Area Exploration

M316L - Fall 2009

Everyone knows how to compute the area of polygons like triangles and rectangles. In this exploration, you will learn about how two ways to compute the area of irregularly shaped objects (i.e., non-polygons). The ideas here are reasonably simple, but they are actually the starting point for calculus[1].

Part 1: Finding the area of your hand

You will need the attached sheets of grid paper (three different sizes).

Start witht the first sheet (with the largest squares).

1. Trace your hand on the grid paper.
2. Lightly "shade in" the drawing of your hand.
3. Approximate the area of your hand by counting up the squares that were shaded. Only count in whole multiples of squares: if any part of the square was shaded, it counts as 1 square.

Now repeat this procedure with the second sheet of grid paper (with the medium-sized squares). What has changed? What is new area?

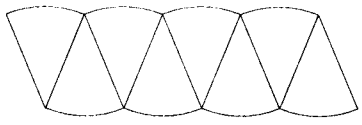
Try to predict what will happen with the third sheet, then see if you were correct. What has changed? What is new area?

How small do you think the squares on the grid sheet would have to be to give you the exact answer?

Part 2: Finding the area of a circle

You will need scissors and the attached circles (two sizes).

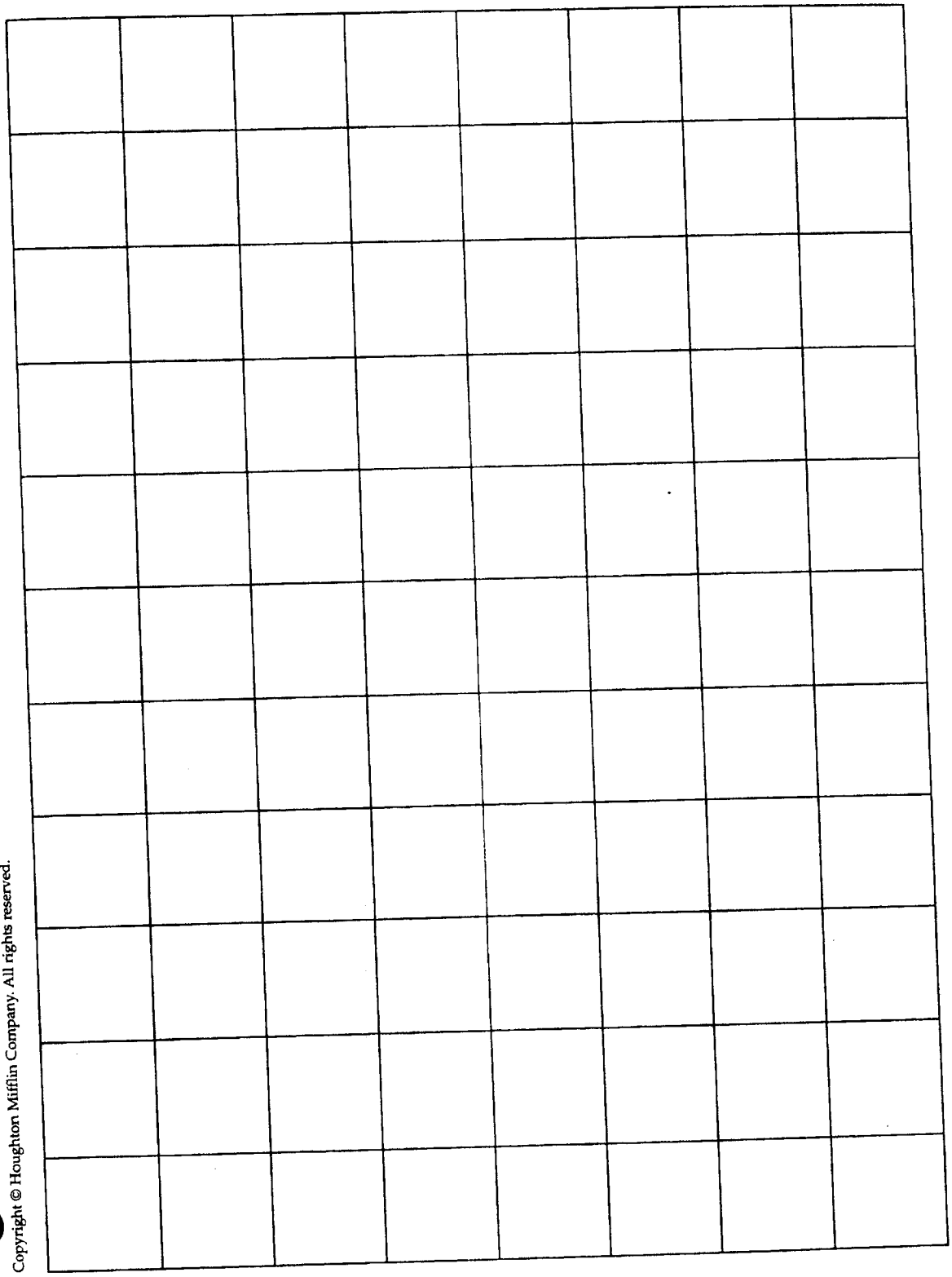
1. Cut out the first circle, cut it into slices as indicated, and place the slices in the shape of a "parallelogram," as shown:



