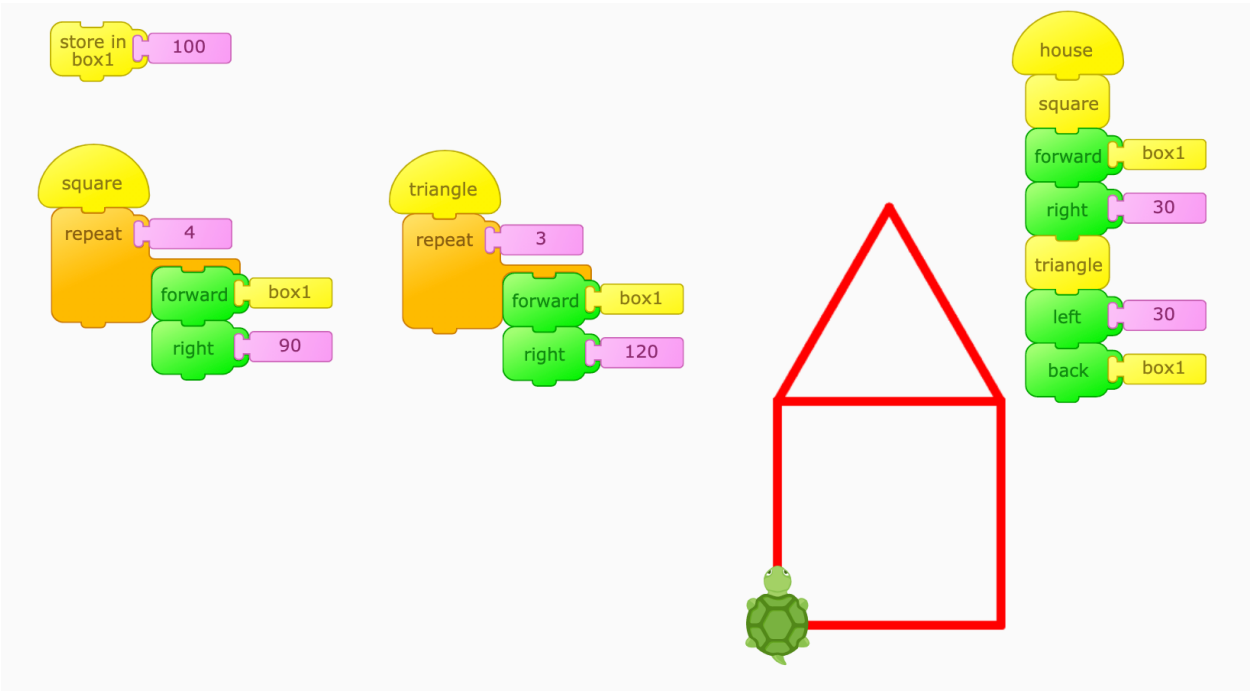
Variables and Scale in Turtle Art

Global Version

1. Create the following program in Turtle Art.
2. Type a value into the `store in box1` block and click on that block to run it.
3. Click on the house block and see what happens.
4. Change the value stored in `box1`, click on the `store in box1` block, and then make a new house.
5. Repeat steps 3 & 4 a few times.



