family went on vacation for \( w \) weeks and 3 days. Which algebraic expression shows the total number of days of their vacation?

\[
\text{Total vacation days} = 7w + 3
\]