

Student Worksheet Part 1 – The Scratch ISS Tracker

Part 1: First, you're going to look at a Scratch program and see how it works.

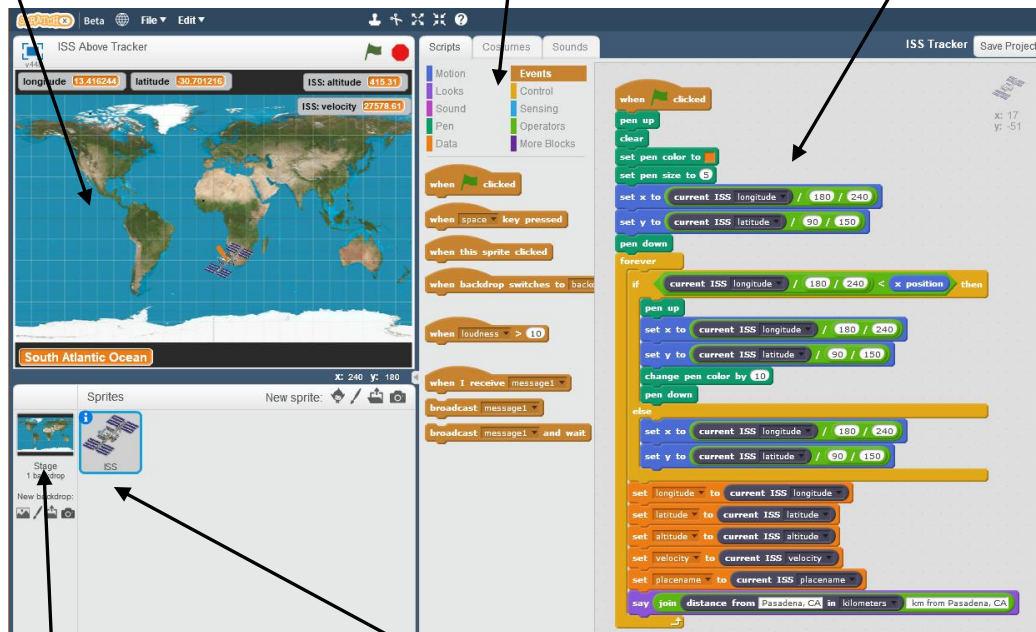
Go to your browser and type in the URL: <http://issabove.com/scratchx>

You'll see the screen below:

This is the display when you run the program

These are instructions you can add to a program

This is the program



This is the background image for the program

This is the avatar (sprite) that can be controlled by the program (e.g. moved)

Answer these questions:

How do you think you can start the program?

.....

What happens in the display panel when you run the program? (Let it run for a couple of minutes.).....

.....

.....

Now, stop the program.

The program in detail.

Look at the program on the left and find an item on the right. Draw arrows from the item on the right to an example on the left (the first one has been done for you).

HINT: looking at the display screen and watching what happens when the program is running can help you figure these out.

```
when clicked
pen up
clear
set pen color to red
set pen size to 5
set x to (current ISS longitude / 180 / 240)
set y to (current ISS latitude / 90 / 150)
pen down
forever
  if (current ISS longitude / 180 / 240 < x position) then
    pen up
    set x to (current ISS longitude / 180 / 240)
    set y to (current ISS latitude / 90 / 150)
    change pen color by 10
    pen down
  else
    set x to (current ISS longitude / 180 / 240)
    set y to (current ISS latitude / 90 / 150)
set longitude to (current ISS longitude)
set latitude to (current ISS latitude)
set altitude to (current ISS altitude)
set velocity to (current ISS velocity)
set placename to (current ISS placename)
say join distance from Pasadena, CA in kilometers km from Pasadena, CA
```

- ← User action
- Command
- Calculate something
- Do something over and over
- Move something
- Data (fixed – the value doesn't change)
- Data (variable – the value changes)
- Display something

What do you think the x and y are (in the blue program lines/rows)? HINT: they have something to do with the display – think of graph paper. These blue rows do something else very important as well. What is that?

.....

.....

.....

.....

Using the program

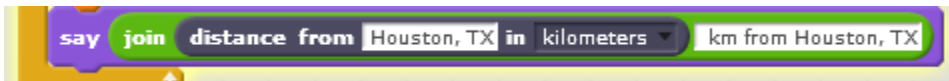
You can change some settings in the program and then run it again.

