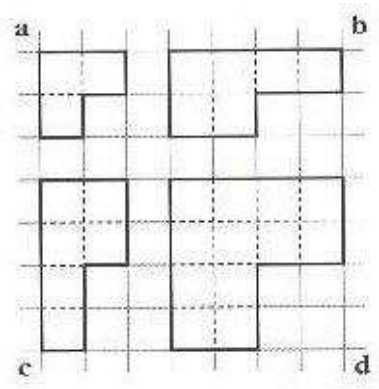
Lab 10.3 Polyomino Blowups Name(s) _____



The figure above shows a bent tromino (**a**) and three copies or it. The **b** copy has been doubled *horizontally*, the **c** copy has been doubled *vertically*, and the **d** copy has been doubled in *both* dimensions.

1. Which of the doubled figures is similar to the original? Explain.

2. For each polyomino with area less than 5, draw the polyomino and three copies on grid paper following the pattern in the figure above. As you work, record the perimeter and area of each stretched polyomino in the table.

	Perimeter				Area			
		Doubled				Doubled		
	Original	Horiz.	Vertic.	Both	Original	Horiz.	Vertic.	Both
Monomino								
Domino								
Bent								
Straight								
Square								
l								
i								
n								
t								

3. Study the table for patterns relating the numbers in the different columns. Write down what you observe.

4. The most important patterns are the ones relating the original figure with the similar figure. State the patterns for perimeter and area.

5. Write down a prediction about what may happen to perimeter and area if you triple, and quadruple, a polyomino in both dimensions.

6. Test your prediction by drawing a few polyominoes and their tripled and quadrupled copies. Write down your conclusions.

The following problems are puzzles involving similar polyominoes.

7. a. With your interlocking cubes, make tiles in the shape of the `l` and † tetrominoes.
   b. On grid paper, draw the five doubled tetrominoes (doubled in both dimensions).
   c. Use your tiles to cover each doubled figure. Record your solutions.

8. Repeat Problem 7 with the following shapes, being sure to multiply the dimensions both horizontally and vertically.
   a. Tripled tetrominoes, using `l` and † tiles
   b. Doubled pentominoes, using P and N tiles
   c. Tripled pentominoes, using P and L tiles

Discussion

A. What is the relationship between the scaling factor and the ratio of perimeters?

B. What is the relationship between the scaling factor and the ratio of areas? Why is this answer different from the answer to Question A?

C. How many tetrominoes does it take to tile a tripled tetromino? How many pentominoes does it take to tile a tripled pentomino? Explain.

D. How many polyominoes does it take to tile a polyomino whose area has been multiplied by *k*? Explain.

These are the standard polyomino names.