

Educator Guide

Block 2 – Lesson 1
60 minutes
Single Student

Minecraft Space Center: Loops and Conditional Loops

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THEME OVERVIEW

Tell the students: In this lesson, you will explore the Minecraft Space Center and experience your first day of training as new space explorers. Block 2 will expand on the points introduced in Block 1 of Coding Fundamentals. This lesson will specifically focus on using Conditionals (if/else) and while loops.

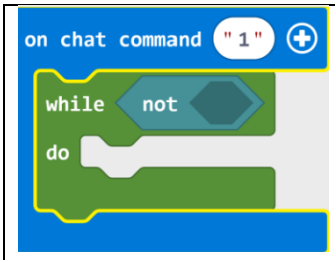
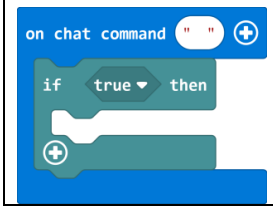
LESSON OBJECTIVES

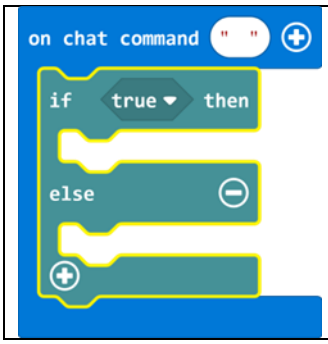
- Reinforce use of repeat Loops
- Learn to use Agent Inspect Block
- Learn to use Agent Detect Block
- Learn to use While Loop Block
- Learn to use if/Else Conditional Block

THINGS TO KEEP IN MIND

- Students are given a radio in the first slot of their hotbar. This item allows students to reset the coding activity.
- Remind students there may be more than one solution for each of the activities.
- Remind students there are many ways to code and some of those solutions would not include a conditional. However, stress to the more complex coding principals in the future. Conditionals are an important building block.

NEW CODING BLOCKS

	**While Loop** Repeats the code if a defined condition is met
	**Agent detect** Detects if there is a block next to the Agent in a defined direction
	**If then** Runs code when condition is met

	**If then else** Runs a specific code depending on whether a condition is met or not met

KEY VOCABULARY

Conditional – An action that occurs if something specific happens

LESSON ACTIVITIES

Direct Instruction (Teacher-Led; "I Do")

Welcome to Coding Fundamentals, a place to learn all about the basic concepts of computer science (**Slide 1**). Let's start this lesson by reviewing the lesson objectives for the day (**Slide 2**). Use **Slide 3** to introduce the important vocabulary. Use **Slides 4-5** to review the coding blocks they will be using in the lesson today.

Computer programs are made up of instructions that tell the computer how to process input and deliver output. An important part of programing is telling the computer WHEN to perform a certain task. (**Slide 6**)

For this, we use something called 'conditionals', because a certain condition or rule has to be met before an action is performed. Students are already familiar with the concept of conditionals in their daily loves. Have you ever had a parent say any of the following?
"IF you clean your room, THEN you can go out with your friends."
"IF your homework is done, THEN you and play video games."
These are all conditionals! Conditionals follow the format of IF this, THEN that. (Sometimes the THEN is implied.) IF (condition is met), THEN (action performed)
Have the students share a few conditionals from their own lives with the class or within small groups.

To help students understand the concepts of this lesson, do the unplugged activity prior to the Minecraft activities. (**Slide 7**)

Materials needed:

- Tables/chairs/desks that are in the classroom
- Different colored sticky notes

Before class begins, go among the table/chairs/desks in your room and put stacks of different colored sticky notes on the surfaces.

Write on the board or put on the projector:
While walking forward inspect (table/chair/desk) = (color of) sticky note if detect (color of) sticky note, Then collect 1 sticky note.

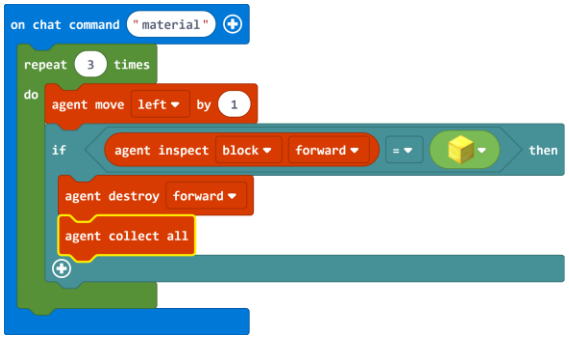
Guided Instruction (Teacher Modeling; "We Do")

Explain to students that they are going to be working in the Minecraft Space Center. Their goal for the day is focus on learning conditionals (if/else) and while loops in their programs. (**slide 8**)

Have all students log into Minecraft: Education Edition at this point. Begin the Minecraft Space Center lesson (located in Coding Fundamentals, Block 2, Lesson 1). They should all spawn into the Space Center and see Commander Cadfield. (**slide 9-10**)

Activity 1: Detecting the First Material (Repeat Loop + If Conditional) [Slides 12-13]
The first activity in astronaut training is how to use the Agent to inspect and collect important space materials for research. Tell students to imagine that they are walking in a room filled with rows of different colored chairs. Their job is to find all the yellow chairs. To do this as they walk by the chairs they are inspecting them for the correct color and when they find yellow chairs they collect them. This is the same thing the Agent will be doing.

