

Agents

- create (s)
- create (s) do
- delete
- delete everyone
- delete agent
- scatter
- scatter everyone
- take camera
- me
- my parent

Traits

- my
- set my to
- of
- color: red green
- color:
- built-in shape:

Movement

- forward
- backwards
- left by degs
- right by degs
- up
- down
- face towards

Detection

- on collision with do
- collidee
- count within
- count within with =
- nearest within
- nearest within with =

Lists

- list of data
- splice into at beginning
- contains data
- Insert data into at beginning
- get data in
- length of

Variables

- var: name data is
- set to
- value of

Environment

- clear terrain
- stamp
- stamp grid
- pen down
- terrain color
- clock
- set clock to
- world trait:
- set world to
- The World

Math

- pi
- random
- + - x /
- remainder of /
- sin
- arcsin
- sqrt
- log
- ln
- power
- larger of and
- round to
- abs

Interface

- when pushed
- while toggled
- toggle to on for
- hide
- show
- set data box to
- data box
- set label to
- label
- slider value
- Add data to line graph x-axis: y-axis:
- clear line graph
- Update bar graph
- Add entry to table undefined: undefi
- clear table

Keyboard

- key held?
- key typed?

Sound

- play sound
- play record delete

Logic

- if
- if else
- while do
- repeat times
- yield
- =
- not
- !=
- <
- >
- <=
- >=
- and
- or

Procedures

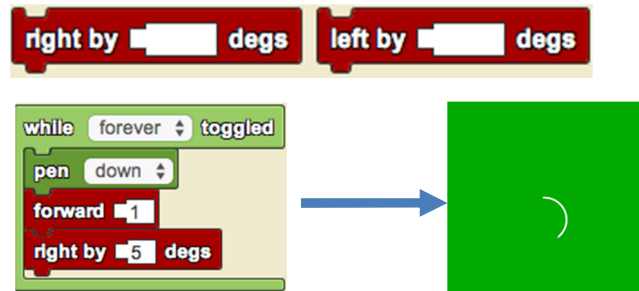
- procedure: name
- add parameter
- return nothing
- call:
- call:
- parameter
- return-early nothing

Left and Right degrees turning: *Making your turtle turn while it is moving*

The movement blocks 'right by' and 'left by' are used to make your turtle agents turn while walking. The amount they turn is *relative* to where they are facing.

Thinking Challenge:

Look at the code to the right. What will happen if you have your turtles turn by a number larger than 5?

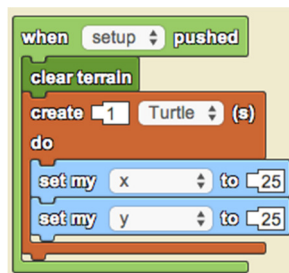


X & Y coordinates in Spaceland: *Placing your turtles on Spaceland*

This is the standard view of the area called 'Spaceland' and is the terrain where the programmed action will take place. There is 1 turtle that is created and the **default location for the turtle is (0,0)**. The **default color and shape is a gray square**.

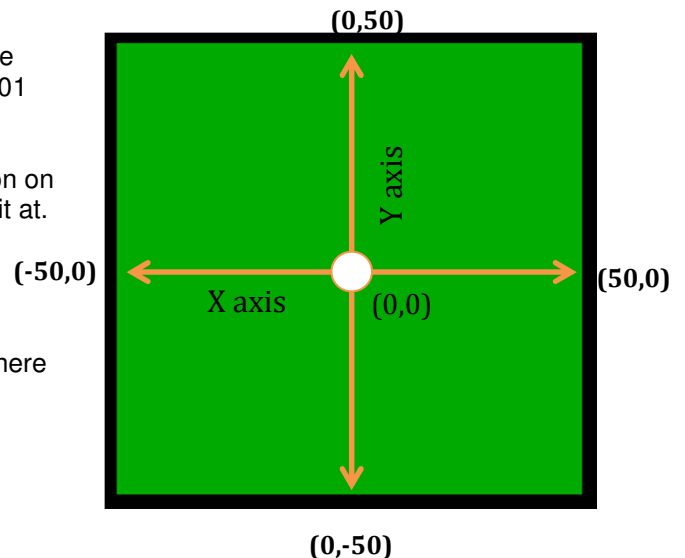
Spaceland is like a grid made up of patches. (0,0) is at the center of the plane. The plane is 101 patches wide and 101 patches tall.

As a programmer you can position an agent at any location on the plane by specifying what X and Y coordinate to place it at.



Thinking Challenge:

Look at the code to the left. Where on Spaceland will the turtle be created?



