

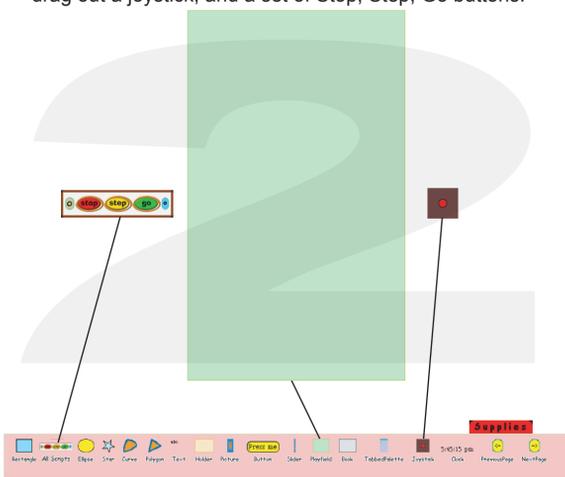
# Lunar Lander Project

The Lunar Lander project is a bit more advanced than the other tutorials you've worked on. Before you attempt to create your own Lunar Lander make sure you know something about:

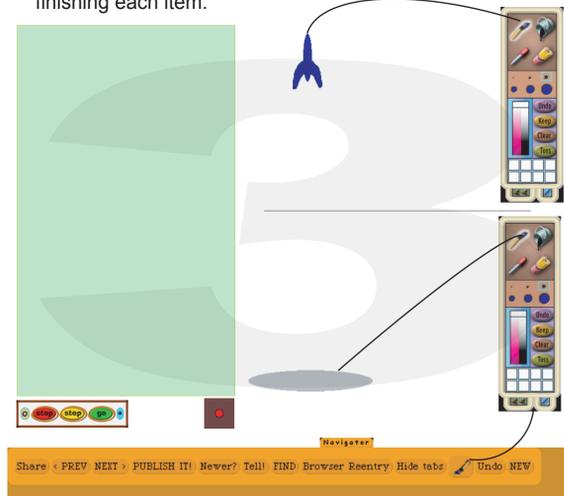
- Drawing Objects
- Naming Objects
- X axis & Y axis
- Setting up Variables
- Scripting
- Tests
- Linking Scripts

The key to making the Lunar Lander work is setting up a variable for the ships Y speed. The ships speed along the Y axis is what you want to control.

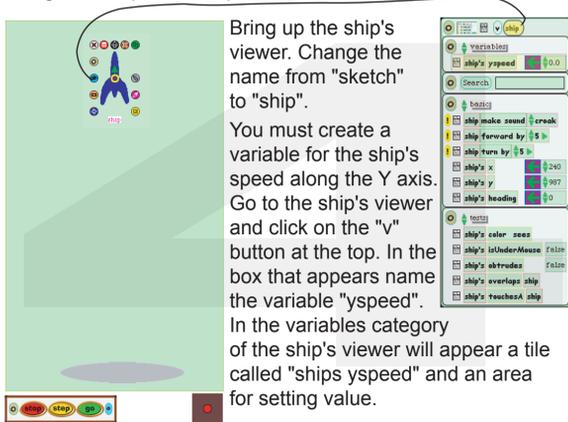
Drag a Playfield out of the supplies flap. While you're at it, drag out a joystick, and a set of Stop, Step, Go buttons.



Use the paint utility and paint a ship. Click "Keep" and then paint your landing pad. Be sure to click "Keep" after finishing each item.



Drop your landing pad and ship onto the playfield. Be sure to align the ship over the pad.



Bring up the ship's viewer. Change the name from "sketch" to "ship".

You must create a variable for the ship's speed along the Y axis. Go to the ship's viewer and click on the "v" button at the top. In the box that appears name the variable "yspeed".

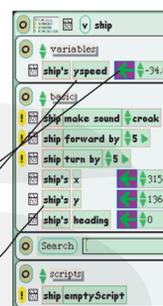
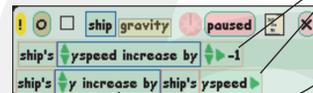
In the variables category of the ship's viewer will appear a tile called "ships yspeed" and an area for setting value.

## Scripts:

There are several scripts that make the Lunar Lander project work:

- Gravity
- Motor
- Allprocesspause
- Land
- Reset

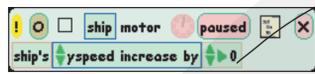
Let's work on the "gravity" script. This one is simple but very important. Drag out an empty script. Name the script "gravity". Drag out a "yspeed" tile by the assignment arrow. Drop it in the "gravity" script. Using the green up/down arrows on the yspeed tile select "yspeed increase by" and set the value to "-1".



