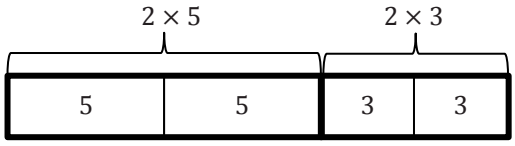
Lesson 11: Factoring Expressions

Classwork

Example 1

a. Use the model to answer the following questions.



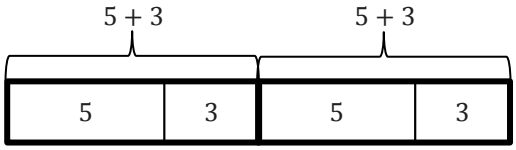
How many fives are in the model?

How many threes are in the model?

What does the expression represent in words?

What expression could we write to represent the model?

b. Use the new model and the previous model to answer the next set of questions.



How many fives are in the model?

How many threes are in the model?

What does the expression represent in words?

What expression could we write to represent the model?

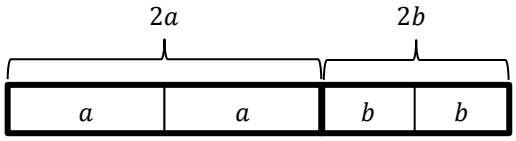
c. Is the model in part (a) equivalent to the model in part (b)?

d. What relationship do we see happening on either side of the equal sign?

e. In Grade 5 and in Module 2 of this year, you have used similar reasoning to solve problems. What is the name of the property that is used to say that $2(5+3)$ is the same as $2 \times 5 + 2 \times 3$?

Example 2

Now we will take a look at an example with variables. Discuss the questions with your partner.



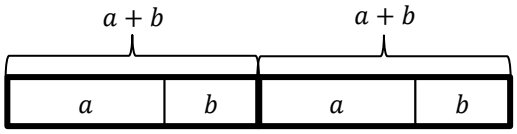
What does the model represent in words?

What does $2a$ mean?

How many a's are in the model?

How many b's are in the model?

What expression could we write to represent the model?



How many a's are in the expression?

How many b's are in the expression?

What expression could we write to represent the model?

Are the two expressions equivalent?

Example 3

Use GCF and the distributive property to write equivalent expressions.

1. $3f + 3g =$ _____

What is the question asking us to do?

How would Problem 1 look if we expanded each term?

What is the GCF in Problem 1?

How can we use the GCF to rewrite this expression?

2. $6x + 9y =$ _____

What is the question asking us to do?

How would Problem 2 look if we expanded each term?

What is the GCF in Problem 2?

How can we use the GCF to rewrite this expression?

3. $3c + 11c =$ _____

Is there a greatest common factor in Problem 3?

Rewrite the expression using the distributive property.

4. $24b + 8 =$ _____

Explain how you used GCF and the distributive property to rewrite the expression in Problem 4.

Why is there a 1 in the parentheses?

How is this related to the first two examples?

Exercises

1. Apply the distributive property to write equivalent expressions.
   a. $7x + 7y$

   b. $15g + 20h$

   c. $18m + 42n$

   d. $30a + 39b$

   e. $11f + 15f$

   f. $18h + 13h$

   g. $55m + 11$

   h. $7 + 56y$

2. Evaluate each of the expressions below.
   a. $6x + 21y$ and $3(2x + 7y)$ $x = 3$ and $y = 4$

   b. $5g + 7g$ and $g(5 + 7)$ $g = 6$

c. $14x + 2$ and $2(7x + 1)$ $x = 10$

d. Explain any patterns that you notice in the results to parts (a)–(c).

e. What would happen if other values were given for the variables?

Closing

How can you use your knowledge of GCF and the distributive property to write equivalent expressions?

Find the missing value that makes the two expressions equivalent.

$4x + 12y$ _____$(x + 3y)$

$35x + 50y$ _____$(7x + 10y)$

$18x + 9y$ _____$(2x + y)$

$32x + 8y$ _____$(4x + y)$

$100x + 700y$ _____$(x + 7y)$

Explain how you determine the missing number.

Lesson Summary

AN EXPRESSION IN FACTORED FORM: An expression that is a product of two or more expressions is said to be in *factored form*.

Problem Set

1. Use models to prove that $3(a + b)$ is equivalent to $3a + 3b$.

2. Use greatest common factor and the distributive property to write equivalent expressions in factored form for the following expressions.
   a. $4d + 12e$
   b. $18x + 30y$
   c. $21a + 28y$
   d. $24f + 56g$