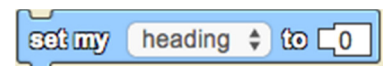
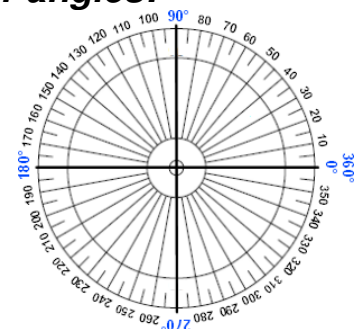
Getting your turtles to go in a specific direction: *know your angles!*

When turtles are created, they are facing out from the center. To have your turtles go in a specific direction you will need to set their heading, which is based on the degrees in a protractor. Notice the start of the circle is at 0 degrees, which also becomes 360 degrees after going around the circle. To go towards the top of Spaceland, the turtle would need to set its heading towards 90 degrees.

Thinking Challenge:

What will happen when you create 5 turtles that are separated by 2 steps forward (like in your Flower Turtle Project)? What direction does each of them face? How does it change with 10 turtles?

What will happen if you have your turtles set heading to 0 degrees using the blue traits block 'set my...'? In what direction will the turtles head?



Model Observation Form

Name(s): _____ Date: _____

Model name: _____

Abstractions*Who are the Agents? What is the Environment? What are the Interactions?**How much time does the main forever loop represent? (minutes? days? months? years?)**What are the variables of interest?***Automation***What happens each time through the forever (or main) loop?***Assumption(s)***What real life elements or behaviors were left out of this model?***Analysis***What patterns did you observe? Do these patterns occur in real-life?*

