Translate Words into Math

Warm Up

Evaluate each algebraic expression for the given value of the variables.

1. $7x + 4$ for $x = 6$ — 46

2. $8y - 22$ for $y = 9$ — 50

3. $12x + \frac{8}{y}$ for $x = 7$ and $y = 4$ — 86

4. $y + 3z$ for $y = 5$ and $z = 6$ — 23

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Essential Question:
How do I translate words into math?

Standards:

MCC7.EE.2: Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

MCC7.EE.4: Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

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Operation	Verbal Expressions	Algebraic Expressions
	• add 3 to a number • a number plus 3 • the sum of a number and 3 • 3 more than a number • a number increased by 3	$n + 3$
	• subtract 12 from a number • a number minus 12 • the difference of a number and 12 • 12 less than a number • a number decreased by 12 • take away 12 from a number • a number less than 12	$x - 12$

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Operation	Verbal Expressions	Algebraic Expressions
	• 2 **times** a number • 2 **multiplied by** a number • the **product** of 2 and a number	$2m$ or $2 \cdot m$
	• 6 **divided into** a number • a number **divided by** 6 • the **quotient** of a number and 6	$a \div 6$ or $\frac{a}{6}$

1 EXPLORE Writing an Expression from a Model

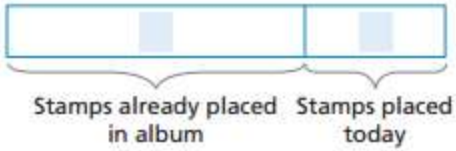
A **Diana has a collection of stamps placed in an album. Today, she put 3 more stamps in her album. Write an algebraic expression that represents the total number of stamps in the album.**

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

WB: Pg. 93

_____

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



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.

in album | today

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

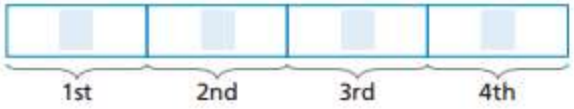
Write an algebraic expression for the total number of stamps. _____

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.



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. _____.

TRY THIS!

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

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Additional Example 1: Translating Verbal Expressions into Algebraic Expressions

Write each phrase as an algebraic expression.

A. the quotient of a number and 4

quotient means "divide"

$$\frac{n}{4}$$

B. *w* increased by 5

increased by means "add"

$$w + 5$$

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Additional Example 1: Translating Verbal Expressions into Algebraic Expressions

Write each phrase as an algebraic expression.

C. the difference of 3 times a number and 7

the difference of 3 times a number and 7

$3 \cdot x \qquad - 7$

$3x - 7$

D. the quotient of 4 and a number, increased by 10

the quotient of 4 and a number, increased by 10

$\frac{4}{n} + 10$

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Check It Out: Example 1

Write each phrase as an algebraic expression.

A. a number decreased by 10

decreased means "subtract"

$n - 10$

B. *r* plus 20

plus means "add"

$r + 20$

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Check It Out: Example 1

Write each phrase as an algebraic expression.

C. the product of a number and 5

the product of a number and 5

$n \quad \bullet \; 5$

$5n$

D. 4 times the difference of *y* and 8

4 times the difference of y and 8

$4 \bullet \quad y - 8$

$4(y - 8)$

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When solving real-world problems, you may need to determine the action to know which operation to use.

Action	Operation
Put parts together	**Add**
Put equal parts together	**Multiply**
Find how much more	**Subtract**
Separate into equal parts	**Divide**

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Additional Example 2A: Translating Real-World Problems into Algebraic Expressions

Mr. Campbell drives at 55 mi/h. Write an algebraic expression for how far he can drive in *h* hours.

You need to *put equal parts together*. This involves multiplication.

55mi/h · *h* hours = 55*h* miles

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Additional Example 2B: Translating Real-World Problems into Algebraic Expressions

On a history test Maritza scored 50 points on the essay. Besides the essay, each short-answer question was worth 2 points. Write an expression for her total points if she answered *q* short-answer questions correctly.

The total points include 2 points for each short-answer question.

Multiply to *put equal parts together.* $2q$

In addition to the points for short-answer questions, the total points included 50 points on the essay.

Add to *put the parts together:* $50 + 2q$

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Check It Out: Example 2A

Julie Ann works on an assembly line building computers. She can assemble 8 units an hour. Write an expression for the number of units she can produce in *h* hours.

You need to *put equal parts together*. This involves multiplication.

8 units/h · *h* hours = 8*h*

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Check It Out: Example 2B

At her job Julie Ann is paid $8 per hour. In addition, she is paid $2 for each unit she produces. Write an expression for her total hourly income if she produces *u* units per hour.

Her total wage includes $2 for each unit produced.

Multiply to *put equal parts together.* $2u$

In addition the pay per unit, her total income includes $8 per hour.

Add to *put the parts together:* $2u + 8$.

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Review Video: Word Problems

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Lesson Quiz

Write each phrase as an algebraic expression.

1. 18 less than a number $x - 18$

2. the quotient of a number and 21 $\frac{x}{21}$

3. 8 times the sum of x and 15 $8(x + 15)$

4. 7 less than the product of a number and 5 $5n - 7$

5. The county fair charges an admission of $6 and then charges $2 for each ride. Write an algebraic expression to represent the total cost after r rides at the fair. $6 + 2r$

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Homework:

Workbook Pg. 97, choose 2 problems from each section (6 problems total)