

Minus and the Distributive Law

You will need:

the Lab Gear

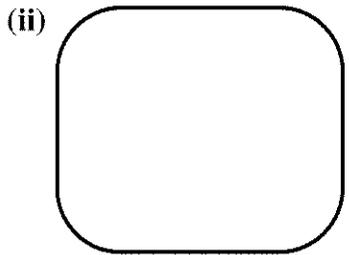
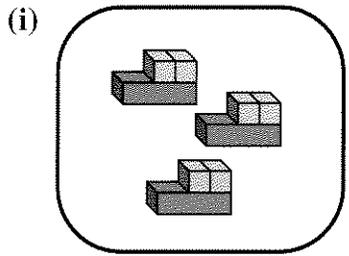


REVIEW ORDER OF OPERATIONS

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.

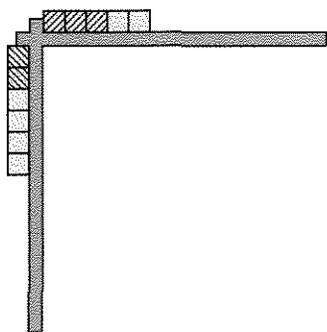
	x	-2
x	_____	_____
-1	_____	_____

9. What is the product?

USING THE CORNER PIECE

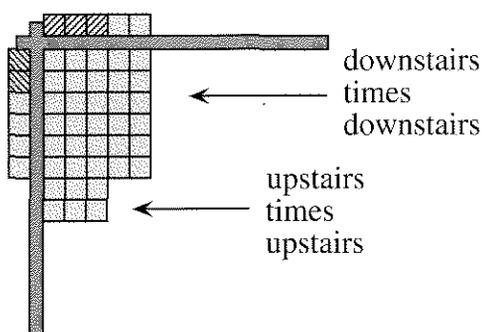
In this lesson, you will learn how to model a product like this with the Lab Gear. You will practice it with numbers before using variables.

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.*

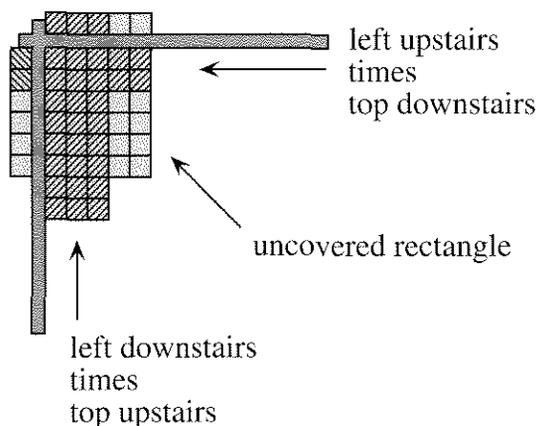


Put the upstairs blocks at the corner of the corner piece.

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 .



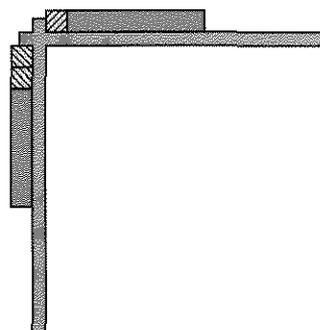
Finally, multiply upstairs blocks on the left with downstairs blocks at the top, and vice versa, placing them as shown.



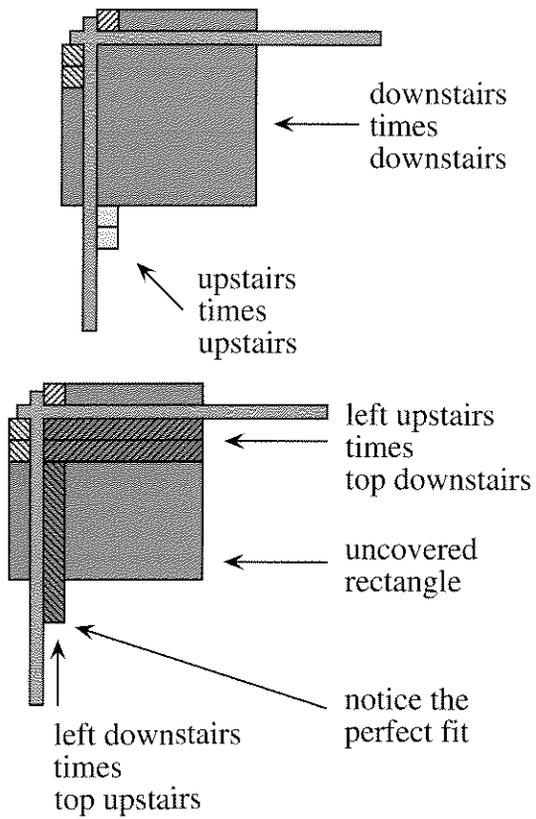
You can now see that the answer ($4 \text{ times } 2 = 8$) is shown by *the uncovered rectangle*.

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

USING VARIABLES



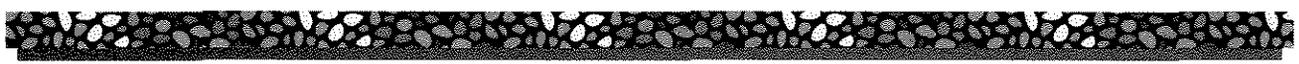
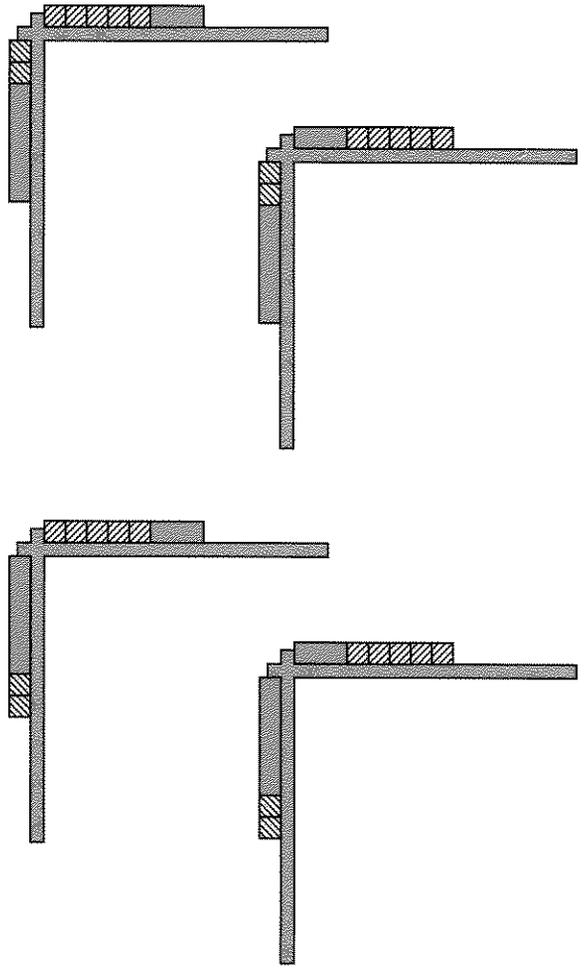
11. Write the polynomials being multiplied.
12. 🔑 Follow the process shown in the following figures with your blocks. Write a brief explanation of each step.



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.)