

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 squares for units.
- Represent x + 2 using the same size square for a unit as above.
- Draw a rectangular array for 3(3+2).
- Draw an array for 3(x+2)



Key Terms

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

a(b + c) = ab + ac for all numbers a, b, and c.

Exercise 1

Fill in the blanks.



Example 3

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

Exercise 2

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

a. 2(x+1), x = 5

b. 10(2c+5), c=1



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

c. 3(4f-1), f = 2

d. 9(-3r - 11), r = 10

Example 4

Rewrite the expression, $(6x + 15) \div 3$, as a sum using the distributive property.

$(6x + 15) \times \frac{1}{3}$
$(6x)\frac{1}{3} + (15)\frac{1}{3}$
2x + 5

Exercise 3

Rewrite the expressions as a sum.

e. $(2b + 12) \div 2$

- f. $(20r 8) \div 4$
- g. $(49g 7) \div 7$



Example 5

Expand the expression 4(x + y + z).

Exercise 4

Expand the expression from a product to a sum so as to remove grouping symbols using an area model and the repeated use of distributive property: 3(x + 2y + 5z).



Example 6

A square fountain area with side length *s* 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.

a. Write two equivalent expressions that represent the rectangular array below.



- b. 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 as sums.
 - a. 2(x + 10)
 - b. 3(4b + 12c + 11)
- 4. Use the distributive property to write the products as sums.

a.	3(2x-1)	g.	$(40s + 100t) \div 10$
b.	10(b + 4c)	h.	$(48p + 24) \div 6$
c.	9(g - 5h)	i.	$(2b + 12) \div 2$
d.	7(4n - 5m - 2)	j.	$(20r - 8) \div 4$
e.	a(b+c+1)	k.	$(49g - 7) \div 7$
f.	(8j - 3l + 9)6	Ι.	$(14g + 22h) \div \frac{1}{2}$

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