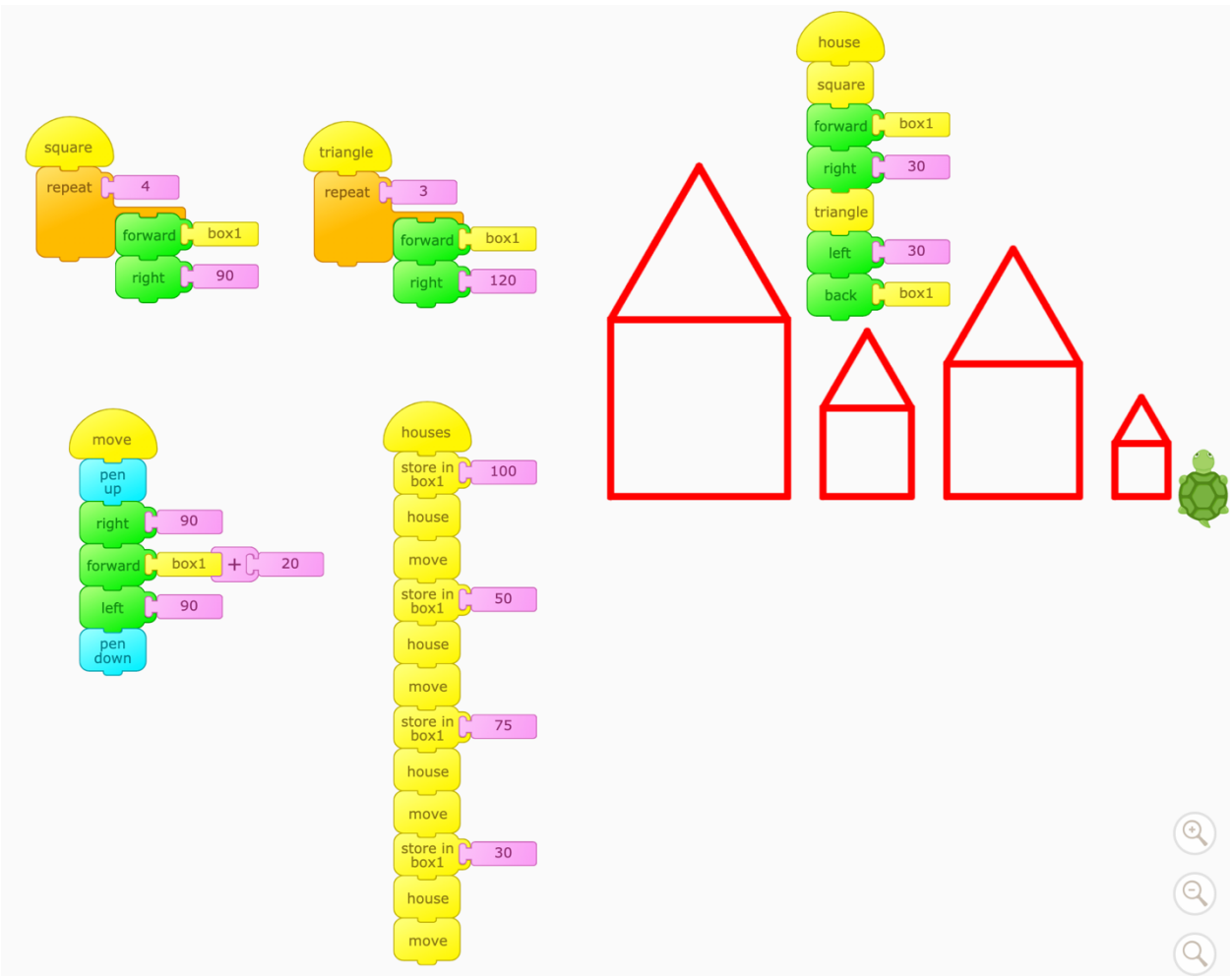
Questions

- What does store in `box1` do?
- What does `box1` do?
- How does this vary the size of your house?

Varying procedures and subprocedures

In this version of the Turtle Art program, changing the value of the thing inside box1 allows you to not only vary the size houses, but create equally spaced neighborhoods.

1. Create the following procedures in a new project or by modifying the procedures used above.
2. Read the code and try to understand what it does.
3. Click on the blocks for `square, triangle, house, move,` and `houses` to make sure that each work properly.



We don't need to set the value of `box1` separately from running the `houses` superprocedure. Its value is changed multiple times in houses, prior to each house being drawn.

The `move` procedure causes the turtle to slide "down the road" with equal spacing between each house.