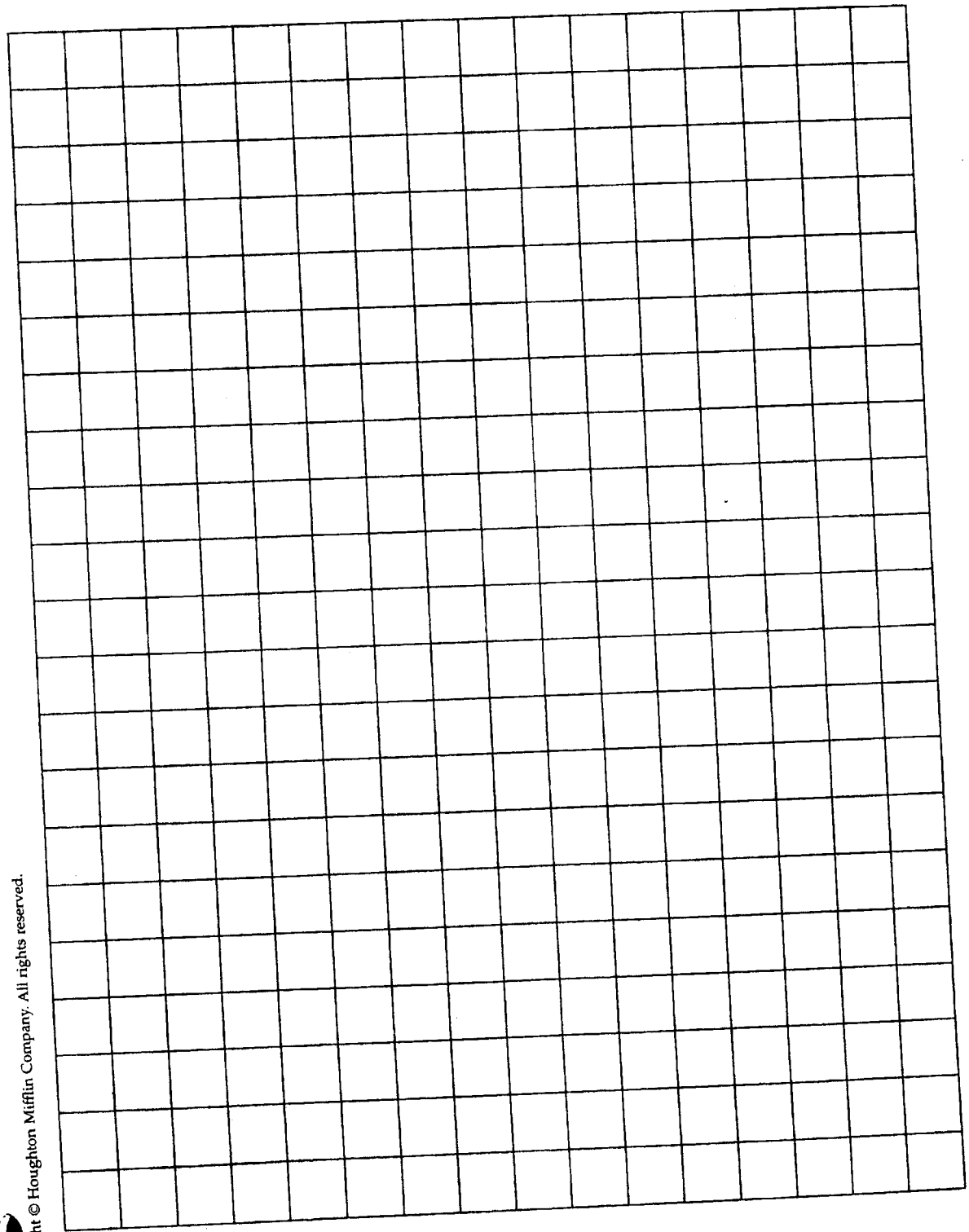
2. Cut out the second circle, and do the same thing.
3. If you wanted to make this into a true parallelogram, how many slices would you need?
4. The area of a parallelogram is base $\times$ height. Use this to find the area of a circle.

