Programming with ScratchJr: Repeat

Aim:	Success Criteria:	Resources:
To understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions. To create and debug simple programs. To use logical reasoning to predict the behaviour of simple programs. In the context of a spaceman's movement floating in space, children use the REPEAT FOREVER block and then the REPEAT block in order to create repetition of an instruction sequence. A prediction should always be made about each code before trying it out. I can use a repeat instruction to make a sequence of instructions run more than once and predict the behaviour.	I can use blocks for movement in different directions. I can use a REPEAT FOREVER block to make a continuous loop. I can use a REPEAT block for a section of instructions. I can predict the behaviour of a character, based on a sequence of instructions.	**Lesson Pack** Tablets (Apple, Amazon or Android) with ScratchJr app installed.
	Key/New Words: ScratchJr, tablet, blocks, programs, character, sprite, background, sequence, project, move, repeat, repeat forever, invisible, shrink, predict.	**Preparation:** Differentiated **Spaceman Activity Sheet** - as required **Using Repeat Activity Sheet** - as required

Prior Learning: Children will have begun to create simple programs using the ScratchJr app in Lessons 1-3.

Learning Sequence

	**Moving Around:** Can children suggest any blocks which make a sprite move? Where would those blocks be? Show screenshot with movement blocks visible and establish the purpose of each. Remind children that the last lesson focused mainly on moving in one direction (to the right) but with the Underwater sea creatures, various different directions were used.	
	**Spaceman Travelling:** Show the screenshot of the spaceman sprite, matched to a suitable background. Which direction might he move in, if he was floating in space? Establish that he may move in many different directions, so we are going to build a sequence of blocks to create this movement.	
	**Repeat or Repeat Forever:** Show the sequence with the REPEAT FOREVER block at the end. Can children describe what effect this block has? Tell children that we don't want the spaceman to keep repeating the sequence forever, just to do it a certain number of times. To do this, we use a REPEAT BLOCK, placed around the blocks we want to be repeated – and say how many times to do it. *(It may be helpful to demonstrate this on a tablet at this point.)*	
	**Program Your Spaceman:** Children use the differentiated **Spaceman Activity Sheets** to program the astronaut to move. Can children use the REPEAT FOREVER and REPEAT blocks, describing the different effects of each? In each case, children should be encouraged to predict what the spaceman will do, based on their precise instructions, before testing the program to see if it behaves as expected. If not, children change the blocks or value to 'debug' the program.  Children select a sequence of move blocks with an END block, and then replace with REPEAT FOREVER. As an extension, children could move on the to MA and HA sheets if appropriate.  Children begin by following the LA sheet, then progress to the MA sheet. They replace the REPEAT FOREVER block with REPEAT for a given number of times. They add a GO HOME button.  After following the LA and MA sheets, children follow additional challenges on the HA sheet, exploring making the spaceman shrink or become invisible, as well as changing their background and sequence. Children can also use the Using Repeat Activity Sheet as an extension or group work.	
	**Predicting Behaviour:** Using the **Lesson Presentation**, display the sequence of code that some children may have managed to get to using the HA Activity Sheet. Can children predict and describe what each block does in turn? What appears to happen to the astronaut? If children have different code, compare examples/ask others to predict the character's behaviour based on this code.	

Task*it*

***Act*it:** In an open area such as the playground, one child can play the role of the spaceman, while another gives instructions of which direction to move and how many steps.

***Paint*it:** Children could paint a picture of an astronaut floating in space or landing on the Moon.

Programming with ScratchJr | Repeat

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I can use blocks for movement in different directions.		
I can use a REPEAT FOREVER block to make a continuous loop.		
I can use a REPEAT block for a section of instructions.		
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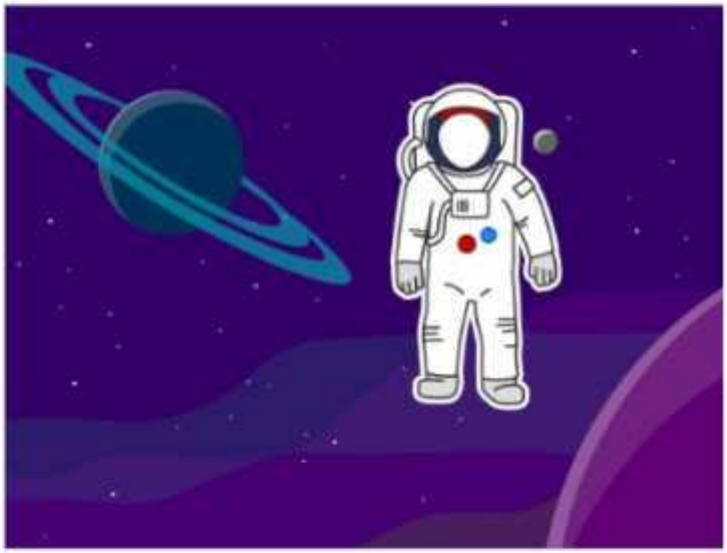
Spaceman

