# Lesson 4: Writing Products as Sums and Sums as Products

### Classwork

Example 1

a. $2(x+5)$	
b. $3(x+4)$	
c. $6(x+1)$	
d. $7(x-3)$	
е.	5x + 30
f.	8x + 8
g.	3x - 12
h.	15x + 20

#### Exercise 1

Rewrite the expressions as a product of two factors.

a. 72 <i>t</i> + 8 c. 3	6z + 72 e. $3r + 3s$
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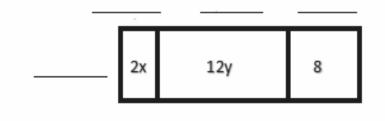
b. 55a + 11 d. 144q - 15



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# Example 2

Let the variables x and y stand for positive integers, and let 2x, 12y, and 8 represent the area of three regions in the array. Determine the length and width of each rectangle if the width is the same for each rectangle.



#### Exercise 2

a. Write the product and sum of the expressions being represented in the rectangular array.

	12d	4e	3
2	24d	8e	6

b. Factor 48j + 60k + 24 by finding the greatest common factor of the terms.



#### Exercise 3

For each expression, write each sum as a product of two factors. Emphasize the importance of the distributive property. Use various equivalent expressions to justify equivalency.

а.	$2 \cdot 3 + 5 \cdot 3$	b.	(2+5) + (2+5) + (2+5)	C.	$2 \cdot 2 + (5 + 2) + (5 \cdot 2)$
d.	$x \cdot 3 + 5 \cdot 3$	e.	(x + 5) + (x + 5) + (x + 5)	f.	$2x + (5+x) + 5 \cdot 2$
g.	$x \cdot 3 + y \cdot 3$	h.	(x + y) + (x + y) + (x + y)	i.	2x + (y + x) + 2y

#### Example 3

A new miniature golf and arcade opened up in town. For convenient ordering, a play package is available to purchase. It includes two rounds of golf and 20 arcade tokens, plus 3.00 off the regular price. There is a group of six friends purchasing this package. Let g represent the cost of a round of golf, and let t represent the cost of a token. Write two different expressions that represent the total amount this group spent. Explain how each expression describes the situation in a different way.



#### Exercise 4

- a. What is the opposite of (-6v + 1)?
- b. Using the distributive property, write an equivalent expression for part (a).

## Example 5

Rewrite 5a - (a - 3b) in standard form. Justify each step, applying the rules for subtracting and the distributive property.

#### Exercise 5

Expand each expression and collect like terms.

a. -3(2p - 3q)

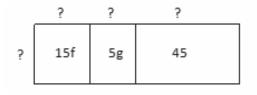
b. 
$$-a - (a - b)$$





#### **Problem Set**

- 1. Write each expression as the product of two factors.
  - a.  $1 \cdot 3 + 7 \cdot 3$
  - b. (1+7) + (1+7) + (1+7)
  - c.  $2 \cdot 1 + (1+7) + (7 \cdot 2)$
  - d.  $h \cdot 3 + 6 \cdot 3$
  - e. (h+6) + (h+6) + (h+6)
  - f.  $2h + (6+h) + 6 \cdot 2$
  - g.  $j \cdot 3 + k \cdot 3$
  - h. (j + k) + (j + k) + (j + k)
  - i. 2j + (k+j) + 2k
- 2. Write each sum as a product of two factors.
  - a.  $6 \cdot 7 + 3 \cdot 7$ b. (8 + 9) + (8 + 9) + (8 + 9)c.  $4 + (12 + 4) + (5 \cdot 4)$ d.  $2y \cdot 3 + 4 \cdot 3$ e. (x + 5) + (x + 5)f.  $3x + (2 + x) + 5 \cdot 2$ g.  $f \cdot 6 + g \cdot 6$ h. (c + d) + (c + d) + (c + d) + (c + d)
  - i. 2r + r + s + 2s
- 3. Use the following rectangular array to answer the questions below.



- a. Fill in the missing information.
- b. Write the sum represented in the rectangular array.
- c. Use the missing information from part (a) to write the sum from part (b) as a product of two factors.
- 4. Write the sum as a product of two factors.
  - a. 81*w* + 48
  - b. 10 25*t*
  - c. 12a + 16b + 8



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5. Xander goes to the movies with his family. Each family member buys a ticket and two boxes of popcorn. If there are five members of his family, let *t* represent the cost of a ticket and *p* represent the cost of a box of popcorn. Write two different expressions that represent the total amount his family spent. Explain how each expression describes the situation in a different way.

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6. Write each expression in standard form.

a. 
$$-3(1-8m-2n)$$

b. 
$$5 - 7(-4q + 5)$$

c. 
$$-(2h-9) - 4h$$

- d. 6(-5r-4) 2(r-7s-3)
- 7. Combine like terms to write each expression in standard form.
  - a. (r s) + (s r)
  - b. (-r+s) + (s-r)
  - c. (-r-s) (-s-r)
  - d. (r-s) + (s-t) + (t-r)
  - e. (r-s) (s-t) (t-r)

