Lesson 3: Writing Products as Sums and Sums as Products

Classwork

**Example 1**

|  |  |
| --- | --- |
| 1. $2(x+5)$
 |  |
| 1. $3(x+4)$
 |  |
| 1. $6(x+1)$
 |  |
| 1. $7(x-3)$
 |  |
| 1.
 | $$5x+30$$ |
|  | $$8x+8$$ |
|  | $$3x-12$$ |
|  | $$15x+20$$ |

Exercise 1

Rewrite the expressions as a product of two factors.

|  |  |  |
| --- | --- | --- |
| * 1. $72t+8$
 | * 1. $36z+72$
 | * 1. $3r+3s$
 |
| * 1. $55a+11$
 | * 1. $144q-15$
 |  |

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

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



* 1. 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.

|  |  |  |
| --- | --- | --- |
| * 1. $2∙3+5∙3$
 | * 1. $\left(2+5\right)+\left(2+5\right)+\left(2+5\right)$
 | * 1. $2∙2+\left(5+2\right)+(5∙2)$
 |
| * 1. $x∙3+5∙3$
 | * 1. $\left(x+5\right)+\left(x+5\right)+\left(x+5\right)$
 | * 1. $2x+\left(5+x\right)+5∙2$
 |
| * 1. $x∙3+y∙3$
 | * 1. $\left(x+y\right)+\left(x+y\right)+(x+y)$
 | * 1. $2x+\left(y+x\right)+2y$
 |

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

* 1. What is the opposite of $\left(-6v+1\right)$? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Using the distributive property, write an equivalent expression for part (a).

**Example 5**

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

Exercise 5

Expand each expression and collect like terms.

* 1. $-3\left(2p-3q\right)$
	2. $-a-(a-b)$

Homework: Unit 5 Lesson 3

1. **Choose 3:** Write each expression as the product of two factors.
	1. $1∙3+7∙3$
	2. $(1+7)+(1+7)+(1+7)$
	3. $2∙1+(1+7)+(7∙2)$
	4. $j∙3+k∙3$
	5. $\left(j+k\right)+\left(j+k\right)+(j+k)$
	6. $2j+\left(k+j\right)+2k$
2. **Choose 3:** Write each sum as a product of two factors.
	1. $6∙7+3∙7$
	2. $\left(8+9\right)+(8+9)+\left(8+9\right)$
	3. $3x+\left(2+x\right)+5∙2$
	4. $f∙6+g∙6$
	5. $\left(c+d\right)+\left(c+d\right)+\left(c+d\right)+\left(c+d\right)$
	6. $2r+r+s+2s$
3. **Choose 2**: Write the sum as a product of two factors.
	1. $81w+48$
	2. $10-25t$
	3. $12a+16b+8$
4. 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.
5. **Choose 2**: Write each expression in standard form.
	1. $-3\left(1-8m-2n\right)$
	2. $5-7\left(-4q+5\right)$
	3. $-\left(2h-9\right)-4h $
	4. $6\left(-5r-4\right)-2\left(r-7s-3\right)$
6. **Choose 2:** Combine like terms to write each expression in standard form.
	1. $\left(r-s\right)+\left(s-r\right)$
	2. $\left(-r+s\right)+\left(s-r\right)$
	3. $\left(-r-s\right)-\left(-s-r\right)$
	4. $\left(r-s\right)+\left(s-t\right)+\left(t-r\right)$