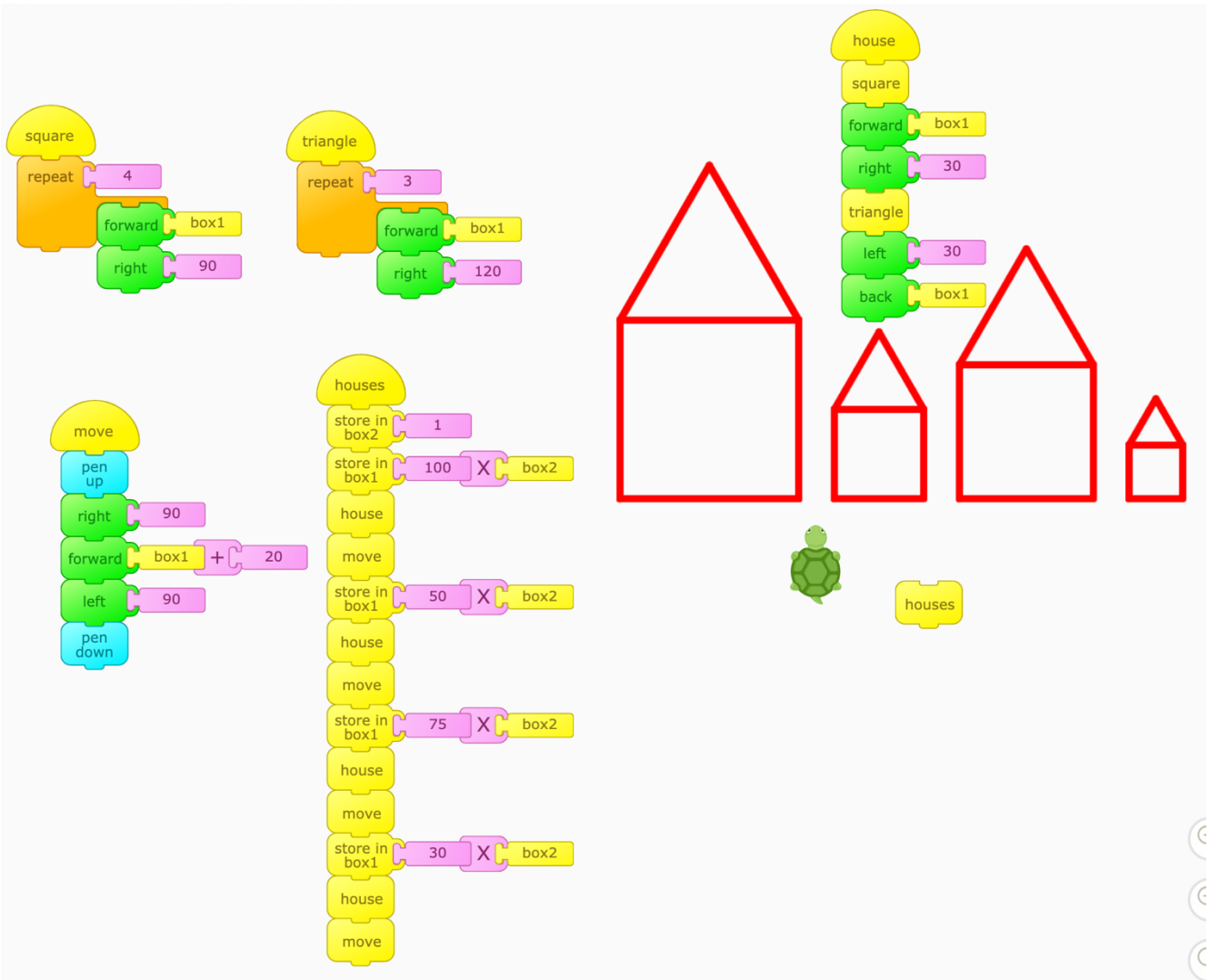
Challenges

- Add additional houses to the `houses` procedure.
- Start houses on the left-hand side of the screen in order to accommodate a larger neighborhood.
- Write a neighborhood procedure that uses the other blocks created, but draws houses of random size
- Change the color of the houses.
- Change the color of the houses randomly.
- Make roofs and houses contrasting colors manually or randomly.