- We will use the Repeat Loop, Inspect each block in front of the Agent until the Agent detects the gold block. The Agent will break and collect the objective block.
- The Agent will scan the long line of blocks detecting for a gold block. When the Agent detects the gold block, it will need to destroy and place it in the Agent's inventory.



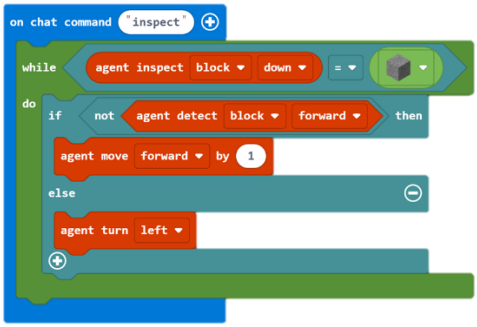
Explain to the students that they are still counting loops right not. Tell the students that they will be now moving toward a While Loop, where they will no longer be counting the loops.

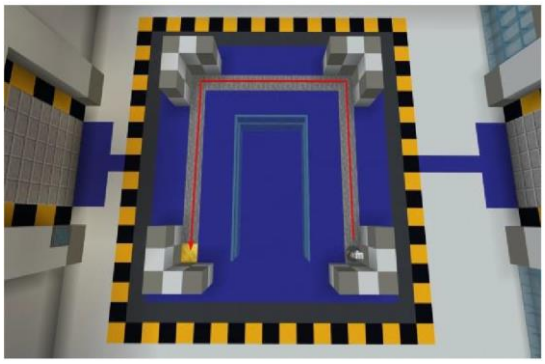
Independent Work (Teacher Support; "You Do")

Activity 2: Detecting Surroundings (While Loop + If Else Conditional) [Slides 14-18]

Explain to the students that their next task is to once again Inspect the surroundings and Detect a gold block, but they are going to have to move the Agent through the path without counting blocks. For this, we will use the While loop. While the Agent is inspecting the block down and the block is stone, the Agent needs to check if it has a block in front of it. If the Agent does not detect a block forward, the Agent needs to move forward, otherwise it needs to turn left.

Agent will do this until stone blocks are no longer detected under the Agent. Tell the students to notice where the Agent ends its journey.

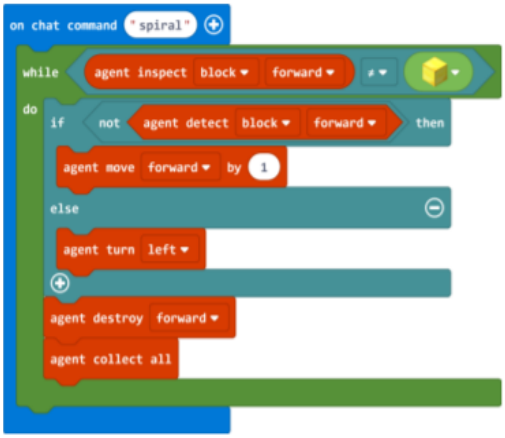




Activity 3: Navigating a Spiral (While Loop + If Else Conditional) [Slides 19-23]

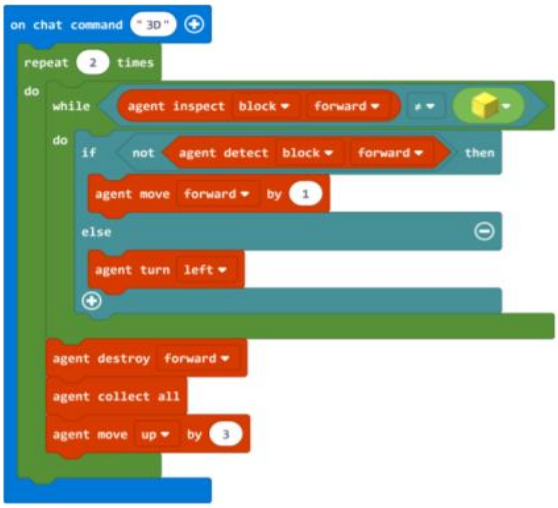
This activity will still use Inspect and Detect, but now with a more complicated pattern. This time, the Agent will be moving in a spiral pattern. The objective is the get the Agent to the gold block, break it, and collect it.

While the Agent Inspects to see if there is a block in front of it and the block is not (≠) gold, If the Agent does not detect a block forward, then the Agent needs to move forward, Else (otherwise) the Agent needs to turn left.



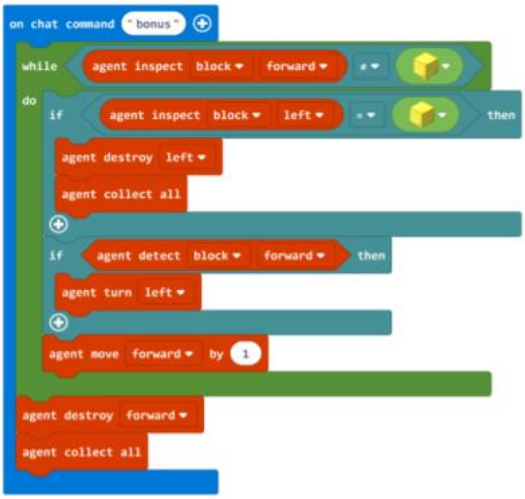


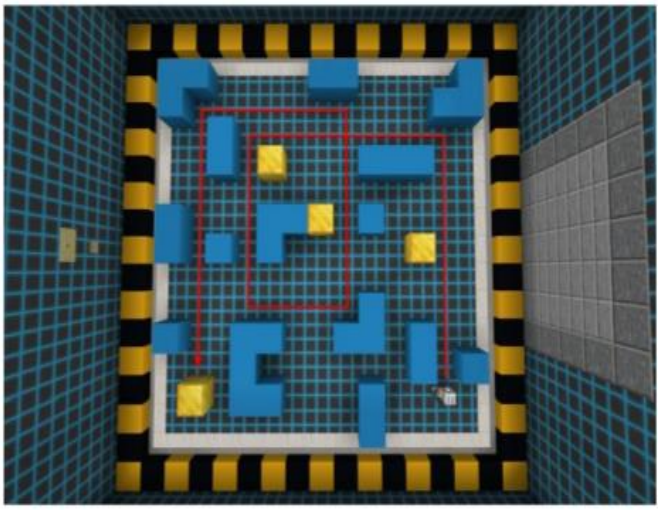
Activity 4: Navigating 3D Space (Repeat Loop + While Loop + If Else) [Slides 24-28]
Explain to the students that they are going to be working in space later, so the Agent needs to work in a 3D environment. Next, the Agent will be in a simulation pool and needs to navigate the spiral path twice. Tell students to refer to the previously completed activities to complete this spiral. The objective is to get to the gold block to break and collect it.



Activity 5: Just Like the Simulations (Bonus) [Slide 29]
Tell the students that they will find themselves in the replica of the simulation room that will be found on the spaceship later. The objective is to destroy and

collect all the gold blocks in the most elegant way! Tell students that they can go up to look at the challenge from the top floor.
Here is an example code snippet:





LESSON CONCLUSION

Ask students about the skills that they have learned during the lesson to reinforce the concepts learned. (Slides 30-31)

1. A While Loop continues until...?
   Answer: A condition has been met
2. What is Conditional?
   Answer: An action that occurs if something specific happens
3. If we are looking for a specific block in the game, what block would we use?
   Answer: Agent Detect
4. In MakeCode, the conditionals blocks are found in which Toolbox drawer?
   Answer: Logic

These questions can also be used as a formative assessment. The formative assessment can be found at the end of this document and can be printed out.

EDUCATIONAL STANDARDS

UNITED STATES: CSTA

- 1B-AP-09 Create programs that use variables to store and modify data.
- 1B-AP-10 Create programs that include sequences, events, loops, and conditionals.
- 1B-AP-15 Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

UNITED STATES: ISTE

- 1.5.D Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- 1.5.C Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

AUSTRALIA: DIGITAL TECHNOLOGIES (YEAR 3 AND 4)

- (ACTDIP019) Following, modifying and describing the design of a game involving simple algorithms represented diagrammatically or in English
- (ACTDIP018) Experimenting with different ways of representing an instruction to make a repetition, for example loops in a flowchart diagram or using a 'REPEAT' statement
- (ACTDIP020) Planning and implementing a solution using a visual programming language, for example designing and creating a simple computer game involving decisions and repetitions, suitable for younger children, that requires user input to make selections, taking into account user responses
- (ACTDIP020) Experimenting with different ways of instructing to make choices and repeat instructions

UK NATIONAL CURRICULUM: COMPUTING (KEY STAGE 2)

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

NAME: _____ **DATE:** _____

MINECRAFT SPACE CENTER: FORMATIVE ASSESSMENT

A While Loop continues until…?	
What is a conditional?	
If we are looking for a specific block in the game, what block would we use?	
In MakeCode, the conditionals blocks are found in which ToolBox drawer?	