Lesson 3 Activity #1 Guide

Student Activity Guide

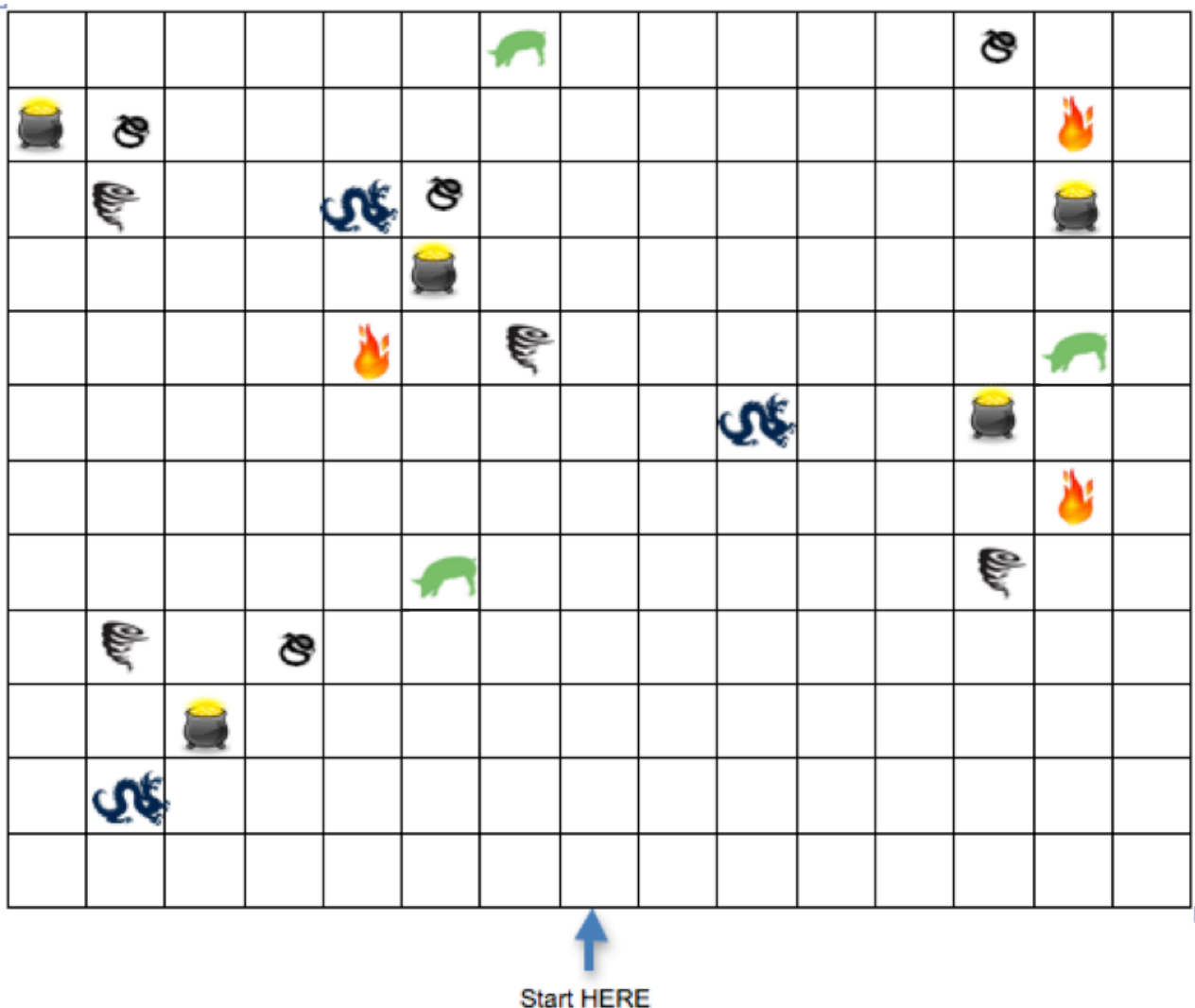
TRAILBLAZER

Instructions and playing board

How to play: On the map, START at the designated position and heading in the direction of the arrow. Using a pencil, draw the path in the CENTER of squares. Pick up ALL the gold while avoiding the hazards, **ending at START**. Color the squares as necessary according to the following rules:

- Take a step forward.
- If you are standing on a **RED** square, then turn right by 90 degrees
- If you are standing on a **BLUE** square, then turn left by 90 degrees
- If you are standing on a **BLACK** square, then turn right by 180 degrees

Trade your map with a partner and figure out if following the landmarks leads you along the path to collect all of the gold while avoiding the hazards.



Progress Monitors for Coding Projects in Module 1

Flower/Painting Turtles Progress Monitor (Agent affecting Environment)

Goals!

- Create Turtles that are separated by 5 steps *[hint: Setup]*
- Have them draw a flower *[hint: Forever with pendown. forward and left by]*

Bonus!

- Use the random block in turtle movement commands *[hint: "right by" random amount]*
 - Use one block you haven't used before
-

Bumper Turtles Progress Monitor (Agent-Environment Interactions)

Goals!

- Add logic so turtles react to red squares by turning right by 90 degrees
- Add logic so turtles react to blue squares by turning left by 90 degrees
- Add logic so turtles react to black squares by turning around 180 degrees

Bonus!

- Change the number of landmarks drawn in the "Paint Landmarks" procedure
 - Use one block you haven't used before
-

Colliding Turtles Progress Monitor (Agent-Agent Interactions)

Goals!

- Create turtles of two different colors, red and blue, and do not have them leave trails.
- Have the turtles move forward with a little wiggle in their walk.
- Upon colliding with a red turtle, have blue turtles react by changing their color to red.
- Add logic so turtles react to each other
- Change a turtle's trait after a collision [size, color, shape, ?]
- Save your project, upload, and share!

Bonus!

- Create a new turtle after a collision
 - Use one block you haven't used before
-

Epidemic Model Progress Monitor

Goals!

- Create several hundred blue turtles and a few red turtles *[hint: Setup]*
- Make them wiggle! *[hint: Forever]*
- Create a collision block in which blue turtles turn red when they encounter red turtles *[hint: Lesson 4 Student Activity #2 Guide]*
- Create a slider and an if-then for the probability of transmission rate *[hint: Lesson 4 Student Activity #2 Guide]*
- Create a slider and an if-then for the recovery rate *[hint: Lesson 5 Student Activity #2 Guide]*

Bonus!

- Add a line graph with a line for infected turtles and one for healthy turtles *[hint: Lesson 6 Student Activity #1]*
- Add a slider (or more) for one (or more) of the following:
 - Number of original healthy population
 - Number of original sick population
- Use one block you haven't used before



Experimental Design Form

Name(s): _____ Date: _____

Model name: _____

Question*What is your question?***Variables***What are the dependent and independent variables in your experiment?***Range***What is the range of values you will use for each variable?***Trials***How many trials will you run at each setting? Why?***Prediction***What effect do you think the changes you make will have on the model?***Data Collection***What data will you collect?***Data Analysis***How will you analyze your data? (i.e. look for patterns, compare final values, look at the graph)***Interpretation***What is the answer to your question? How does the analysis of your data help you answer your question?*

Scientific Practices with Computer Modeling & Simulation

Name: _____ Date: _____

The table below lists scientific practices. Please provide an example of what you did that matches the practice.

Practices:	
Asking questions and defining problems	
Develop and use a model	
Plan and carry out an investigation	
Analyze and interpret data	
Use mathematics and computational thinking	
Construct explanations and design solutions	
Engage in argument from evidence	
Obtain, evaluate, and communicate information	