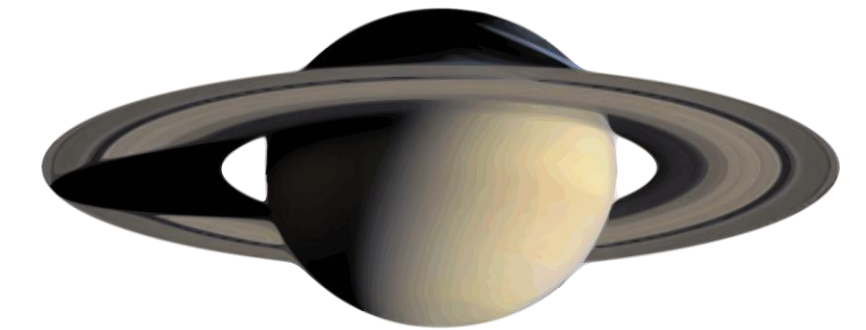
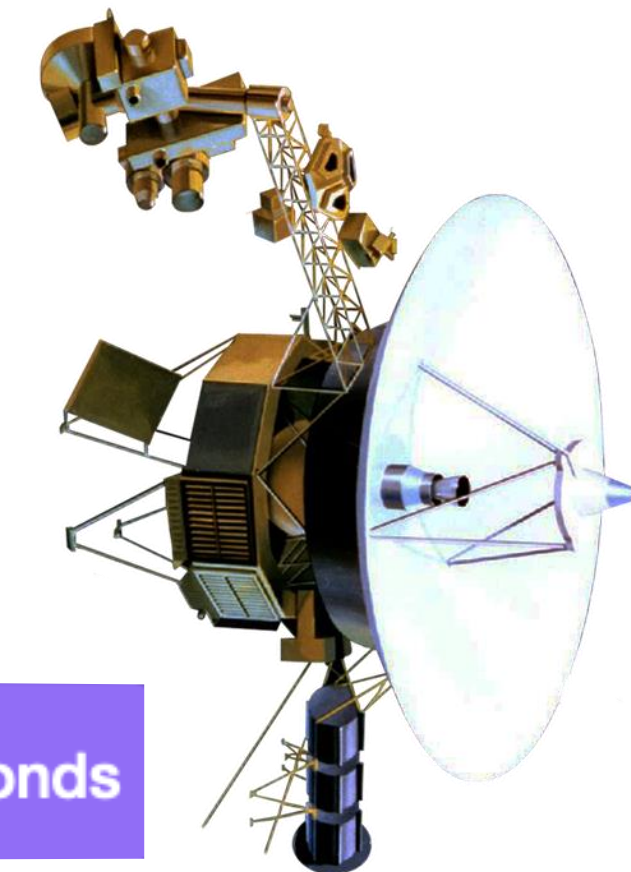
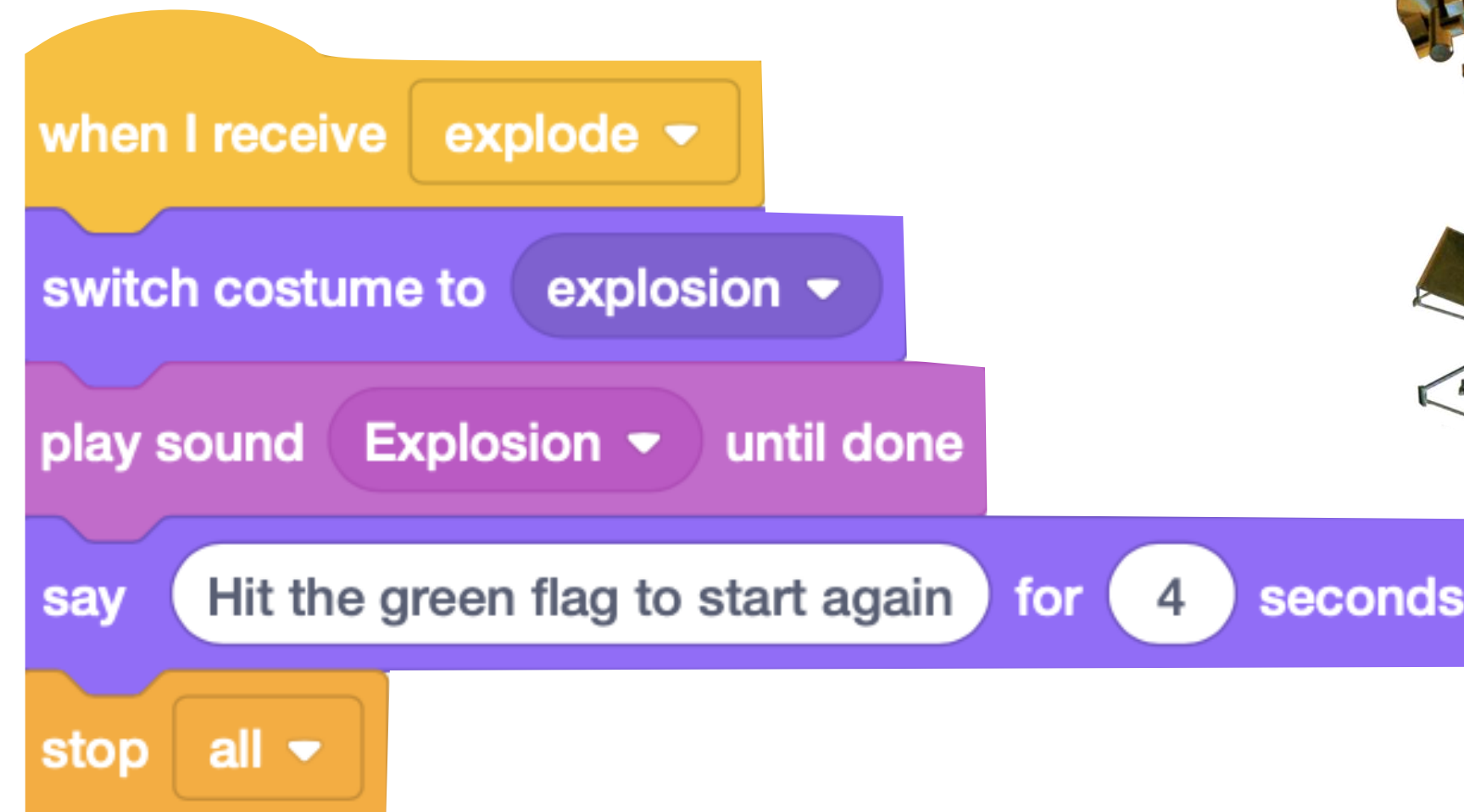
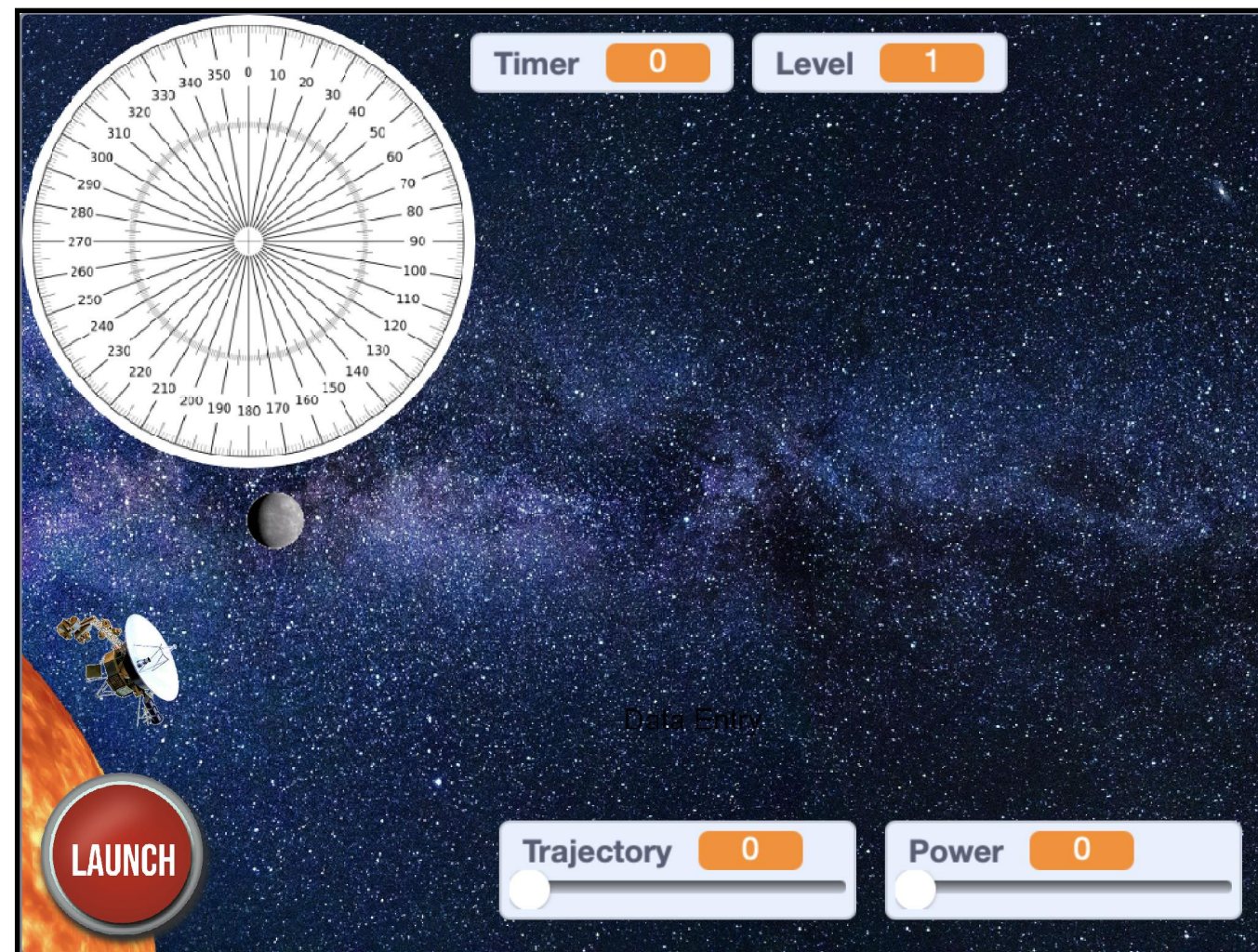