Scale

In this version of the Turtle Art program, we will add a second *variable*, box2. This value will represent the scale of the images drawn by the turtle

1. Create the following procedures in a new project or by modifying the houses procedures from the previous activity.
2. Read the code and try to predict what it does.
3. Run the houses block.
4. Change the number stored in box2 in houses. Then run houses again. What happened? Try different numbers stored in box2. What happens to your neighborhood? What is scale?



Challenge

- Your move procedure now needs to be debugged to deal with the issue of scale. A little bit of math should do the trick! Can *you* fix it?
- Embrace some of the challenges listed in the previous activity.

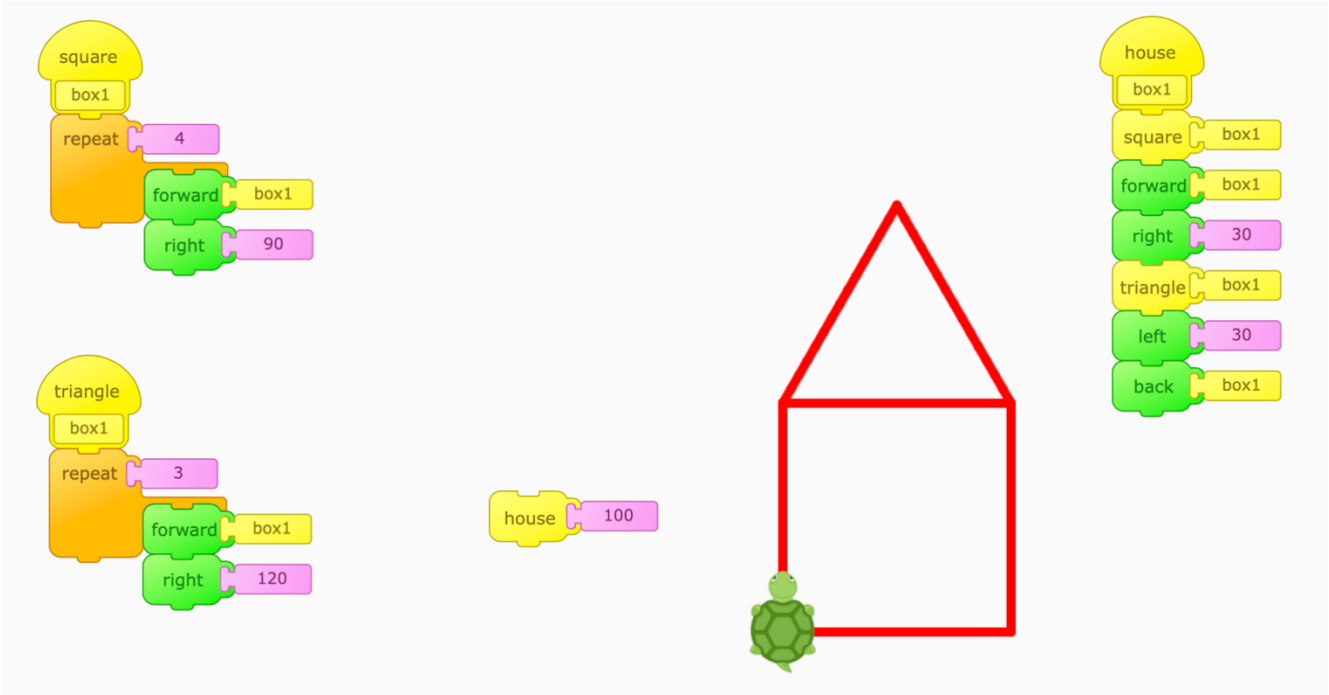
Variables and Scale in Turtle Art
Local Version

In this version of the project, we will create procedures with inputs. These *local variables* are a more flexible efficient way of changing values in a computer program.

