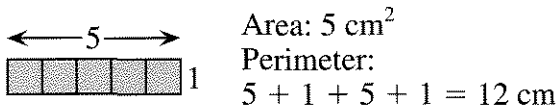# Perimeter

You will need:
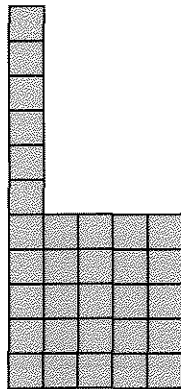
the Lab Gear

graph paper

PERIMETER OF LAB GEAR BLOCKS

When we discuss the perimeter and area of the Lab Gear blocks, we will be thinking of the tops of the "flat" blocks, which are two-dimensional figures. For example, if you look at the 5-block from above, you would see this figure. Its area is 5 cm², and its perimeter is 12 cm.
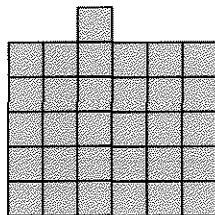
$\longleftarrow 5 \longrightarrow$
Area: 5 cm²
Perimeter:
$5 + 1 + 5 + 1 = 12$ cm

Find and write the area and perimeter of these figures, which are the top faces of groups of yellow blocks.
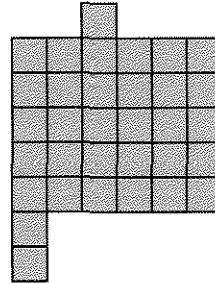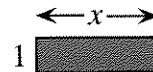
1.

2.

3.

To determine the area and perimeter of the blue blocks, we will not use the actual measurements. Instead, we will consider their dimensions in terms of x and y.

For example, this figure, the top of an x-block, is a 1-by-x rectangle. So its area is x (since $1 \cdot x = x$), and its perimeter is
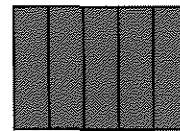
$$x + 1 + x + 1$$

which, by combining like terms, can be written $2x + 2$.
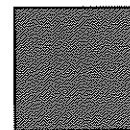
$\longleftarrow x \longrightarrow$
1

Find and write the area and perimeter of the following rectangles, which are the top faces of blue blocks. Be careful when combining like terms.
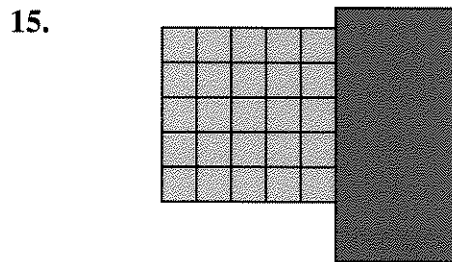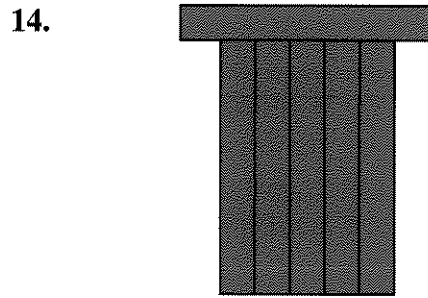
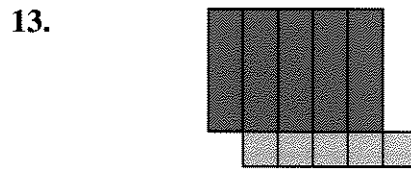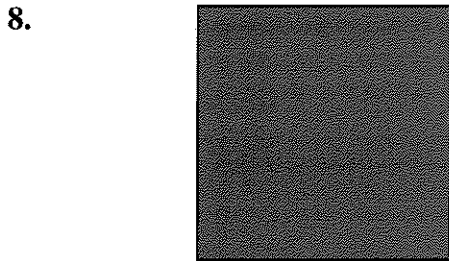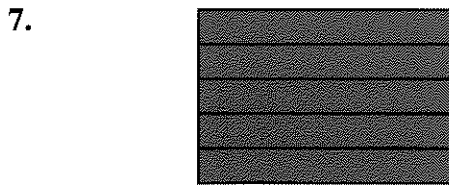**4.**

5.

6.

7.

8.

9.

PERIMETER OF LAB GEAR FIGURES

In these problems, assume that x and y are positive. In fact, assume that x is between 1 and 5, and y is between 5 and 10.

Find the perimeter of these figures.

10.

11.

12.

13.

14.

15.

MAKING FIGURES

Use an xy-block and a 5-block to make figures having these perimeters. (These can be any shape. They do not have to be rectangles.) Sketch the figure in each case.

16. $2x + 2y + 2$

17. $2x + 2y + 10$

18. $2y + 12$

19. Repeat the last three problems using a y-block and a $5x$-block.

20. �

    a. Use another combination of blocks to get a perimeter of $2x + 2y + 2$.

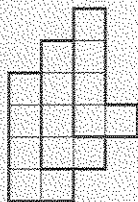   b. Use another combination of blocks to get a perimeter of $2x + 2y + 10$.

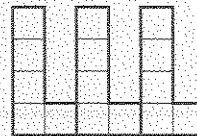   c. Use another combination of blocks to get a perimeter of $2y + 12$.

PENTOMINO STRIPS

21. What is the perimeter of the L pentomino?

22. Draw a strip of L pentominoes, as shown in the figure above. What is the perimeter if you've used 3 L's?

23. Make a table like this, extending it to 7 rows.

L's	Perimeter
1	...
2	16
3	...

24. Explain how you would find the perimeter of a 100-L strip without drawing it.

25. How many L's were used if the perimeter was 92?

26. Repeat problems 22-25 for an arrangement like the one above.

27. ← You can use graphs to compare the perimeter patterns for the two pentomino strip arrangements.

    a. Draw a pair of axes. Label the horizontal axis *Number of L's* and the vertical axis *Perimeter.*

    b. Graph all the number pairs from your first table. For example, since the 2-L strip has a perimeter of 16, you would plot the point (2, 16).

    c. On the same pair of axes, graph all the number pairs from your second table.

    d. Compare the graphs. How are they the same? How are they different?

28. Repeat problems 22-25 using another pentomino.

POLYOMINO AREA AND PERIMETER

29. Arrange three blocks so that the perimeter of the resulting figure is $6x + 2y$. Find all the solutions you can.

30. Arrange four blocks so that the perimeter of the resulting figure is $8x + 18$. Find all the solutions you can.

31. Arrange five blocks so that the perimeter of the resulting figure is $2y + 2x + 12$. Find all the solutions you can.