RAF Code Commanders: Cosmic Launch Project

Session 5



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For more free and exciting STEM resources go to www.rafyouthstem.org.uk

Disclaimer: Included in this project are links to YouTube videos and other websites selected to support learning outcomes for students. These links and media have been checked for their suitability at the time of publication.

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The content of third-party links may change over time. We recommend that project facilitators carefully review media and third-party links before sharing them with students.



Feedback & Social Media

We welcome feedback! If you encounter any errors or broken links in this project, or have constructive suggestions for improvement, please email Antony Hyett at antony@hyetteducation.com and provide details. Your cooperation and feedback is greatly appreciated.



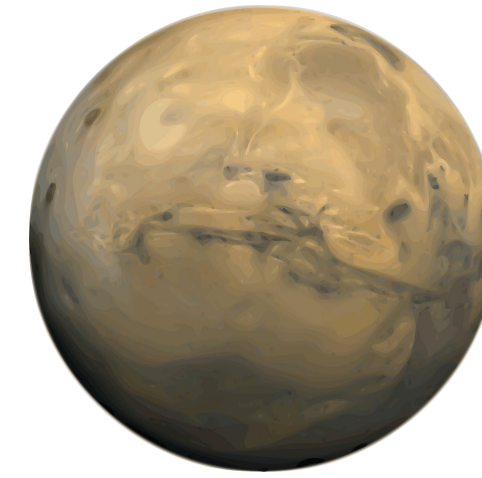
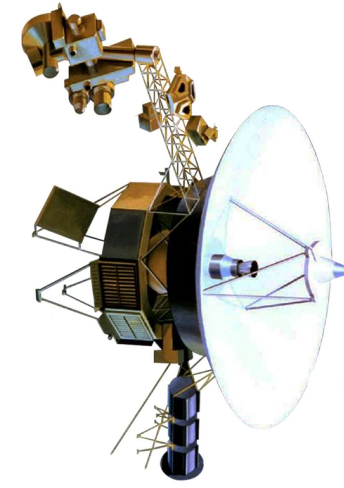
We'd love to see how you're getting on with this project. Please share students' participation, progress and enjoyment of this project on social media using the hashtag **#RAFCodeCommanders** and follow **@rafyouthengage** and **@hyetteducation** to keep up to date with RAF Youth & STEM and Hyett Education's work with schools.



Session 5: Extending our game

Overview

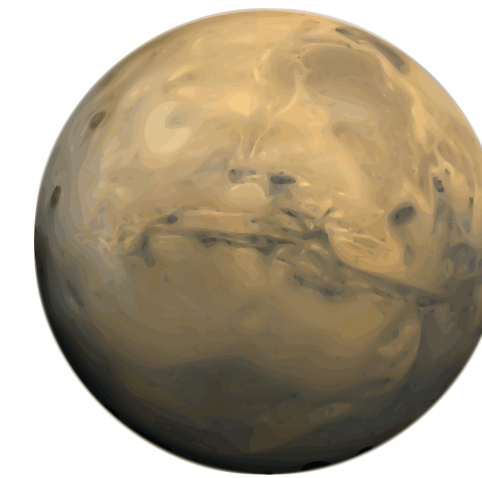
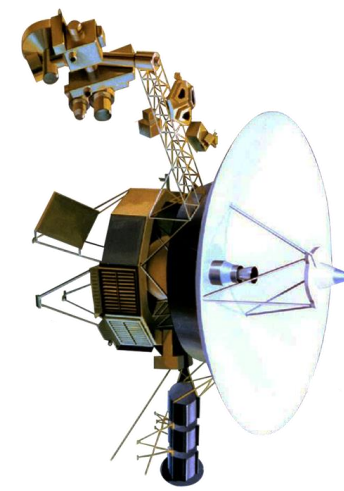
In this project you will:



- Learn to code a space game using the programming tool **Scratch**
- Learn key vocabulary in computer science, including **algorithm**, **sequencing**, **selection**, and **iteration**
- Revise and extend your knowledge of our Solar System
- Consider the challenges of exploring our Solar System and beyond.

Last session

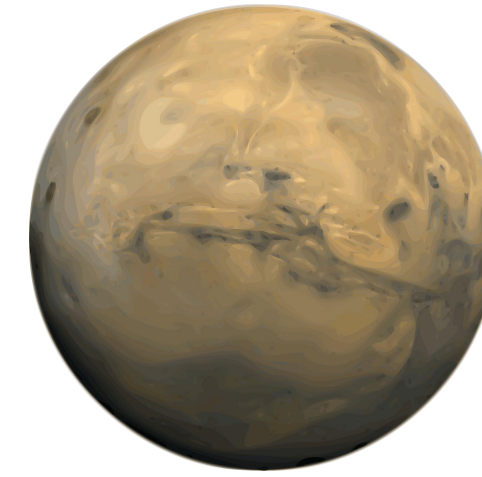
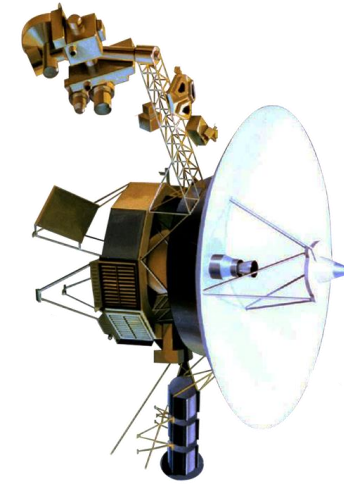
You:



- Learned about the true scale of The Solar System within our galaxy, and of of galaxy within the Universe ...
- Created an explosion if the probe hits the edge of the Stage
- Coded what happens if the player completes all levels
- Added a timer to the game
- Added sound effect to complete the game

This session

You will:

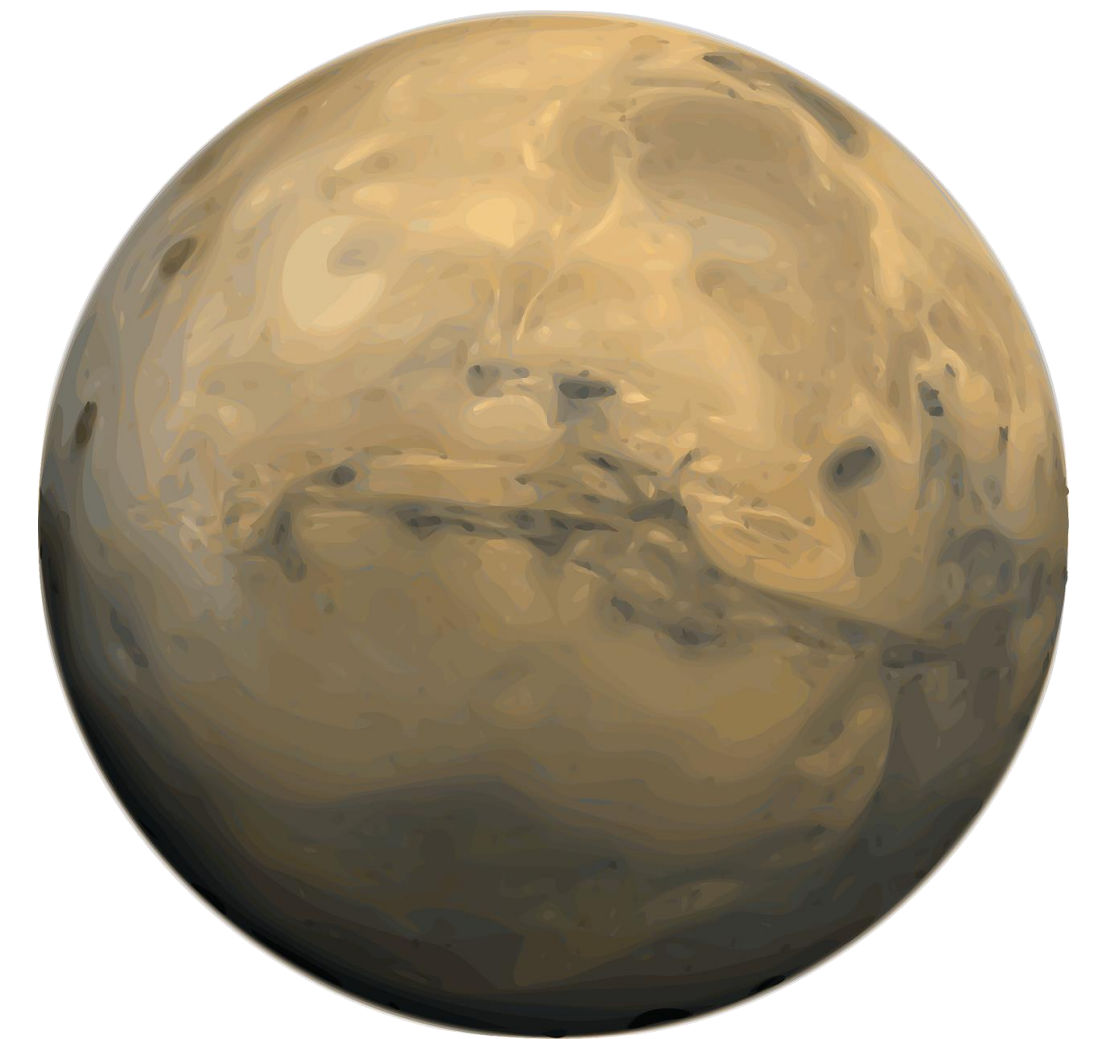


- Consider the challenges of sending astronauts to Mars
- Extend your game by adding new features, including new graphical and gameplay elements

Planning a mission to Mars: some key facts

Learn

- The furthest a human being has ever been from The Earth is about **250,000 miles**. This distance was achieved when the **Apollo** missions (including Apollo 11) were **orbiting The Moon**.
- The journey to Mars is over **69 million** (69,000,000) miles, over **270 times further away** than The Moon.
- The Apollo 11 mission flew for three days to The Moon, and spent two days orbiting / landing, before flying home to Earth. The entire mission was 8 days long.
- A mission to Mars is likely to be at least 18 months long, including at least 4 months travelling there, and 4 months travelling back. **(The journey is actually likely to be more like 6 months).**



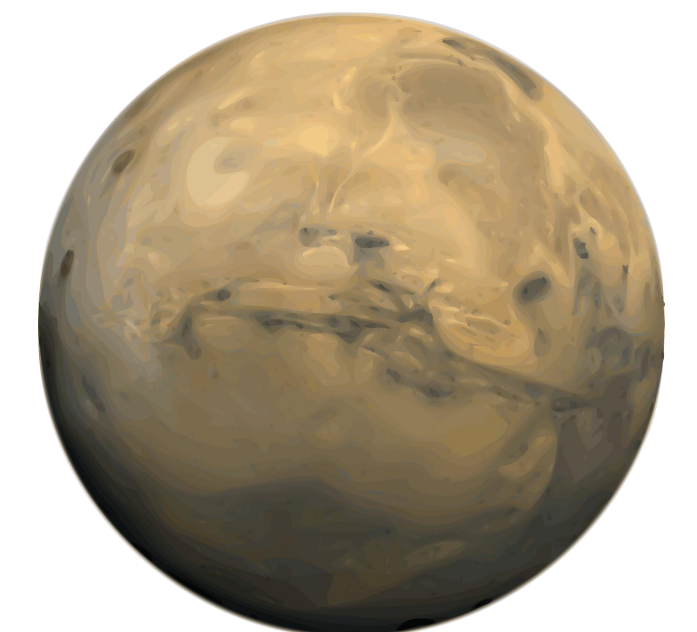
Planning a mission to Mars: some key facts

Learn

- Mars has a thin atmosphere. As with the Earth's atmosphere, this dramatically heats up any space craft moving through the atmosphere.
- To see this effect, see the re-entry scene from the movie 'Apollo 13' - <https://youtu.be/A83anvGUrCs> (Watch first 60 seconds only)
- Unfortunately, the atmosphere of Mars is too thin to fully slow down a space craft using parachutes, so other technologies are needed.
- In comparison, The Moon has **no atmosphere at all**, but this means that planning a landing on The Moon doesn't have to worry about the heating effect. The Lunar Module (LM) in the Apollo missions, did not need to be protected from the heat.



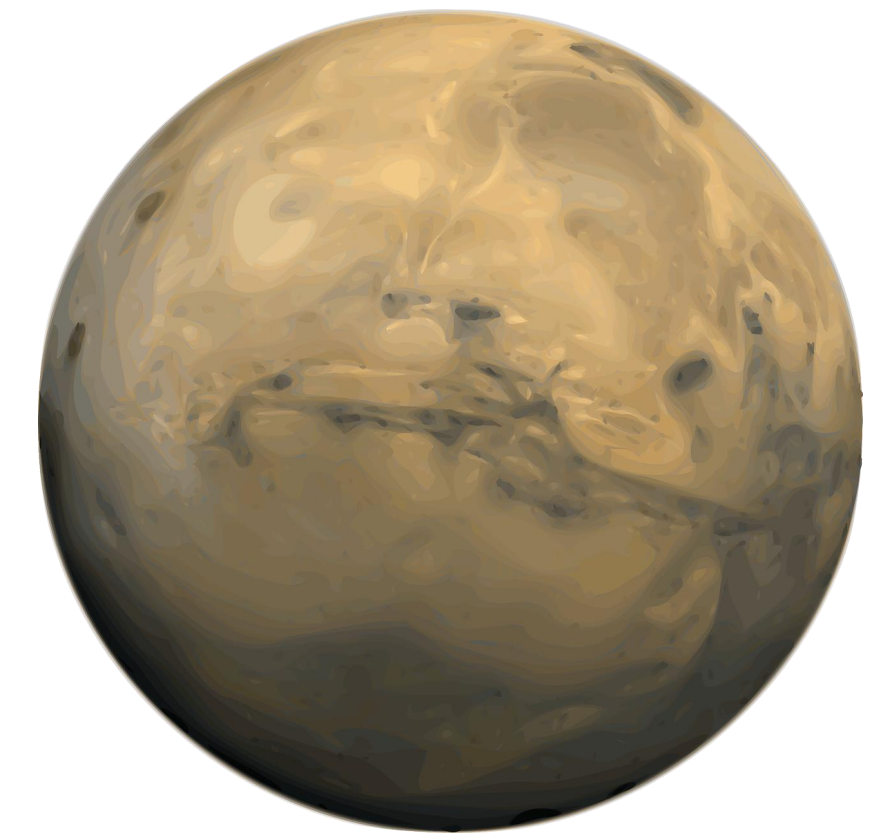
The Apollo Lunar Module



What are the challenges of a journey to Mars?