I can use a repeat instruction to make a sequence of instructions run more than once.

Open the ScratchJr app and start a new project in the My Projects screen.

Choose the **Space** background and add an **Astronaut** sprite.

Drag some of the movement blocks into the working area and try them out.

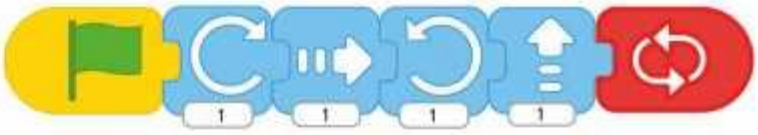


1. Make a sequence of movements. **Connect** them together. Start with the **GREEN FLAG** and use an **END BLOCK**. Copy this **sequence** and then click the **GREEN FLAG** to try it out.

2. Add extra blocks or remove some, to make a new movement sequence. Try it out.

3. What do you think will happen if we change the **END BLOCK** for a **REPEAT FOREVER** block?

Try it out.



4. Start a new sequence of your own. Use the **GREEN FLAG** to start and **REPEAT FOREVER** to end.

5. What happens to the spaceman when he reaches the edge of the screen?

6. Use the Red Hexagon to stop running the code.

7. Make a new sequence for a partner to copy or create. Can you **predict** what the spaceman will do before you try it out?

Spaceman

I can use a repeat instruction to make a sequence of instructions run more than once.

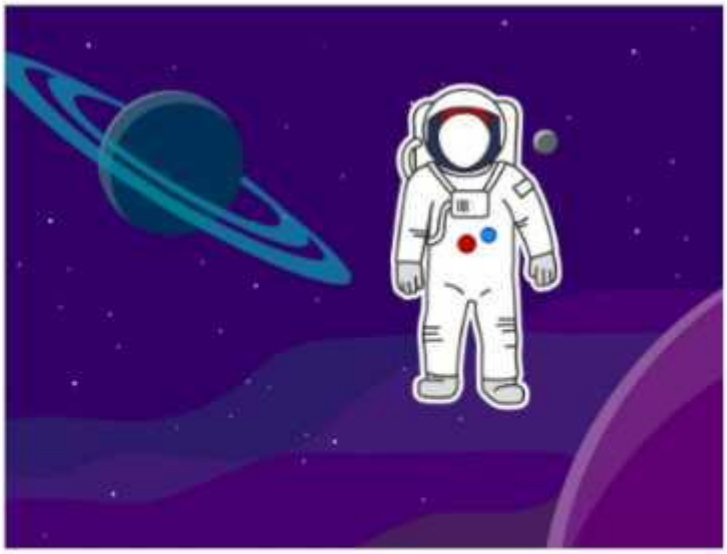
You need to have a ScratchJr project with the **Space** background and add an **Astronaut** sprite.

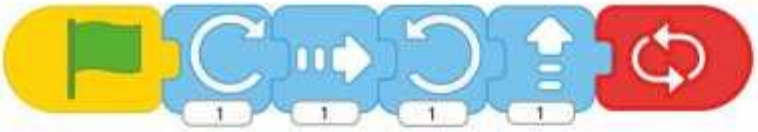
Either copy the sequence below or use your own sequence of movement blocks.

You should have at between 4 and 8 movement blocks in your sequence.

Remember the **GREEN FLAG** to start and the **REPEAT FOREVER** at the end.

Can you **predict** what the spaceman will do before you run the sequence?





