Lesson 3: Writing Products as Sums and Sums as Products

Classwork

Opening Exercise

Solve the problem using a tape diagram. A sum of money was shared between George and Brian in a ratio of $3:4$. If the sum of money was $\$56.00$, how much did George get?

**Example 1**

Represent $3+2 $using a tape diagram.

Represent $x+2$ using a tape diagram.

Draw a rectangular array for $3\left(3+2\right)$.

Draw an array for $3(x+2)$.

Exercise 1

**Key Terms**

**Distributive Property:** The distributive property can be written as the identity

$a\left(b+c\right)=ab+ac$ for all numbers $a, b,$ and $c.$

Determine the area of each region using the distributive property.

****

**Example 2**

Draw a tape diagram to represent each expression.

* 1. $(x+y)+(x+y)+(x+y)$
	2. $(x+x+x)+(y+y+y)$
	3. $3x+3y$
	4. $3(x+y)$

**Example 3**

Find an equivalent expression by modeling with a rectangular array and applying the distributive property to the expression $5(8x+3)$.

Exercise 2

For parts (a) and (b), draw an array for each expression and apply the distributive property to expand each expression. Substitute the given numerical values to demonstrate equivalency.

* 1. $2(x+1)$, $x=5$
	2. $10(2c+5)$, $c=1$

For parts (c) and (d), apply the distributive property. Substitute the given numerical values to demonstrate equivalency.

* 1. $3\left(4f-1\right)$, $f=2$
	2. $9(-3r-11)$, $r=10$

**Example 4**

Rewrite the expression $(6x+15)÷3$ in standard form using the distributive property.

Exercise 3

Rewrite the expressions as a sum.

* 1. $\left(2b+12\right)÷2$
	2. $(20r-8)÷4$
	3. $(49g-7)÷7$

**Example 5**

Expand the expression $4\left(x+y+z\right).$

Exercise 4

Expand the expression from a product to a sum by removing grouping symbols using an area model and the repeated use of distributive property: $3\left(x+2y+5z\right)$.

**Example 6**

A square fountain area with side length $s$ $ft.$ is bordered by a single row of square tiles as shown. Express the total number of tiles needed in terms of $s$three different ways.

Problem Set

1. 1. **** Write two equivalent expressions that represent the rectangular array below.
	2. Verify informally that the two equations are equivalent using substitution.
2. You and your friend made up a basketball shooting game. Every shot made from the free throw line is worth $3$ points, and every shot made from the half-court mark is worth $6$ points. Write an equation that represents the total amount of points, $P$, if $f$ represents the number of shots made from the free throw line, and $h$ represents the number of shots made from half-court. Explain the equation in words.
3. Use a rectangular array to write the products in standard form.
	1. $2\left(x+10\right)$
	2. $3(4b+12c+11)$
4. Use the distributive property to write the products in standard form.

|  |  |
| --- | --- |
| * 1. $3(2x-1)$
	2. $10\left(b+4c\right)$
	3. $9(g-5h)$
	4. $7(4n-5m-2)$
	5. $a\left(b+c+1\right)$
	6. $(8j-3l+9)6$
 | * 1. $\left(40s+100t\right)÷10$
	2. $\left(48p+24\right)÷6$
	3. $\left(2b+12\right)÷2$
	4. $(20r-8)÷4$
	5. $(49g-7)÷7$
	6. $\left(14g+ 22h\right)÷\frac{1}{2}$
 |

1. Write the expression in standard form by expanding and collecting like terms.
	1. $4\left(8m-7n\right)+6\left(3n-4m\right)$
	2. $9\left(r-s\right)+5(2r-2s)$
	3. $12\left(1-3g\right)+8(g+f)$