Discuss

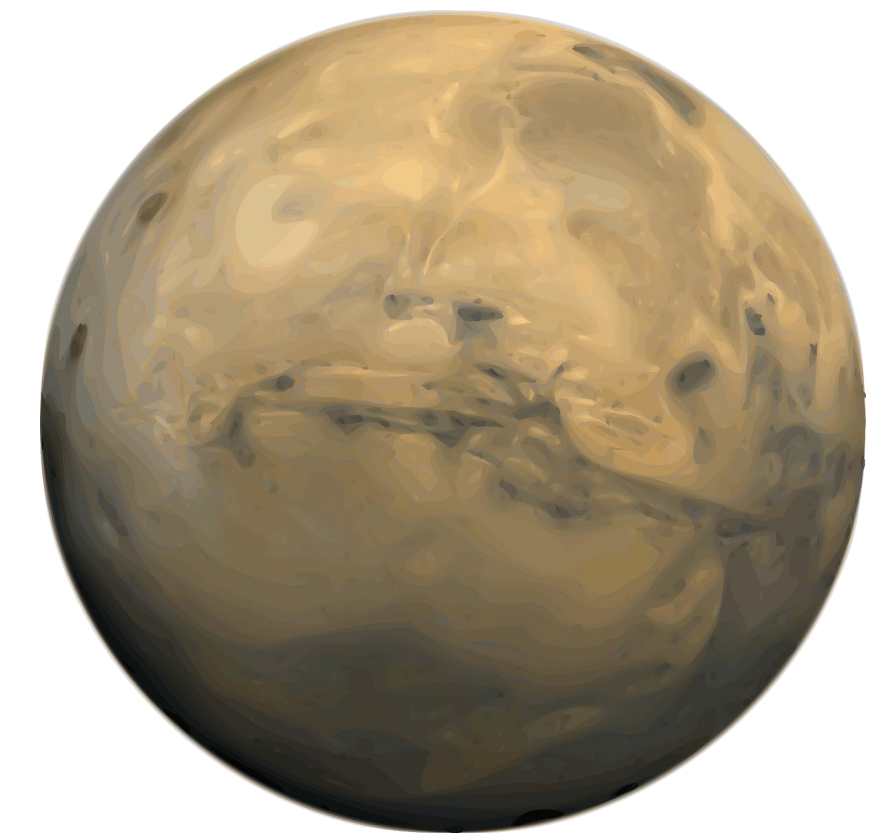
- Discuss as a group what you think the challenges are of sending astronauts to land on Mars.
- Consider:
 - The journey time there and back
 - Feeding the crew
 - Landing on Mars
 - Surviving on Mars
 - The effects on the crew, including their physical and mental health



The challenges of a journey to Mars

Watch

- ‘The Challenges of Landing Humans on Mars’ - https://youtu.be/SC_CsRDAFok
- ‘What exactly does space travel do to your body?’ - <https://youtu.be/siL97hz8o2w> (stop video at 3m10s)
- ‘How Space is bad for your body’ - <https://youtu.be/jp6snBzrMUA>



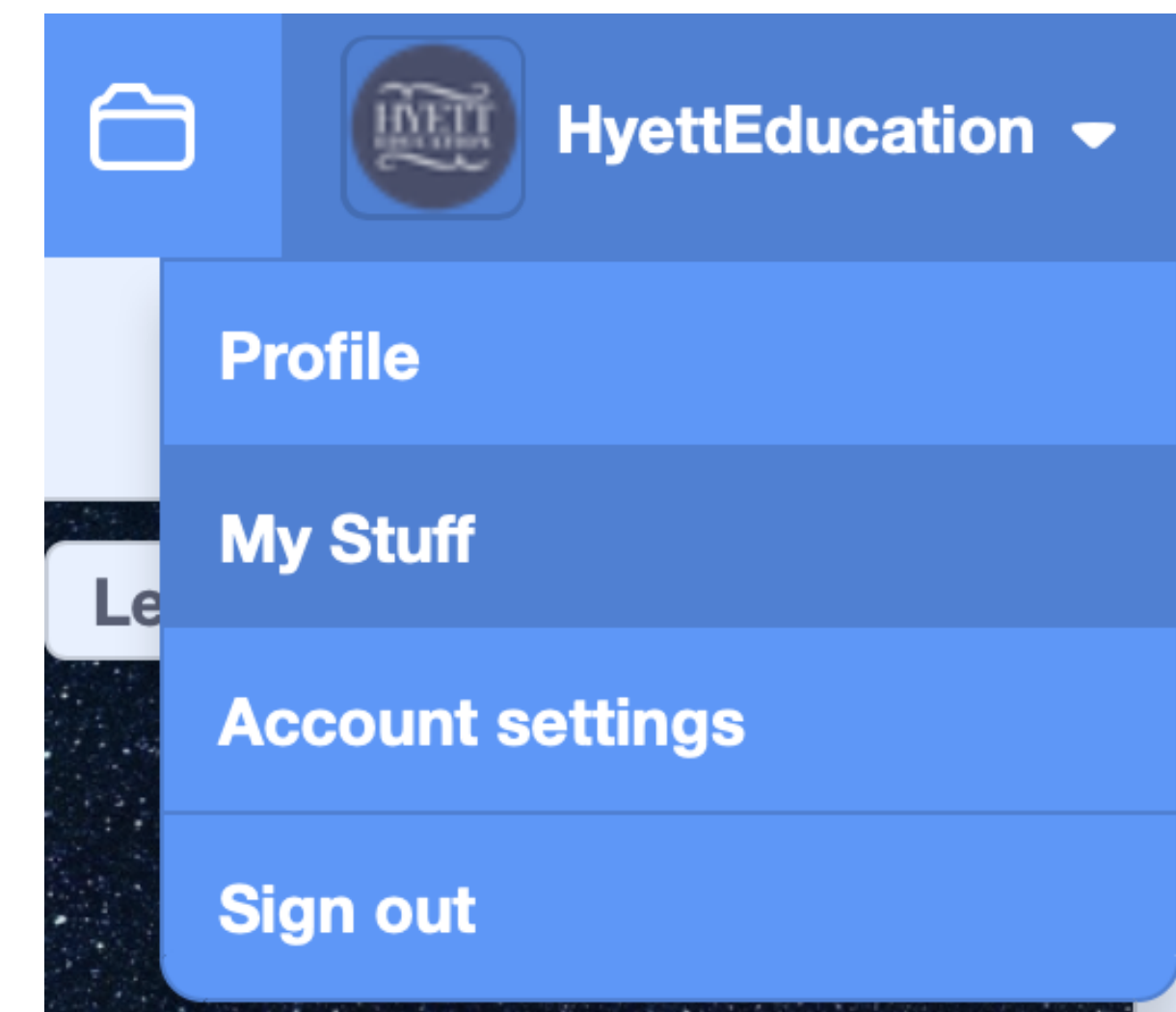
Discuss

Would you volunteer to be on the crew of the first mission to send human astronauts to Mars?

Opening up your project

- Log into your Scratch accounts with your username and password
- Click onto your username in the top right hand corner, then onto '**My Stuff**'
- You should see your project in the list - click onto it to open it up again.

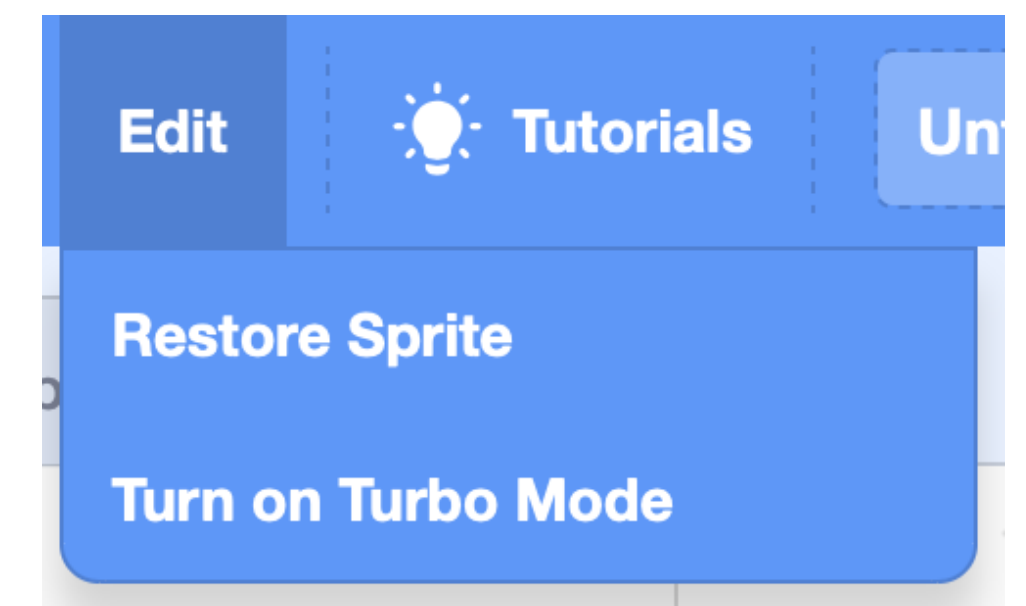
Learn



Correcting mistakes

- If you make a mistake when using Scratch – e.g. by deleting pieces of code accidentally - and are using a device with a keyboard, you can ‘**undo**’ that mistake by pressing the **Ctrl** key (to the left of the space bar) and the **Z** key together. There is a limit to how many steps back you can take though, so do this as soon as you realise your mistake.
- If you accidentally delete a sprite, go to ‘**Edit**’ at the top of the screen and click ‘**Restore sprite**’.