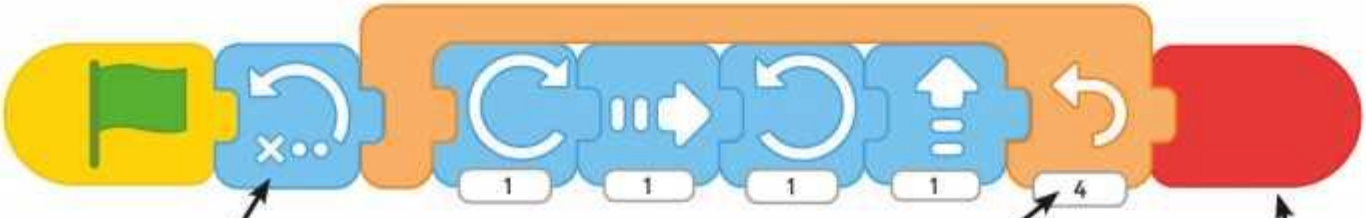
What if you change the values of the numbers underneath the blocks?

What will happen?

Try it and test your code.

When we use **REPEAT FOREVER**, the sequence just keeps running in a **loop** forever or until we stop the program.

We can make the sequence run for a particular number of times. Use the **REPEAT** block to make this sequence instead:



This block sends the sprite back to its start

The **END BLOCK** finishes the sequence

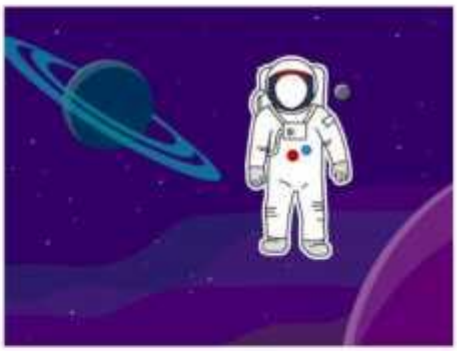
The number shows how many times to repeat the sequence

Try some different sequences using the **REPEAT BLOCK**. Any code inside the **REPEAT BLOCK** will be done the number of times shown underneath.

Spaceman

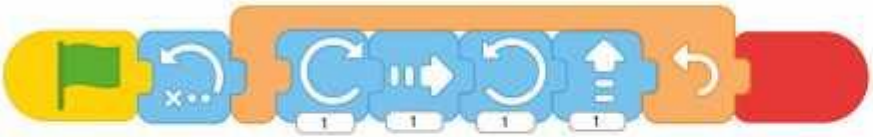
I can use a repeat instruction to make a sequence of instructions run more than once.

You need to have a ScratchJr project with the **Space** background and add an **Astronaut** sprite.



Check that you already have a sequence using the **REPEAT** block.

It might look something like this:



Challenge 1

Can you add a block inside the **REPEAT SEQUENCE** to make the spaceman **SHRINK** each time. Predict what will happen, then test your code to try it out!

Challenge 2

Edit your **REPEAT** block so that the sequence inside is repeated 9 times. Can you remember how to do it?

Challenge 3

Add a block at the end to make the spaceman become **INVISIBLE**. Make sure it is outside the **REPEAT SEQUENCE**.

Challenge 4

Add a new background. Select the **Moon** background and add the spaceman again.

Challenge 5

Go back to your code by selecting the spaceman on the first background. Choose a new **END** block. You should have a new block to choose with a picture of the second background. Predict what will happen when you run your code, then try it out!

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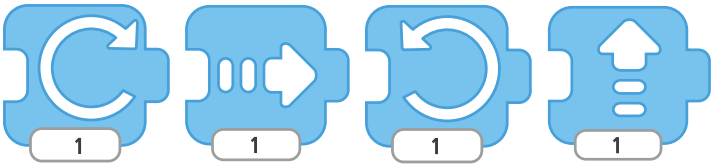

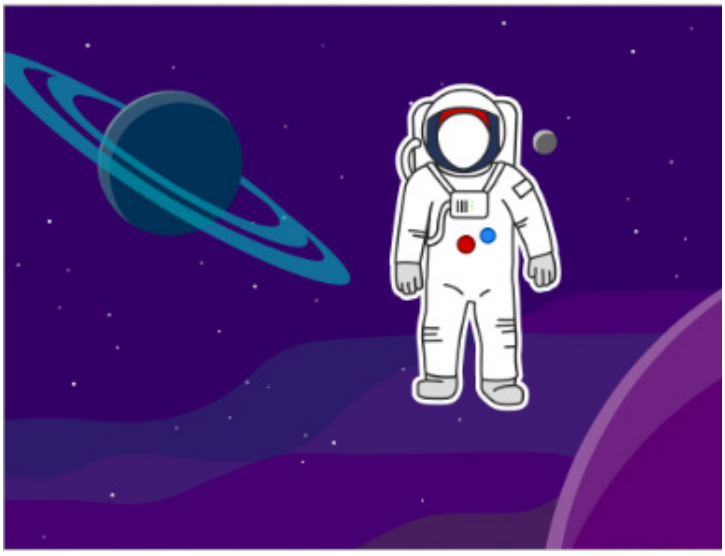

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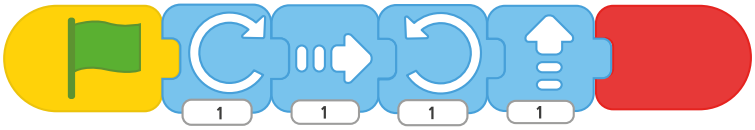

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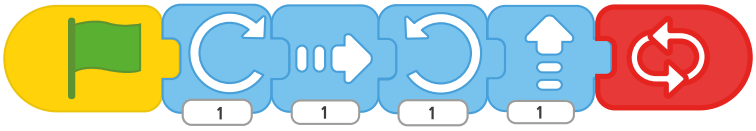

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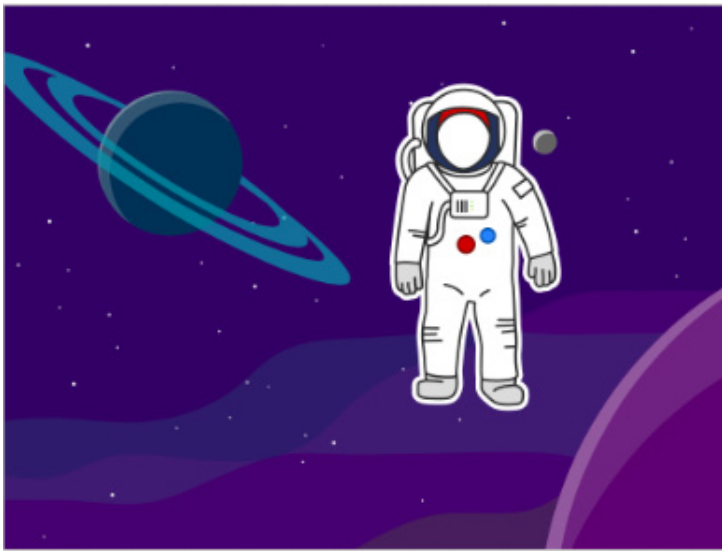

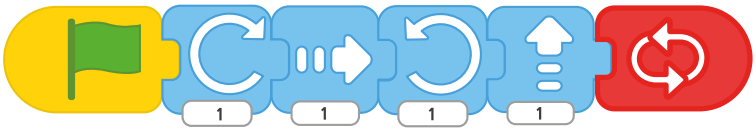

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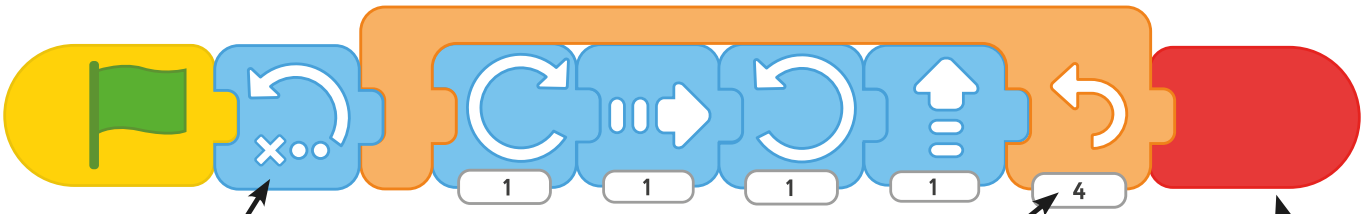

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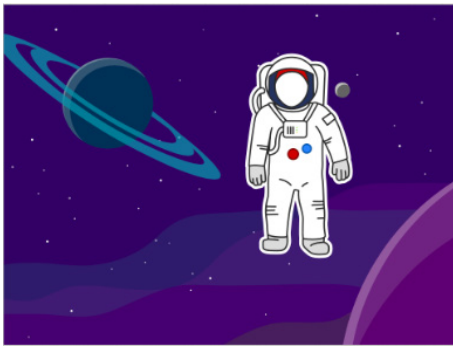

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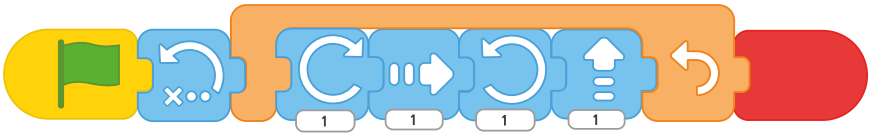

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Go back to your code by selecting the spaceman on the first background. Choose a new **END** block. You should have a new block to choose with a picture of the second background. Predict what will happen when you run your code, then try it out!

Using Repeat

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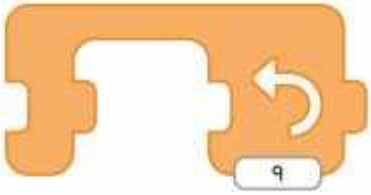
Can you write down what each of the blocks does in this code? What does it make the spaceman character do?



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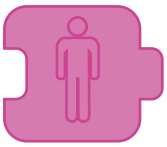
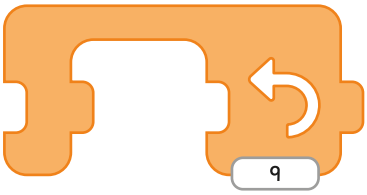
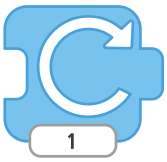






Lesson 4: Repeat

Repeat

This lesson guides children through the understanding of using repetition in simple programs. It is intended that an adult is present to work through the activities and these may be delivered to one group at a time after the lesson introduction.

The initial code on the LA Spaceman Activity Sheet does not include any repeat function. The sequence just runs through once and then ends. Children can then predict and test the difference by changing the **END BLOCK** for a **REPEAT FOREVER BLOCK**.

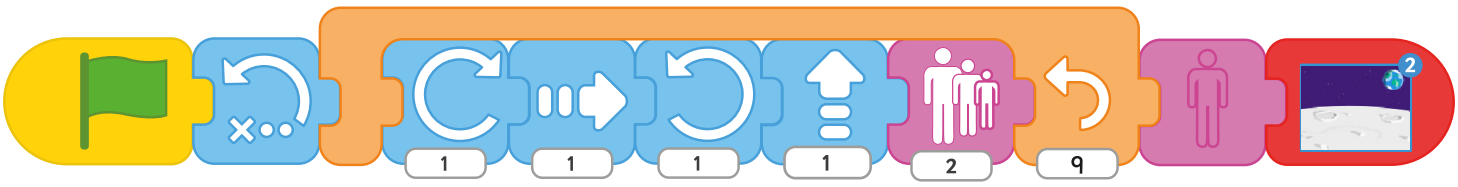
Activity Sheets: Spaceman

As with previous lesson in the unit, the Activity Sheets are designed for all children to work through in order from LA to HA. Some children will progress further than others. It is also possible for some children to start directly with MA Activity Sheet, if appropriate.

By the end of the activity, children will have explored the different use of the REPEAT FOREVER block compared to the REPEAT block, which runs a sequence for a given number of times.

