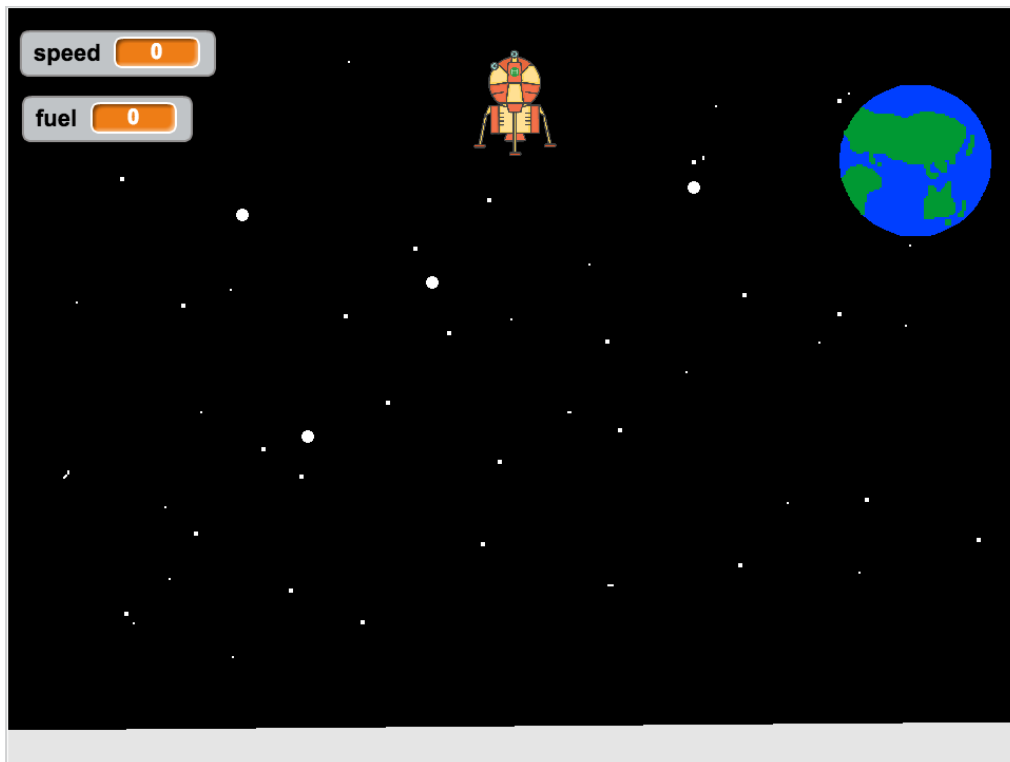


MOONHACK

MOONHACK 2018 SCRATCH PROJECT

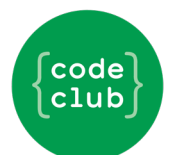


INTRODUCTION

On 20 July 1969 the first humans to ever touch down on the Moon did so in the lunar module. Landing this machine was no easy task. The pilot, Neil Armstrong had to land the craft softly enough so that it would not crash on landing while also monitoring the amount of fuel he burned while slowing down the craft.

In this activity we are going to simulate this first moon landing from 49 years ago. Follow the instructions below to create your own Lunar Module Simulator.

Is this your first time using Scratch? This [guide](#) introduces the Scratch programming language.



STEP 1: POSITION THE LUNAR MODULE

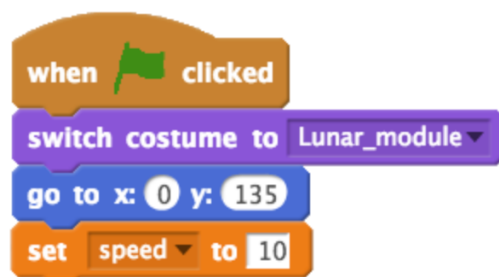
Let's start by creating code that will place the Lunar Module in a place that will allow it to fall to the Moon.

Activity Checklist

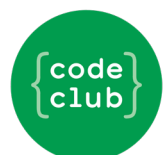
- Open the Moonhack 2018 Scratch project online [here](https://bit.ly/mh-scratch-18) or at bit.ly/mh-scratch-18
- When this game starts (by clicking the green flag) the Lunar Module will appear exactly where you would like it to start by adding the code below to the `Lunar_Module` sprite:



- To keep track of our speed while we fall we will start the program with a falling speed of 10 using the `variable` named speed.
- Add a new block to your code to match the image below:



- Test out your code by clicking the flag. Does the speed get set to 10 and Lunar Module move to the top of the screen?

