Math 3309 **CONCEPTUAL MATHEMATICS II** Spring 2004
Dr. Duval **Project 6**
due Thursday, April 15

Fencing in Spaces

This project is an extension of Unit 4.1, Fencing in Spaces, from the Covering and Surrounding book (Grade 6) of the Connected Mathematics Project.

Problem 4.1 Suppose you wnated to help a friend build a rectangular pen for her dog, Shane. You have 24 meters of fencing, in 1-meter lengths, to build the pen. Which rectangular shape would be best for Shane?
Experiment with square tiles to find all possible rectangles with a *perimeter* of 24 meters. Sketch each rectangle on grid paper. Record your data about each possible plan in a table with these column heading:

Length	Width	Perimeter	Area

Problem 4.1 Follow-Up

1. Which design would give Shane the best pen for running?
2. Which design would give Shane the most space for playing?

We will generalize Problem 4.1 Follow-Up, question 2, first by both allowing for different perimeters, and removing the restriction of 1-meter length units of fencing, and then by replacing rectangles with other shapes.

(a) Answer Problem 4.1 Follow-Up, question 2.

(b) Suppose now your friend can get fencing in any length (not just 1-meter segments), but still wants to only buy 24 meters of fencing total; can you help her give Shane more space?

(c) Suppose now she wants to buy 17 meters of fencing total (still with no restriction on how long each segment of fencing must be). Which design would give Shane the most space for playing?

(d) Given an arbitrary total perimeter, which design gives Shane the most space for playing?

(e) What if your friend wants to build a **triangle**-shaped pen with 24 meters perimeter? Which design would give Shane the most space for playing? What about 17 meters perimeter? What about an arbitrary perimeter?

(f) What if your friend wants to build a pen of an arbitrary shape? (You can simulate this with a string of fixed length, and then estimate the area with M & M's.)

(g) Is there a pattern to your answers for rectangles, triangles, and arbitrary shapes?