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**CHAPTER 9-4**

**Modular Programming**

A fundamental principle of programming (and problem solving) is to break the job into manageable pieces. As we write code to solve more complicated problems, it will become very important to write modular programs, which means we’ll have lots of smaller programs for specific jobs which can be re-used by higher level programs.

Your task is to write a program called **house** which will (not surprisingly) draw a simple rectangular house with a triangular roof, rectangular windows and doors. Normally it is much better to work through a worksheet together, but in this case, you might want to carefully read the whole assignment, and then have each group member work on a different smaller piece.

First write a program  
 to **rectangle** :width: height :x :y  
that draws a rectangle with given width and height starting at (x,y). You can decide which corner of the rectangle (x,y) will be. (In other words, you can move to (x,y) then go up or down etc, just be sure to remember which way you decided to do it.) Copy your program and a picture of   
 1. A rectangle with width 75, height 50, starting at (200,100)  
 2. A rectangle with width 200, height 25, starting at (-250, -50)

In the same way, write a program  
 to **triangle** :base :height :x :y  
that draws an isosceles triangle with given base and height starting at (x,y). Notice that you’ll need a bit of trig (and the **arctan** command) to find the angle you need to turn. The Edall button on the Logo window is really helpful in allowing you to see all your programs at once.

Next write programs **wall** and **roof** that use **rectangle** and **triangle** to draw the rectangular body of the house and the roof, respectively. Experiment with different choices of widths, heights, (x,y), etc to get a house that you like. Your **wall** and **roof** programs should also color the house and the roof. See the color handout and pick colors you like.

Write a program  
 to **door** :width :height :startx :starty :knobx :knoby :radius  
which uses **rectangle** and **arc** to draw a door starting at the point (startx, starty), puts a doorknob centered at (knobx, knoby) with the given :radius, and colors the door. You can pick where to put the door, the knob, and what color to use. Experiment with different numbers. Play with it until you find a door you like.

Write a program  
 to **window** :width :height :x :y  
that uses **rectangle** to draw a window and color it. Feel free to be creative and make the windows as fancy as you like.

Finally write the main program **house** which uses the **wall**, **roof**, **door**, and **window** programs to make a house. Include at least two windows. Write other programs to add any other features you like. By breaking the job into smaller pieces, it’s much much easier to find and fix mistakes. Copy all your programs and your finished picture below: