

#6 Simple Logo House

Let's work on drawing using Logo. Open up **Square** (not Square1 from last time). **Square** should look like this:

```
=====
to Main
  cc
  talkto "t1
  ;works with turtle named t1
  repeat 20 [Square]
end
=====

to square
  ;draws a square of 50 units
  pd
  repeat 4 [forward 50 right 90 wait 1]
end

to Start
  Main
end
```

Now save it as **House**. This makes a copy of it that we will change.

So far we have only been drawing a square or a line. Let's do some experimenting to see if we can draw a triangle. Go to the Command Center and type **cc <enter>**, to clear the command center, then **cg <enter>** to clear the graphics.

First, let's talk about degrees. Degrees measure how much you are turning. When the turtle draws a square, it makes 90-degree turns. So a 90-degree turn is the measure of a right angle. But how much is a degree, anyway? In the Command Center, let's tell our turtle to put its pen down, turn one degree, go forward 50 and back 50.



```
cg  
pd right 1 forward 50 back 50
```

Hmm. How much did it turn? It's hard to tell. Obviously one degree isn't much. Now, what if we tell it to repeat those same commands 45 times?



```
repeat 45 [ right 1 forward 50 back 50]
```

Ninety times? Enough times to go full circle? Experiment until your turtle is drawing a starburst. Remember **repeat** has two inputs: a number of times to repeat, and a list of commands to repeat. You have just learned that there are 360 degrees in a circle, and each degree is a tiny turn for the turtle.

Now, about going through the turns to draw a figure. Let's suppose YOU are a turtle, and the floor of the room you are in is the screen. If you are facing straight ahead and then turn yourself to face to the right, you have turned yourself 90 degrees.

Choose three endpoints for a big equal-sided triangle on the floor (for example, a chair, the door jamb, and a table leg.) Walk along one side of the triangle, and then turn yourself the required angle to get to the next side. Notice you have turned more than 90 degrees! In fact, you have turned 120 degrees. Go to the next corner. Turn 120 degrees. Walk to the next corner. Turn 120 degrees. You are now facing the same way you started, so you have turned a total of 360 degrees, or full circle. You have now done all the turns that a turtle would do if it were drawing an equal-sided, or equilateral, triangle.

Draw a triangle with a pencil on a piece of paper. Suppose that it is 50 turtle steps on a side. Write a set of instructions in English on a piece of paper that tells the turtle how far to walk and how far to turn. Then translate it to Logo. Use **repeat**. (Check this and other answers at the end of the book, but only after you have worked on the problem for a while. Also find a troubleshooting guide there.)

Get to the Procedures Page (using **<ctrl f>** in MicroWorlds 2.0). Name our new procedure **To triangle**. Add a line of explanation, such as **;draws a triangle of 50 units**. Don't forget **pd**. Then type in your instructions. Finish with **end**.

Go back to the Graphics Page. In the Command Center, type **triangle** and hit enter. Did the turtle draw a triangle? If not, go back to the Procedures Page. Adjust the procedure till it works. Show your teacher that it works by going to the Command Center and typing **triangle**, then pressing **<enter>**.

We can draw a lot more than triangles. In the Command Center, play with turns of smaller angles. We'll see what happens with **right 60** instead of **right 120**, just for grins. Type in this:

```
cg
pd
repeat 8 [forward 50 right 60 wait 1]
```

and press **<enter>**. What happened? Now replace **right 60** with **right 30**, then **right 20**, then **right 1**. You'll need to increase the number of repeats to get a good idea of what you are drawing. To return the turtle to its centered, heads-up position, type **cg**, then **pd**.

Remember pen up, or **pu**. Your turtle will be crawling around and drawing things. If you don't want a line to follow him, pull his pen up, move to another spot, and then put it down again (**pd**).

Now, let's work on calling our square and triangle procedures to make a simple picture of a house: a square with triangle on top.

Returning to the command center, let's type this:

```
cg
square
triangle
```

What did the turtle draw? It doesn't look like a house. What is wrong? The triangle starts in the wrong place!

Our turtle needs to clear graphics, draw a square making right turns, pick its pen up, then move up to the roof and face along one line of the triangle before it starts drawing the roof triangle. Imagine you are the turtle, and write down instructions for yourself in English using a piece of paper. Translate them to Logo. What combination of **pu**, **forward**, and **right**, with inputs, will do the trick? Here's another function you may need: **seth**, pronounced set-H, for set heading. Remember that **seth 0** points the turtle up; **seth 90** points it to the right; **seth -90** points it to the left; **seth 180** points it down.

Then type your commands into the Procedures Page. To test them, go to the Command Center and type the name of the procedure.

Name this procedure **climb.to.roof**, which MicroWorlds reads as all one word, a name. Don't forget the beginning and end words, and a line of explanation.

On the Procedures Page, create another procedure called **to house** that explains what it is doing, clears graphics, and then calls the procedures **square**, **climb.to.roof**, and **triangle**. End it with **end**.

Save your work by striking the control and s keys, **<ctrl> <s>**. *Show* your teacher that your program draws a house when you type **house** and press **<enter>** in the Command Center.