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 : ▢ undefined ▢
- 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.

right by [   ] degs   **left by [   ] degs**

```
while   forever ⬍  toggled
pen   down ⬍
forward  1
right by  5  degs
```

Thinking Challenge:
Look at the code to the right. What will happen if you have your turtles turn by a number larger than 5?
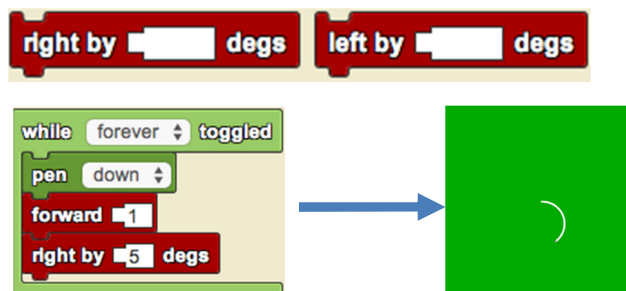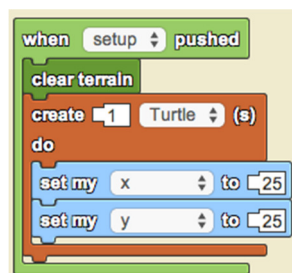
X & Y coordinates in Spaceland: *Placing your turtles on Spaceland*

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.

```
when   setup ⬍  pushed
clear terrain
create  1  Turtle ⬍  (s)
do
set my  x   ⬍  to  25
set my  y   ⬍  to  25
```

Thinking Challenge:

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

(0,50)

Y axis

(-50,0) — X axis — **(50,0)**

(0,0)

(0,-50)
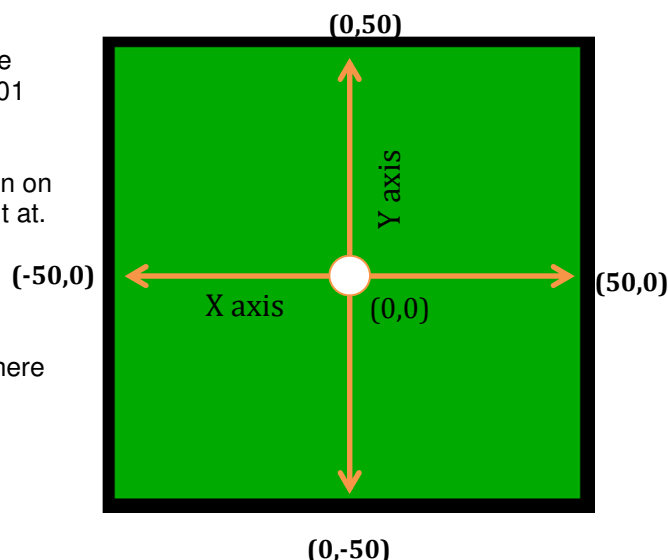
Getting your turtles to go in a <u>specific</u> direction: *know your angles!*

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?

set my   heading ⬍ to 0