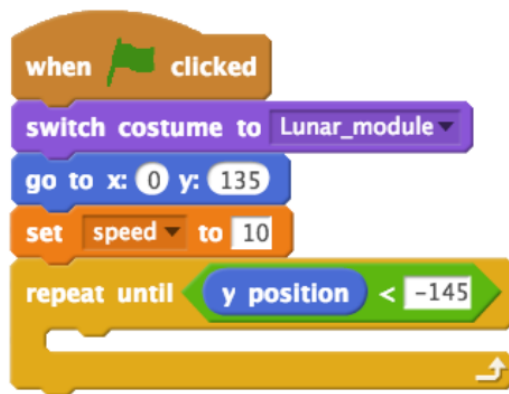


STEP 2: SIMULATING MOON GRAVITY

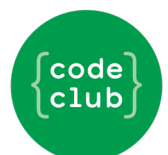
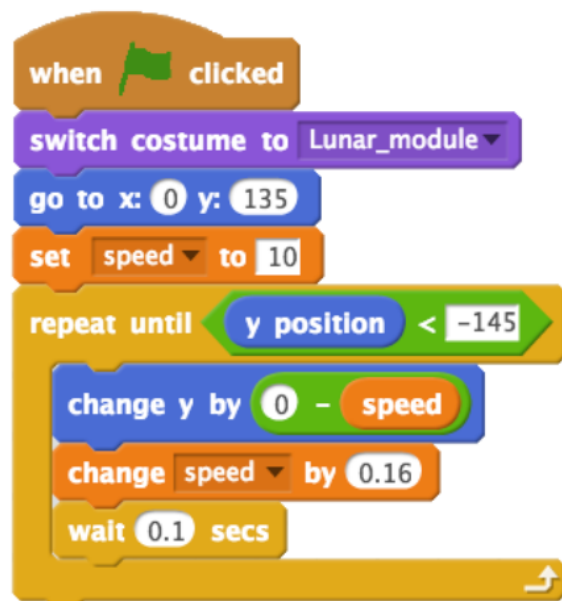
Now we are going to have the lunar module fall at a pace that matches the gravity of the moon.

Activity Checklist

- We are going to add a **repeat until** loop to this project that will repeat a certain command until a certain condition is met. In this case it is the location of the spaceship.



- Next we are going to add 3 blocks of code that will simulate the speed at which the Lunar Lander fell to the Moon upon landing. Did you know that the gravitational force on the Moon is 0.16 as strong as it is here on Earth?



- Lastly, we are going to add thrusters to your Lunar Module. This will allow you to change the speed at which the vehicle is falling by changing its speed to the opposite direction.



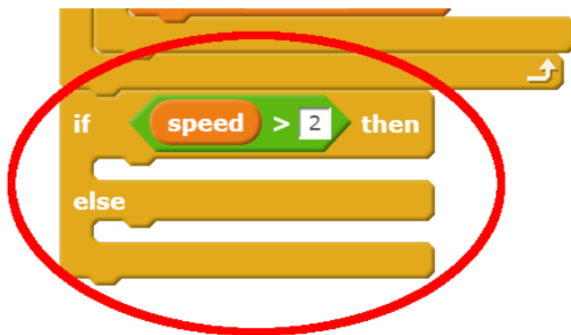
- Test your program. You probably have a Lunar Module that can fly to the top of the screen or land on the Moon with ease. Next we are going to make this game more realistic by adding some more concepts to your Scratch program.

STEP 3: CRASH OR SUCCESS?

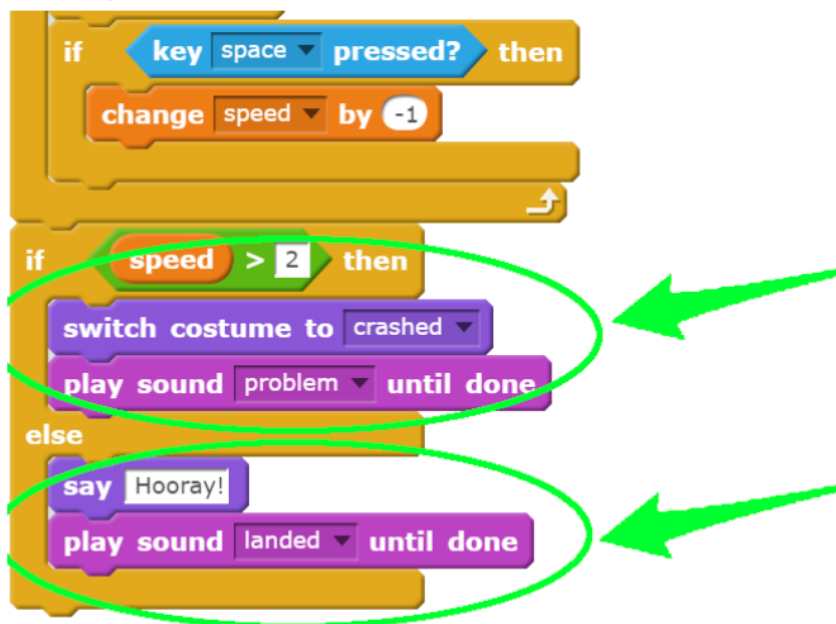
Now that the Lunar Lander has made it to the surface of the moon we must be able to detect its ability to land safely.

