

# Minus and the Distributive Law

You will need:

the Lab Gear

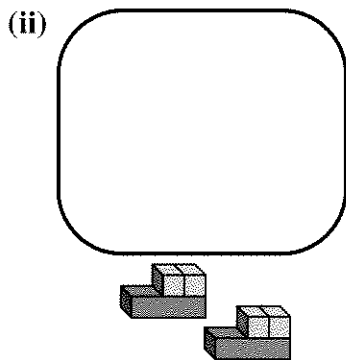
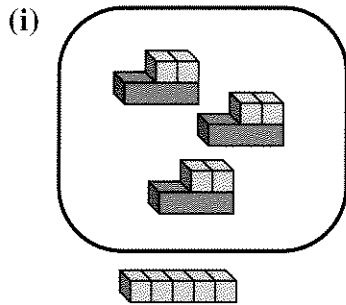


**REVIEW** ORDER OF OPERATIONS

1. Compare these two expressions, and these two figures.

$$(5 - 3)(x - 2)$$

$$5 - 3(x - 2)$$



- Which expression means *multiply*  $(x - 2)$  by 3 and *subtract the result from* 5? (Remember order of operations.)
- Which figure shows that expression with the Lab Gear?
- Which expression means *subtract 3 from 5* and *multiply the result by*  $(x - 2)$ ?

- Which figure shows that expression with the Lab Gear?
- Here are the same expressions, rewritten without parentheses. Which is which?

$$11 - 3x \qquad 2x - 4$$

Write without parentheses.

- $7 - 3(y - 4)$
- $(7 - 3)(y - 4)$
- $(4 - 2)x + 1$
- $(4 - 2)(x + 1)$
- $x - 2(x + 1)$
- $(x - 2)(x + 1)$
- $(x - 2)x - 1$

If you added another set of parentheses to the expression in problem 8, you would get  $(x - 2)(x - 1)$ . One way to multiply these binomials is to use the multiplication table format.

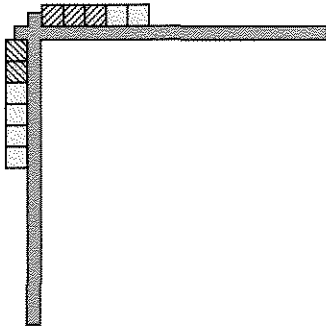
	$x$	$-2$
$x$	_____	_____
$-1$	_____	_____

9. What is the product?

**USING THE CORNER PIECE**

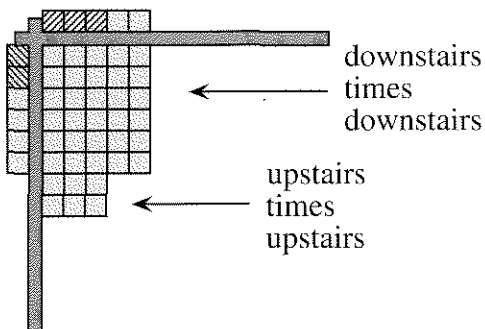
In this lesson, you will learn how to model a product like this with the Lab Gear. You will practice it with numbers before using variables.

**Example:** In the case of  $(6 - 2)(5 - 3)$  set up the problem as shown in the figure. The method you will follow is to *multiply all the blocks on the left side by all the blocks across the top*.

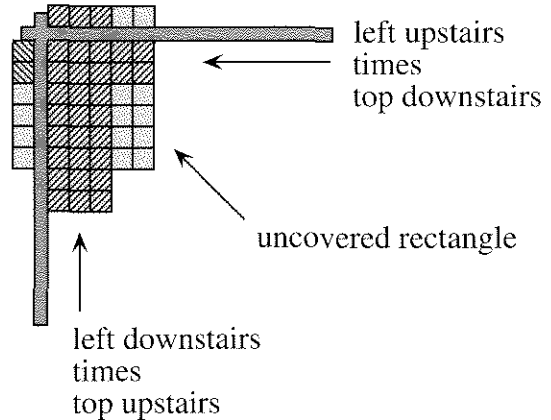


Put the upstairs blocks at the corner of the corner piece.

First, multiply the downstairs blocks. Then multiply the upstairs blocks by each other. Since  $-2(-3) = 6$ , a positive number, these blocks must appear *downstairs* somewhere. They will be arranged in a 2-by-3 rectangle. It would be nice to line up the rectangle with its factors, but then it would have to be upstairs, making it  $-6$ , which would be wrong. So we can *line it up with only one of the two factors*. Let's choose the  $-3$ .



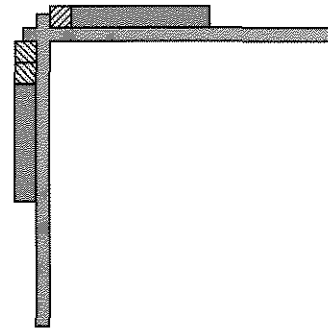
Finally, multiply upstairs blocks on the left with downstairs blocks at the top, and vice versa, placing them as shown.