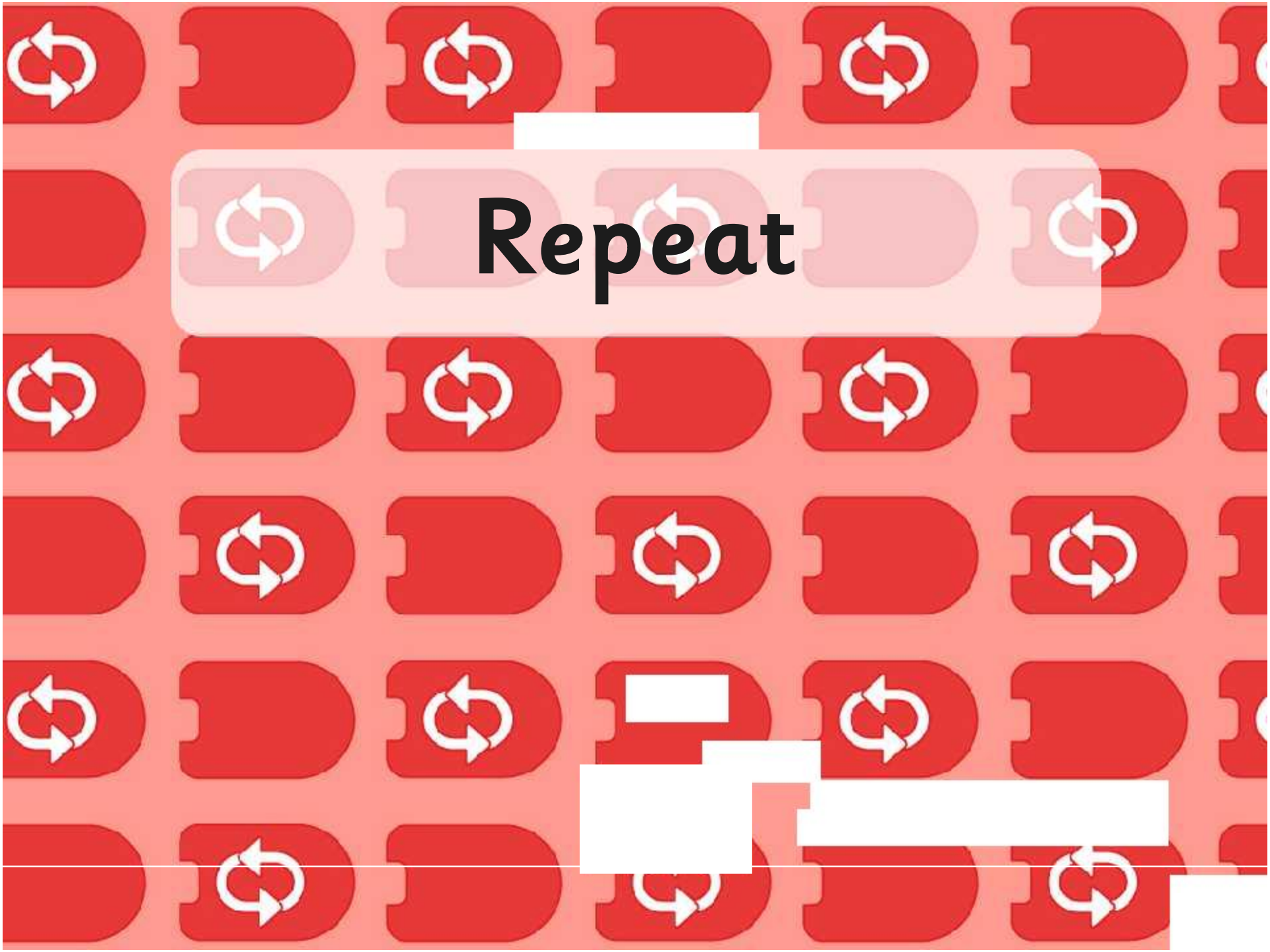
As an additional challenge, the function is given a purpose in the final Activity Sheet, where the Astronaut is programmed to disappear into the distance and end up on the Moon.

Some children may be able to investigate this technique further and understand the process which has created the effect. By adding a shrink instruction to each iteration of the repeat, followed by an invisible instruction at the end, it creates the illusion. After the Astronaut disappears, the new background is fetched. The final code is below:



Computing

Programming with ScratchJr


Repeat

Aim

I can use a repeat instruction to make a sequence of instructions run more than once and predict the behaviour.