Activity Checklist

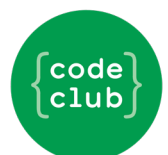
- We are going to create a conditional statement that states if the vehicle is traveling at a speed higher than 2m/s at the time of landing then we will report a crash.



- Depending on whether or not the landing is successful, we will create a different sound and image for the lunar module.



- Test your code. Will the Lunar Module land successfully on the moon if travelling at the appropriate speed?

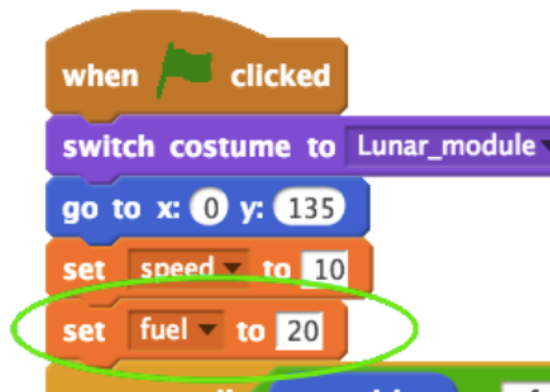


STEP 4: FUEL

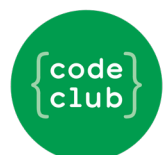
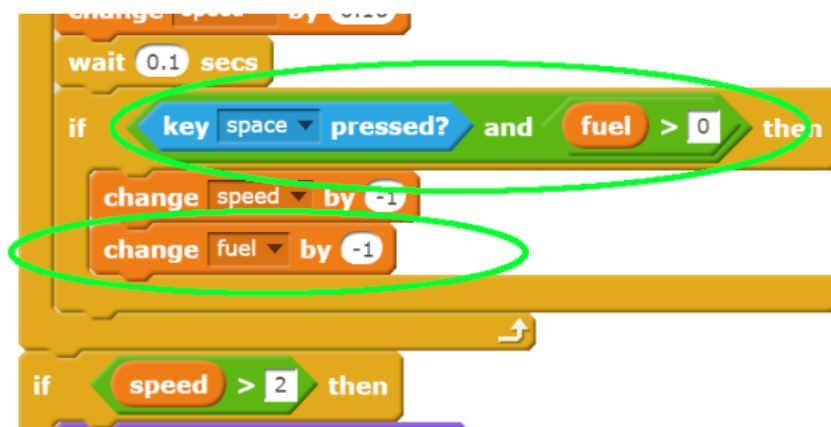
We would all love to have unlimited fuel in our vehicles. But Neil Armstrong had a limited amount he could use 49 years ago. We are going to make this simulator more realistic by adding a finite amount of fuel we can burn.

Activity Checklist

- Next we are going to set the fuel **variable** to 20 to limit our thrusters when landing.



- Next, we will need to update our conditional statement to check if we have any fuel left before changing our speed and decreasing our fuel level.



CONGRATULATIONS!

You have completed the Moonhack Scratch project of 2018! Celebrate by inviting your friends and family to have a go at your new Lunar Module simulator.

Now that this project is done there are so many other things you can do.

Extra Activities

- Have a go at the Moonhack Python project.
- Create your own “Moon” themed project in Scratch, Python or HTML/CSS!
- Improve this project by completing the challenges below;

Challenge: Adding Thrusters

Can you update your code to change its costume to thrusters every time you burn fuel? Don't forget to add the thruster sound too!

Hint: you will need to replace your if block with an if/else block.

Challenge: Mars Lander

NASA needs you! Research the gravitational force on Mars and change the speed of your Lunar module falls to reflect this. Let NASA know exactly how much fuel they will need to carry in a similar module when landing humans on the Red Planet.