Learn

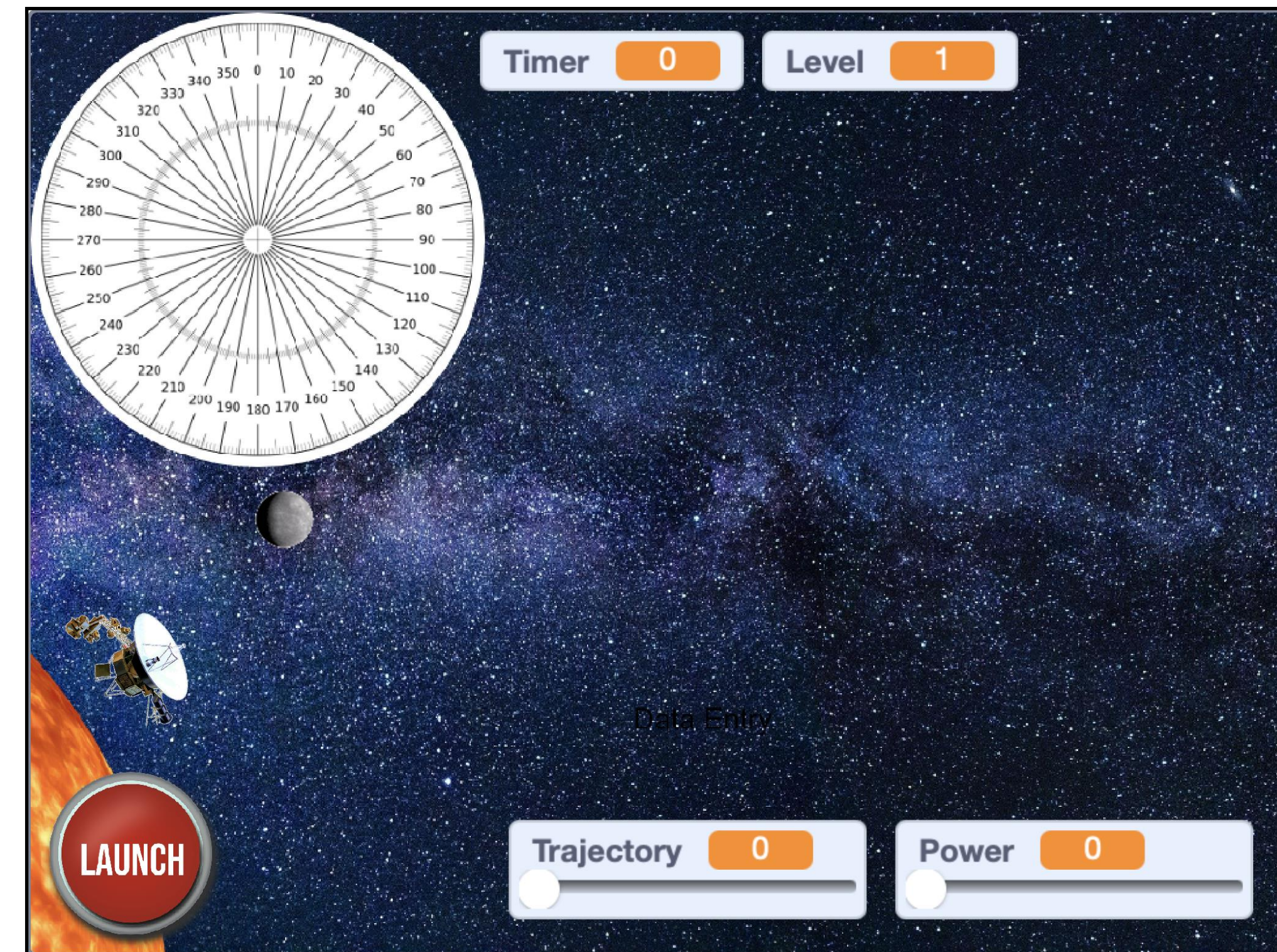


Extending our game

A list of some possible enhancements to your program

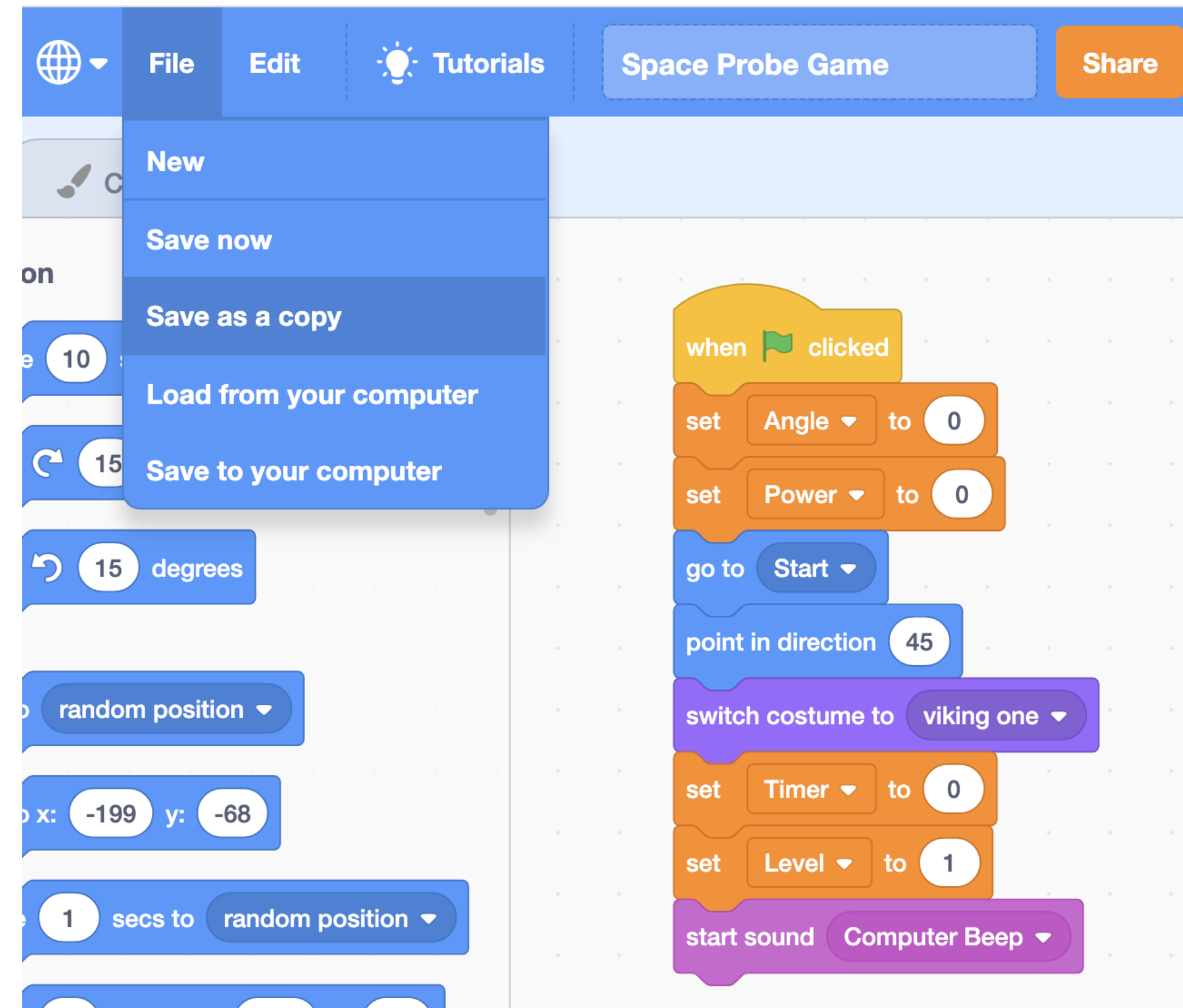
Discuss

- Adding pen lines behind the probe when launched through space (**Quite straightforward**)
- Adding a 'quickest time' variable, and changing this at the end of each game if it is beaten (**Medium difficulty**)
- Changing the speed of the probe as it moves through space, and then making it crash if it is still going too quickly (**More tricky ...**)