Success Criteria

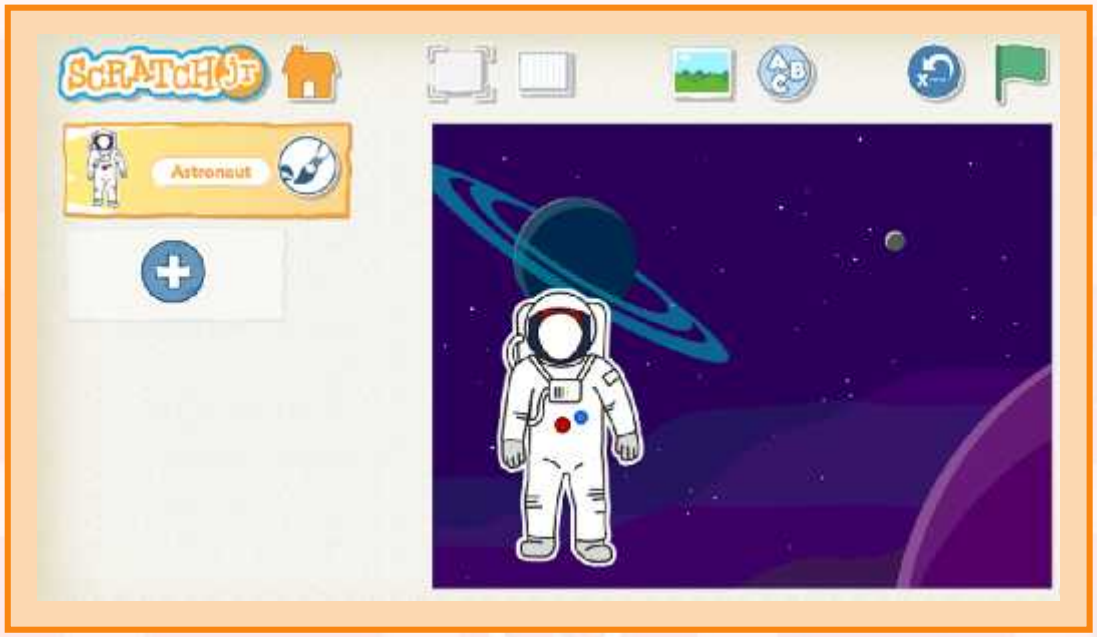
- I can use blocks for movement in different directions.
- I can use a REPEAT FOREVER block to make a continuous loop.
- I can use a REPEAT block for a section of instructions.
- I can predict the behaviour of a character, based on a sequence of instructions.

Moving Around

Can you describe any blocks which make a sprite move?

What do they look like and where would those blocks be?

Spaceman Travelling



Look at this Astronaut floating in Space. Which direction might he be moving in?

He may move in many different directions, so we are going to build a sequence of blocks to create this.

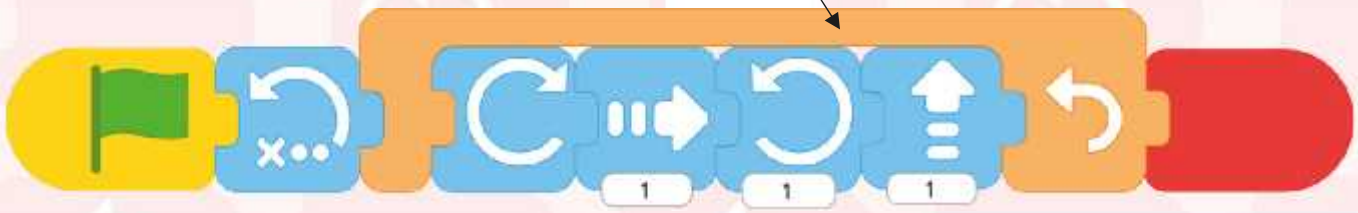
Repeat or Repeat Forever

Look at this sequence of movements. Can you predict what will happen to the Astronaut?

What will happen if we add the REPEAT FOREVER block at the end instead?

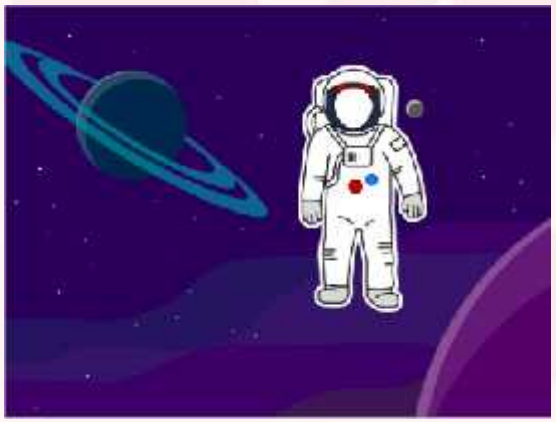
What if we don't want the astronaut to keep repeating the sequence forever, just to do it a certain number of times?