Task 1:

Change the location and units

Stop the program if it is running.

By default, the program uses Houston, TX as your location and shows how far from Houston the ISS is in kilometers. The last line in the program can be changed to set your real location:



- Click in the first white area to change Houston, TX to your city and state.
- Click to the right of where it says kilometers and change it to miles.
- Click in the second white area and change it to mi from city, state (insert your city and state, of course).

Start the program. The white speech bubble should now show the distance from your city to the current ISS position. Notice how quickly it changes.

NOTE: The distance is calculated between your city and the place on Earth that the ISS is directly above at that moment.

For 2 minutes, note the distance from your city every 15 seconds and write the results below:

Elapsed time	Distance in miles
0 seconds	
15 seconds	
30 seconds	
45 seconds	
1 minute	
1 minute 15 seconds	
1 minutes 30 seconds	
1 minute 45 seconds	
1 minutes	

Right now, is the ISS getting closer to you or further away?

.....

How far is it between one measurement and the next?

How long would it take you to go this distance in a car or on a bus?

Task 2:

Change the pen color.

Stop the program.

To change the pen color, you will need to swap out a command. You are going to remove the `set pen color to` and replace it with `set pen color to 0`. You need to:

Make sure that you are on the **Pen** area in the instructions part of the screen. These are all the instructions for doing things with the pen.

Unlock the commands below `set pen color to`. You do this by clicking and holding (grab) the `set pen size to 5` command and dragging it down the screen. The whole set of commands below it is now unlocked.

Drag the `set pen color to` from the program to the instructions area and drop it there.

Drag the `set pen color to 0` from the instructions area to the place where the `set pen color to` was in the program. Click where it says zero and change it to a different number.

You can choose a number from 0 to 200: for example, number 0 is color red, number 70 is green, number 130 is blue, and number 170 is magenta.

Grab the bottom part of the program at the `set pen size to 5` command and drag it up to lock it to the new command.

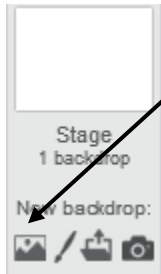
Start the program. Wait a minute or two and see what color the orbit track of the ISS now is. Leave the program running and go to Part 2.

Student Worksheet Part 2 – Creating a Scratch program

Part 2: How, you're going to create your own program.

Go to a new browser tab and type in the URL: scratch.mit.edu

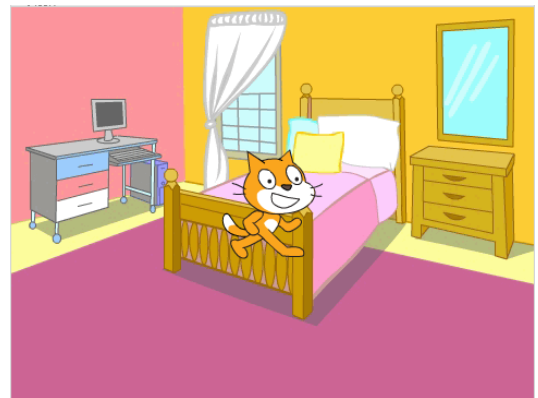
Click on the orange cat to TRY IT OUT. You'll see the same screen layout that you did in Part 1, but there's no program!



Start by choosing a backdrop for your cat.

Click and see a whole range of backdrops. Click the one you want twice to select it.



In the one on the right, I want to make the cat jump on the bed!




Now go to the instructions (Scripts tab):

The instructions are in different code blocks (these are the ones you'll probably use for this program):

- **Motion** will move your Sprite
- **Sound** allows you to play a sound (or create a new one to play)
- **Events** allows you to add the start the program event
- **Control** allows you to create a loop (run commands over and over)

HINT: if you want to find out what any instruction does, click the  in the grey bar above the scripts tab, then move your  pointer to the instruction you want to find out about. A help panel on the right of the screen slides out and tells you what that instruction does.

Create your program to make your cat do something. Make sure you have  at the top of your program.

Before you finish the lesson, go back to the ISS Tracker tab and see what your orbit track looks like now. It's doing what your ISS-ABOVE does on the world map screen.