Making a copy of your game

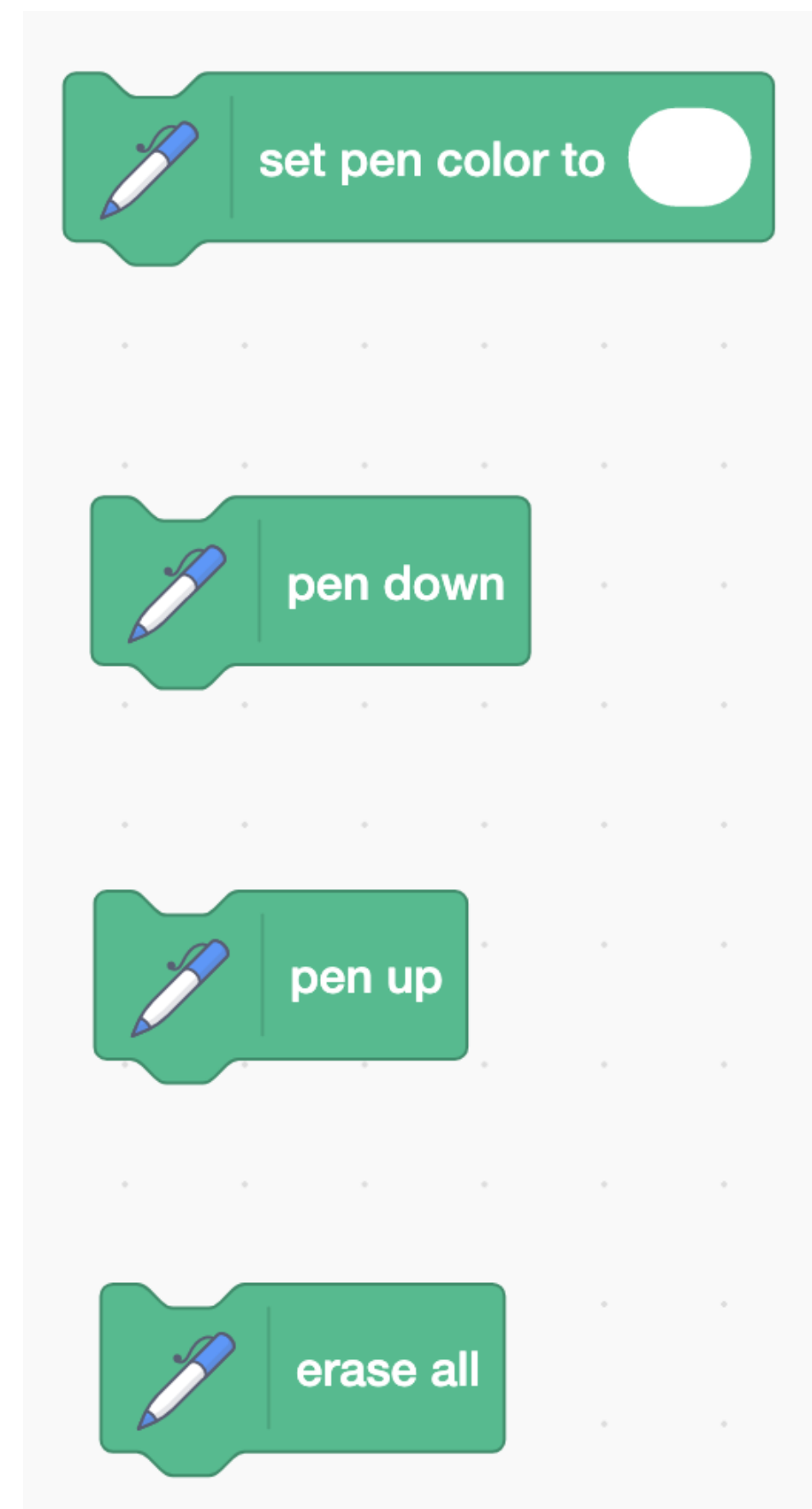
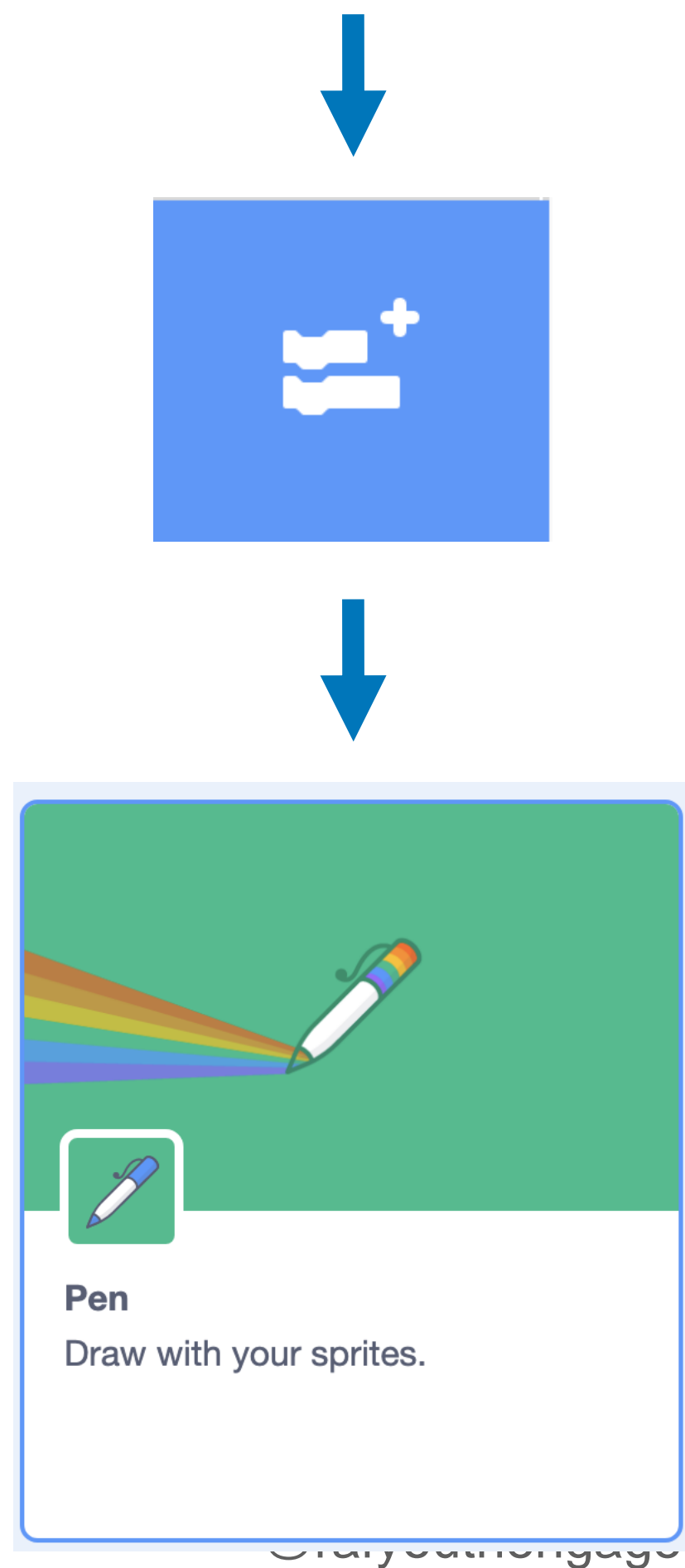
Before making any major changes to your game, it is sensible to duplicate your project. That way, if you ever find that your game is not working, and you can't work out why, you can re-open the original project again.