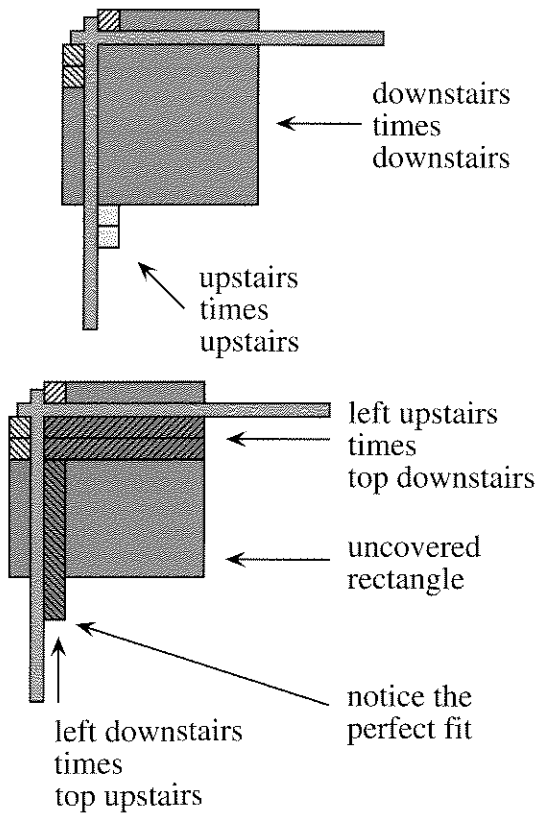
You can now see that the answer ( $4 \text{ times } 2 = 8$ ) is shown by *the uncovered rectangle*.

10. Use the corner piece to show the product  $(5 - 2)(7 - 4)$ .

#### USING VARIABLES



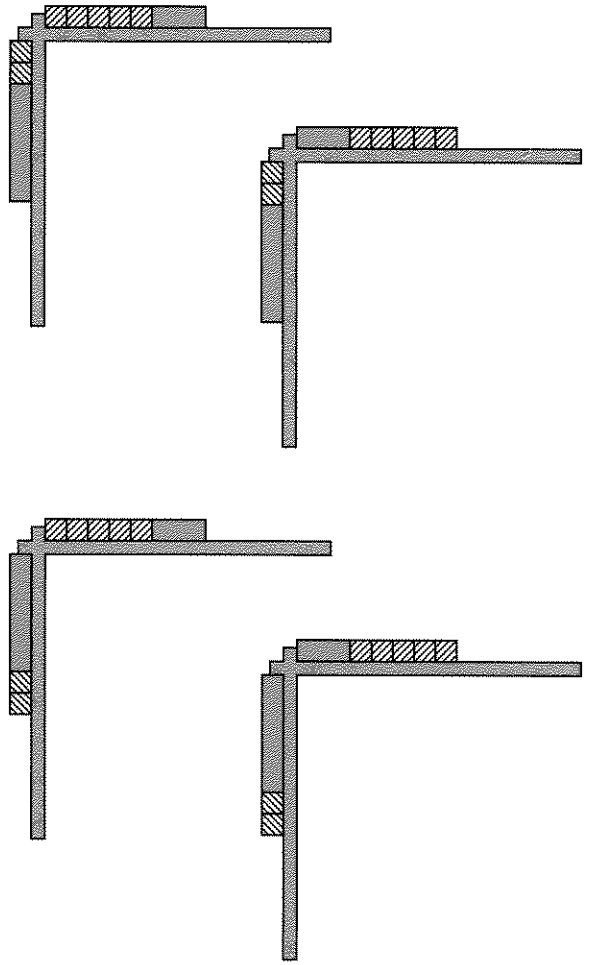
11. Write the polynomials being multiplied.
12. 🔑 Follow the process shown in the following figures with your blocks. Write a brief explanation of each step.



13. Write the dimensions of the uncovered rectangle and the product.
14. Use the Lab Gear to multiply.
  - a.  $(x - 1)(2x - 3)$
  - b.  $(y - 5)(2y - 1)$
15. Use the Lab Gear to multiply.
  - a.  $(y + 1)(y + 5)$
  - b.  $(y - 1)(y + 5)$
  - c.  $(y + 1)(y - 5)$
  - d.  $(y - 1)(y - 5)$

16. Use the Lab Gear to multiply.
  - a.  $(2x + 3)^2$
  - b.  $(2x - 3)^2$
  - c.  $(2x + 3)(2x - 3)$

17. This figure shows four ways to set up the multiplication  $(y - 2)(y - 5)$ . Of those, three will work. Experiment to find out which three. Sketch your solutions.



**DISCOVERY** MAKE A SQUARE

For each problem, arrange the blocks into a square. Not all are possible. Write an equation relating the side length and area of the square.

18.  $x^2 + 6x + 9$

19.  $4x^2 + 4x + 1$

20.  $x^2 + 8x + 4$

21.  $x^2 + 4x + 16$

22.  $9x^2 + 12x + 4$

23.  $x^2 + 2xy + y^2$

**REVIEW** SOLVING EQUATIONS

24. Use the cover-up method to solve these equations.

a.  $30 - 3(2x + 1) = 9$

b.  $19 - 2(x + 5) = 1$

c.  $(5 - 3x) - 2 = -3$

d.  $5 - 3(x - 2) = 20$

e.  $(5 - 3)(x - 2) = 10$

**REVIEW** FUNCTION DIAGRAMS FOR CONSTANT PRODUCTS


For each equation, 25-27:

- Make a large function diagram (with number lines ranging from at least -12 to 12), using your calculator to help you find values if needed.
- Do all the in-out lines meet in a single point?
- Are there any horizontal in-out lines? (In other words, in-out lines where  $x = y$ .) For what values of  $x$  and  $y$ ?
- Follow the  $y$ -value with your finger as  $x$  changes from -12 to 12. Describe  $y$ 's motion. (Does it move up or down? Does it ever *jump*? For what values of  $x$  does it move fast? Slowly?)

25.  $xy = 9$

26.  $xy = 8$

27.  $xy = -9$

28.   $x$  is greater than 1, and  $6/x$  is a whole number. What could  $x$  be? (Hint: There are more than three solutions.)