[1] Calculus is awesome.

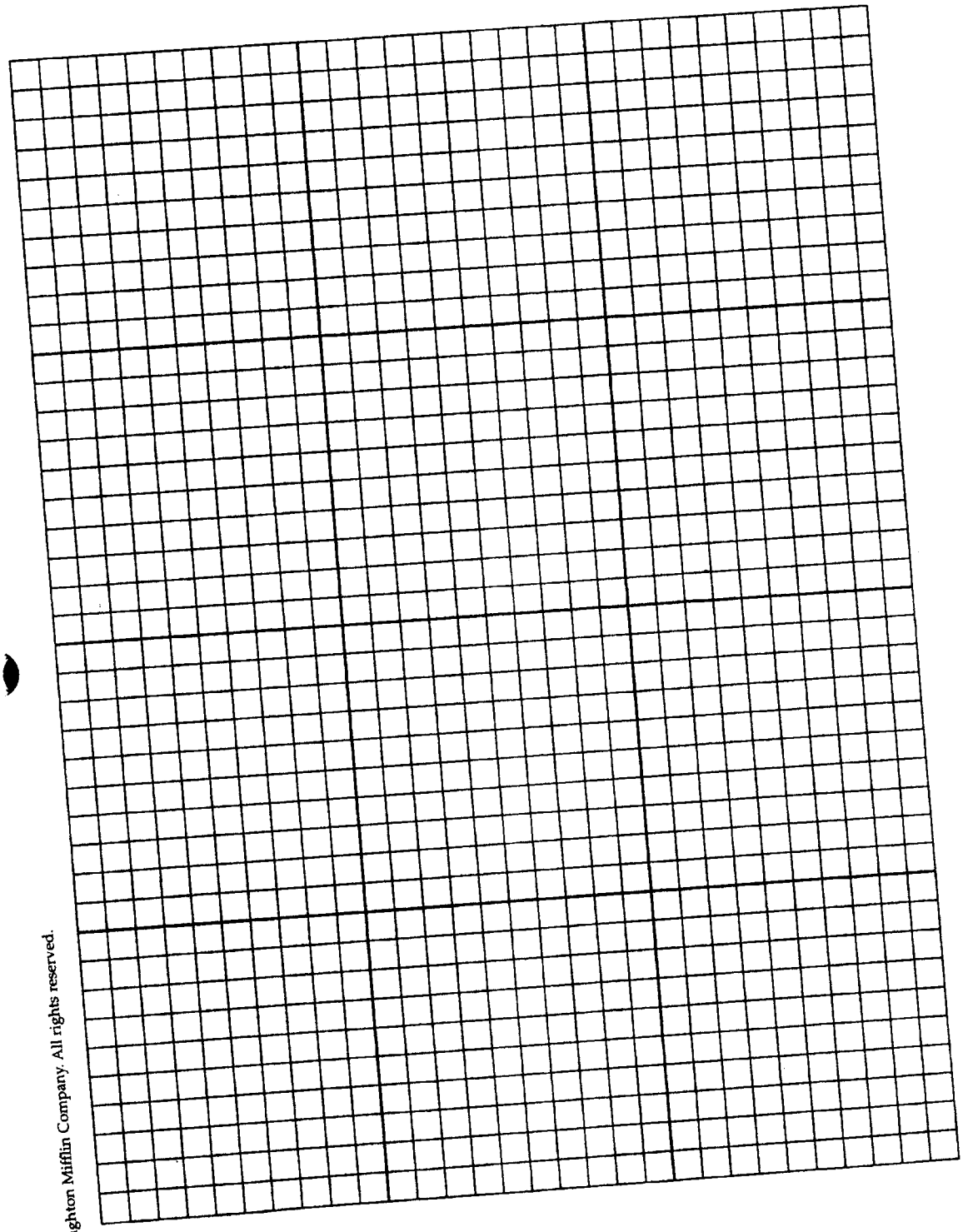
Polyomino Grid Paper