Challenge help slides

Adding pen pathways behind your probe

To add the pen commands, click on:



← Change the pen colour

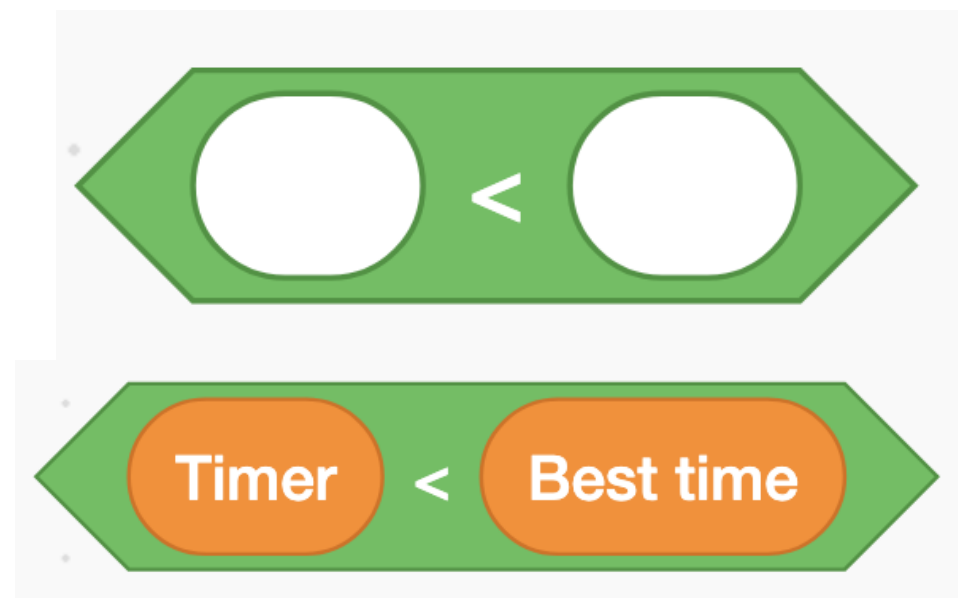
← Put the pen down (start drawing)

← Lift the pen up (stop drawing)

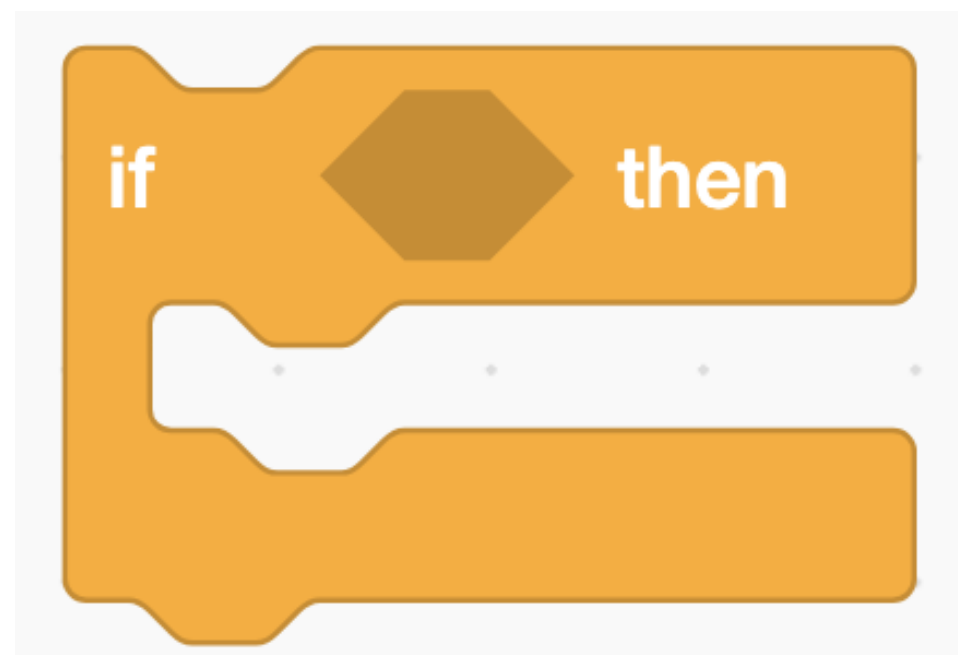
← Erase all of the lines

Think carefully about where in your code you want to add your pen code.

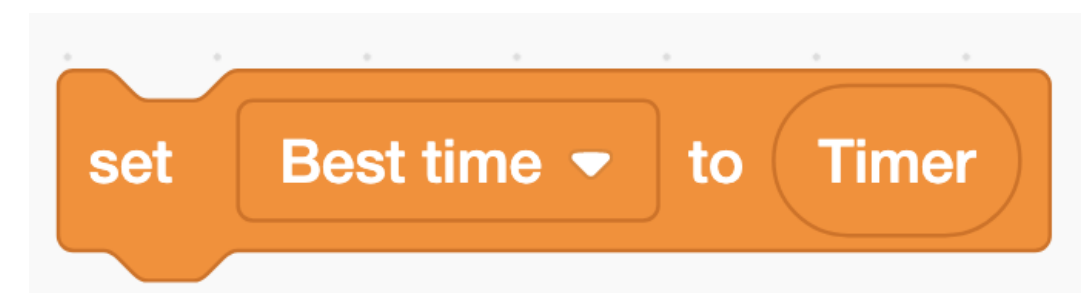
Adding a 'best score' variable



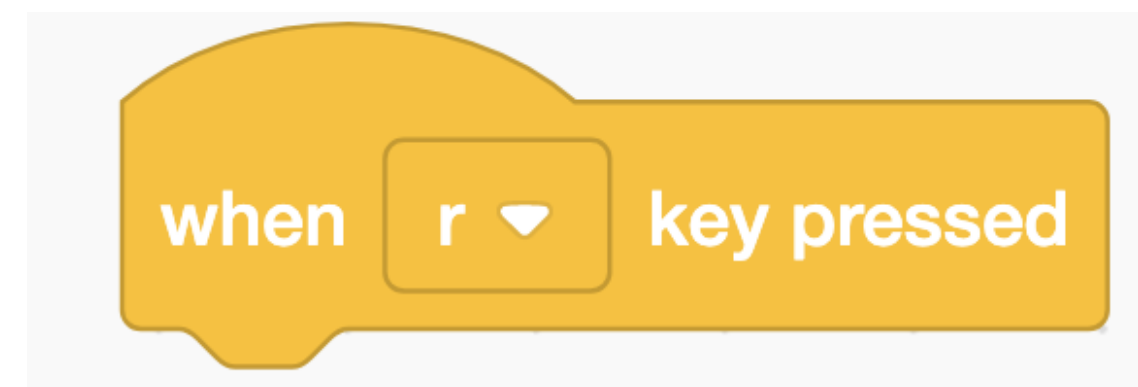
Checks to see whether one value or variable is less than another



Checking to see if something is true



Setting a variable to the current value of another variable

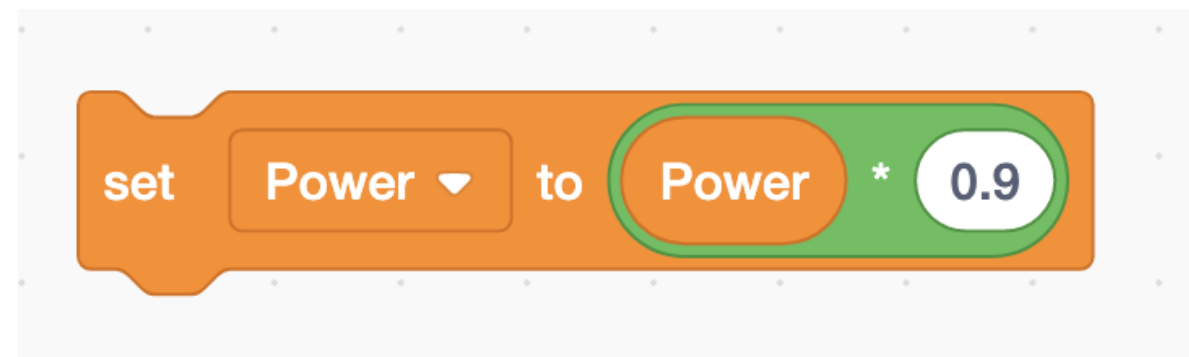


Performing an action when a key is pressed

To create a new variable, click onto the 'Variables' commands, then 'Add new variable'