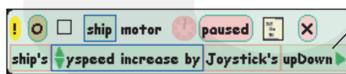
Drag out a "ship's y" tile by the assignment arrow and drop it into second place in the "gravity" script. Set it for "y increase by". Go back to the viewer and grab the "ship's yspeed" tile (not by the assignment arrow this time). Drop this tile onto the value of your second place "yspeed increase by" tile. Done! When this script is run your ship will move in a negative direction on the Y axis at an ever increasing rate. (that is, it will fall faster and faster.) Click the exclamation point on the gravity script to test it.

## The "motor" Script

Go to the ship's viewer and drag out an empty script. Name it "motor". Drag out a "ships y speed" tile by the assignment arrow and drop it in the motor script. Choose "yspeed increase by".



Bring up a viewer for the joystick and in the "joystick" category find the "Joystick upDown" tile. Drag it out and drop it on the value area of the "yspeed" tile in the "motor" script. Now you have a "motor" that can work against "gravity", control the speed of the ship's fall, make it hover, or even boost it into space.

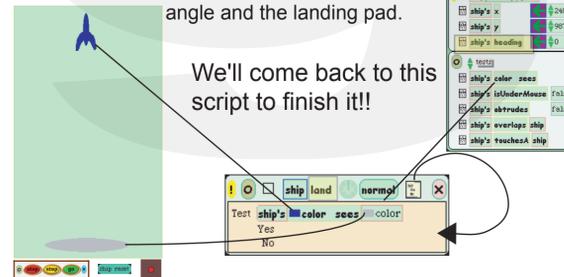


We can fly the ship but now we must land it!

## The "land" Script

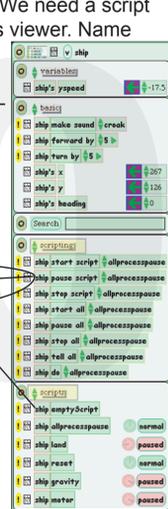
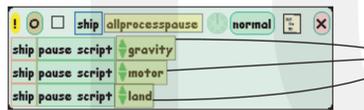
Drag an empty script out of the ship's viewer and name it "land". Tear off a Test/Yes/No tile and drop it into the "land" script. Go back to the ships viewer and from the "tests" category grab a "ship's color sees" tile. Drop it next to "Test". Click on the "ship's color" rectangle and drag the eyedropper over the ship's tailfin. Click on it and notice that the "ships color" rectangle has changed to the color of the tailfin. Repeat the process with the "sees color" rectangle and the landing pad.

We'll come back to this script to finish it!!

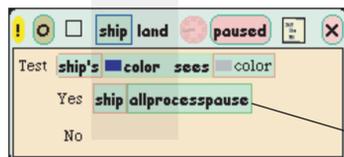


## The "allprocesspause" Script

On landing, we must shut everything down. We need a script for that. Drag an empty script from the ship's viewer. Name it "allprocesspause". Go to the ships viewer and look at the "scripting" category. Drag three "pause script" tiles into the "allprocesspause" script. Use the green arrows on the tiles to set one for "gravity", one for "motor" and one for "land". This script will pause the three major scripts whenever it is fired.

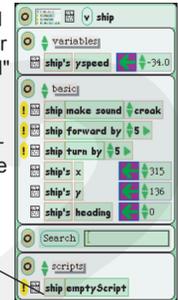


Let's return to the "land" script for a moment. Go to the "ship's" viewer and from the "scripts" category grab an "allprocesspause" tile. Drop it next to "Yes" in the Test tile. Now when the ship touches the landing pad, all the major scripts will pause and wait for you to reset.



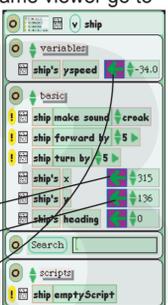
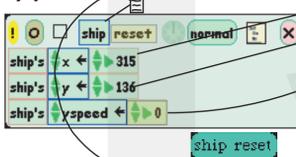
## The "reset" Script

As you build and test your lander you will find yourself repeatedly putting the lander back in position and setting your "yspeed" values back to "0". Here is a clever time saver called a "reset" script. Go to the "ship" viewer and open the "scripts" category. Drag out an "empty script" tile name it "reset".



Drag out the "ship's x" tile and drop it into the new "reset" script. Do the same with the "ship's y" tile. In the same viewer go to the variables category and using the large green assignment arrow next to the value drag out the "ship's yspeed" tiles. Drop them into the reset script. Set the yspeed value to "0".

Click "ship" and get a menu. Select "button to fire this script" Place the button near the joystick.



When you click the "go" button the ship will begin to fall faster and faster. Use the joystick to control the rate of descent.

When you touchdown on the pad all scripts will pause.



You can now customize this project however you like. Do you think you can set up the joystick to control motion on the X axis as well as the Y? Can you create different behaviors for landing on different landing pads, or for landing too fast? It's all yours now.