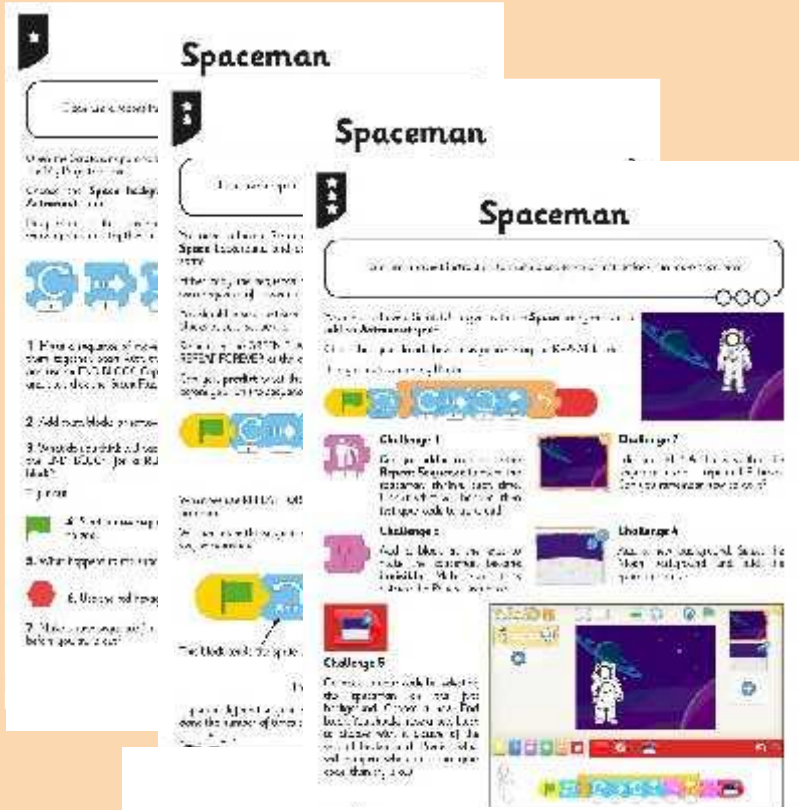
To do this, we use a REPEAT block, placed around the blocks we want to be repeated – and say how many times to do it.



Program Your Spaceman

Use the Spaceman Activity Sheets to program your Astronaut to move.





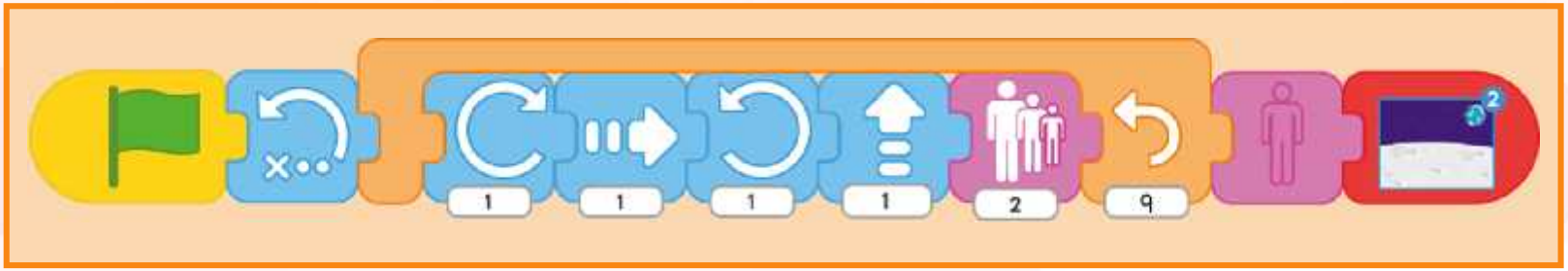
You will be using REPEAT blocks to make him carry on moving!

Predicting Behaviour

Look at the code below.

Can you predict and describe what each block does in turn?

What appears to happen to the Astronaut?



Aim

I can use a repeat instruction to make a sequence of instructions run more than once and predict the behaviour.

Success Criteria

- I can use blocks for movement in different directions.
- I can use a REPEAT FOREVER block to make a continuous loop.
- I can use a REPEAT block for a section of instructions.
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