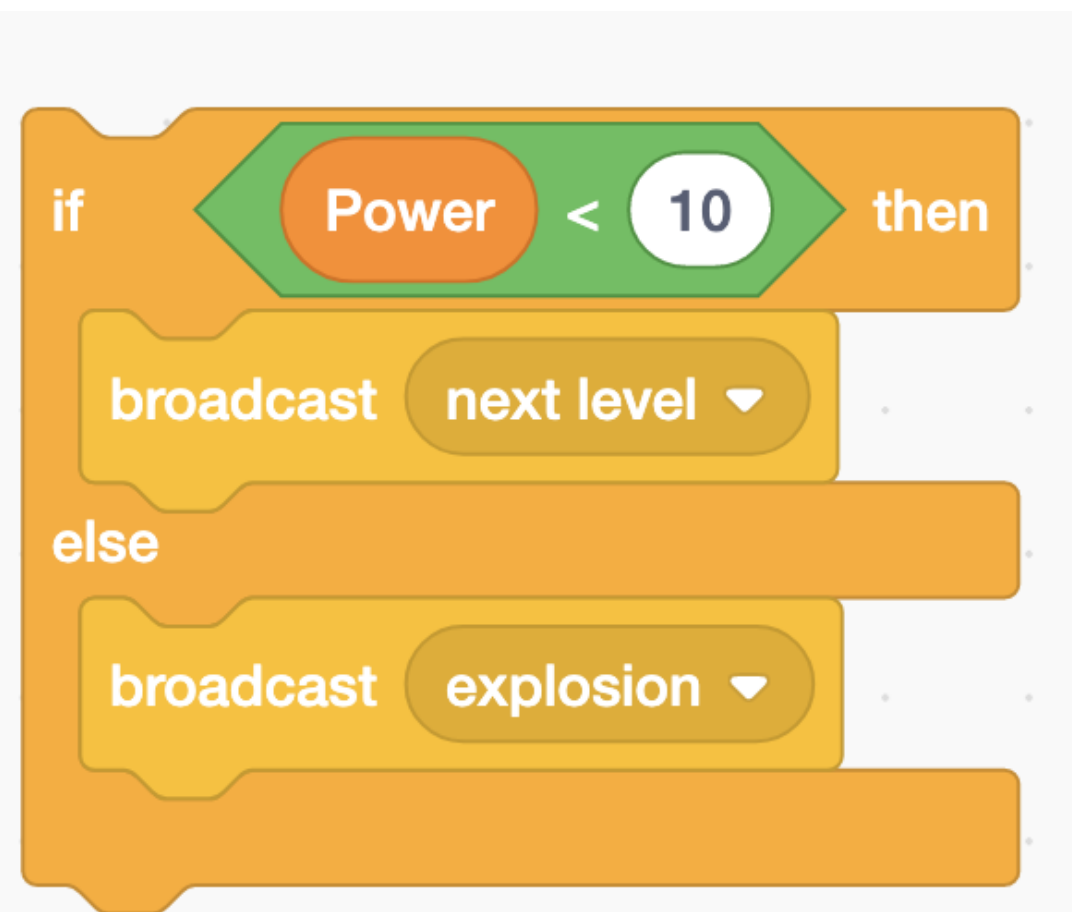
How will you reset the 'best time'?
If you do it every time the green flag is pressed, it won't record the best time over more than one game and will be useless!

Changing the speed of the probe, and crashing it if it's going too fast when it touches the planet.



Reduces the power to 90% of its current level. Used **repeatedly in a loop**, this will slow the probe down until it eventually stops.

Think carefully about where these code snippets might be added, and what they might replace in your existing code.



If the Power is less than 10 when the probe touches the planet, broadcast the 'next level' message.

If Power is equal to, or greater than, 10, then broadcast the explosion message.

This will make the game more challenging to play, as the player will no longer know that they can use any Power as long as the angle is correct!

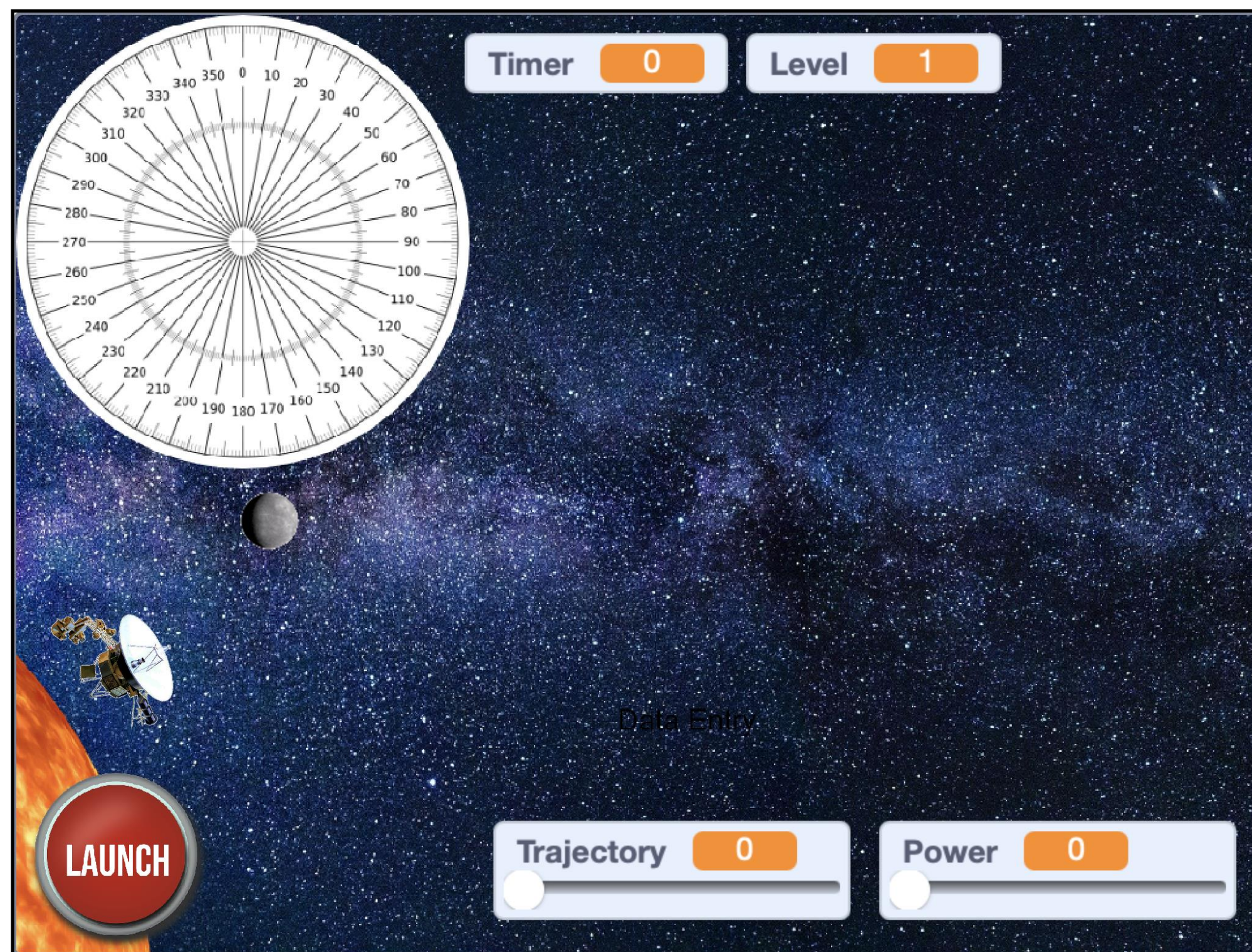


Learn

A version of the game with all extension enhancements added - <https://scratch.mit.edu/projects/424949469>

A support video for facilitators in implementing these enhancements, can be found at <https://youtu.be/ct6unftsHUo>

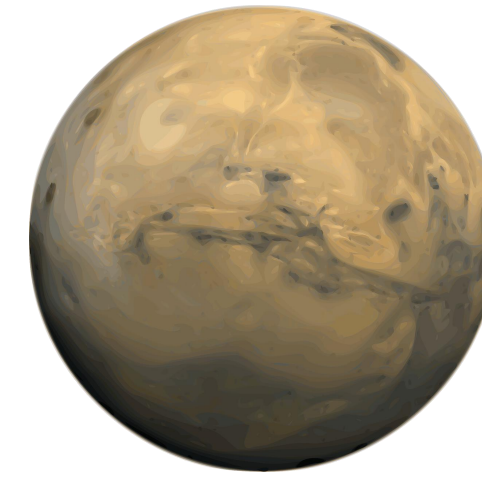
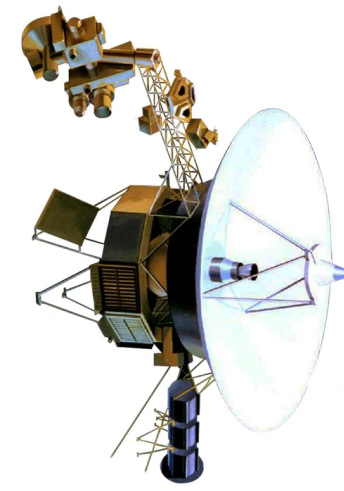
Play, share, discuss!



Thank you for taking part in this **#RAFDigitalLearning** project. We hope you've enjoyed it.

Overview

In this project you have:



- Learned to code a space game using the programming tool **Scratch**
- Learned key vocabulary in computer science, including **algorithm**, **sequencing**, **selection**, and **iteration**
- Revised and extended your knowledge of our Solar System
- Considered the challenges of exploring our Solar System and beyond.

Project credits

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Special thanks to Flt Lt Michelle Randall (RAF Youth & STEM), Antony Hyett (Hyett Education – www.hyetteducation.com) & Richard Anderson (TechMentor UK – www.techmentor.uk).



Other credits

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