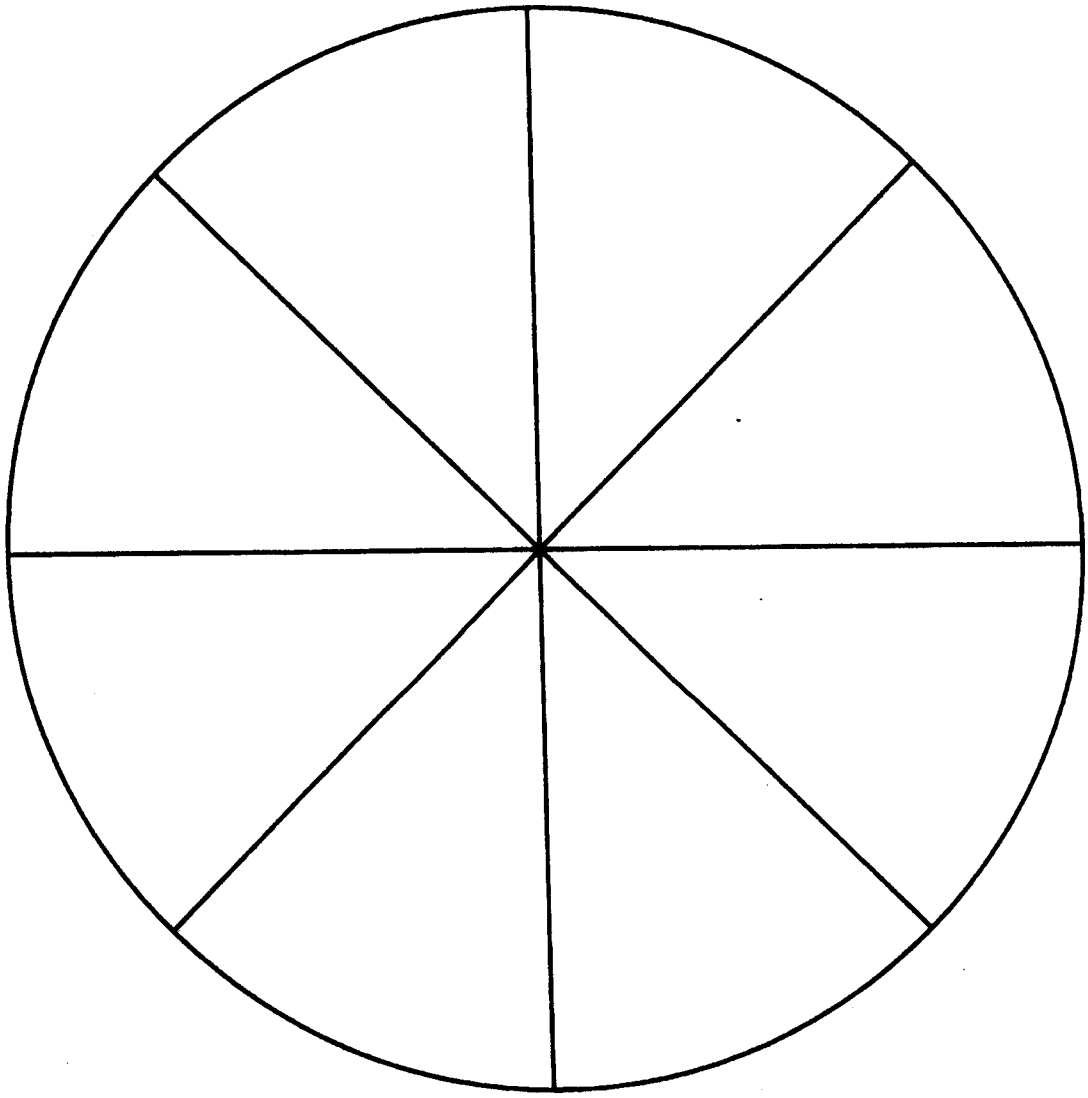


Other Base Graph Paper



Base 10 Graph Paper





Exploring the Area of a Circle