1. Create the following program in Turtle Art.
2. Once you create a stack of blocks, including the "hat," and name that *procedure.*
3. Drag a `box 1` block into the hat and you will see the input added to the top of the procedure.
4. Notice how a new block is created with an open jaw for a variable value.

This process creates a new block that requires an input, just like `forward`. Procedures and subprocedures may now pass values to each other.

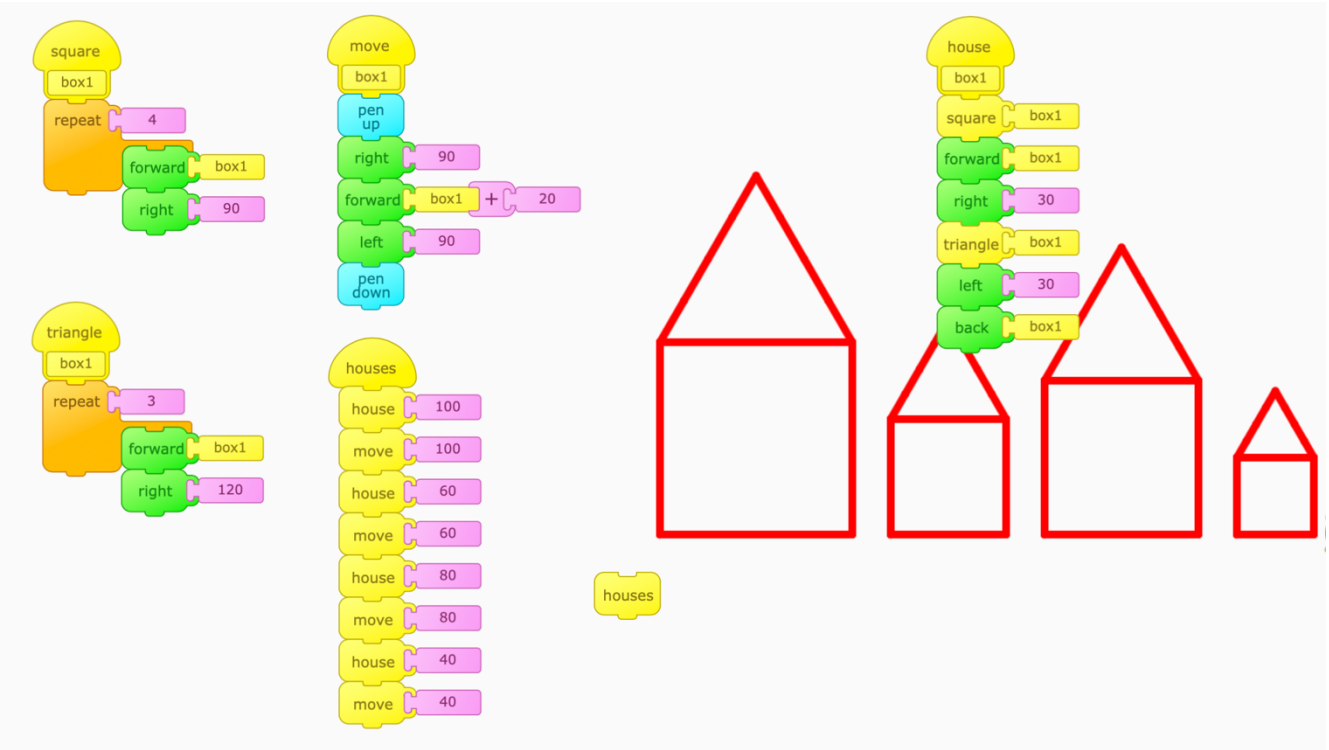
5. Run the `house` block, change the value input to `house` and run the house block again.



Do you understand how `house` and its subprocedures work now?

A New Neighborhood

Create the following program and run it by clicking on the `houses` block.



A More Elegant Version of the Previous Program

Modify the `house` and `houses` blocks in the program, as follows. What is the advantage of this new version?