Educator Guide

Block 1 – Lesson 1
45 minutes
Single Student

Animal Research Center (ARC): Basic Moves and the Agent

THEME OVERVIEW

Welcome to the Animal Research Center a place where students can learn all about animals in different habitats (biomes) and the challenges they face. Students will go out into the field to interact and learn more about wild animals. But before that, students will familiarize themselves with all the tools they have at their disposal.

LESSON OBJECTIVES

- Learn basic navigation in Minecraft: Education Edition using a keyboard, mouse, and the WASD keys.
- Become familiar with the interface of the game and **MakeCode**.
- Be introduced to their Agent and the basic Agent moves using the **MakeCode** interface.
- Begin to understand the concept of **Decomposition** as students break problems down into codable solutions for the Agent.
- Begin to see the importance of **Sequencing**, putting things in order, so that the agent can complete its tasks.
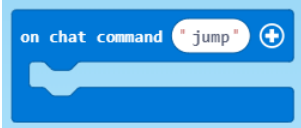
THINGS TO KEEP IN MIND

- 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.

MINECRAFT MECHANICS

C	C Summons the Agent and opens the Make Code interface.
T	T Opens chat panel in Minecraft for commands to be typed
ESC	ESC When a student wants to leave the game, leave chat, or pause the game.

CODING BLOCKS

	On chat command Runs the code when the student types the chosen text in the chat window.
	Agent move Tells the Agent to move in a certain direction by a defined amount.
	Agent turn Tells the Agent to turn left or right.

KEYWORDS

MakeCode – the coding program used in-game to code the Agent.
Decomposition - Breaking down a complex problem or system into smaller parts that are more manageable and easier to understand.
Sequencing - The set of logical steps that are carried out/executed in order.
Pseudo Code - An informal description of a computer program or algorithm.

START OF LESSON PROCEDURE

Number of Activities: 5
Optional Activity: 1

INTRODUCTION AND LEAD-IN: 5 minutes

Introduction:

Welcome to Coding Fundamentals, a place to learn all about the basic concepts of Computer Science. We are going to spend time learning these ideas in Minecraft: Education Edition. To help us on our journey we will use the MakeCode interface along with the in-game Agent.

Lead-in:

Explain to students that they have come to the Animal Research Center to learn more about different animals and the habitats (biomes) they live in. Before they can venture into the field to visit the animals, they must learn about the basic tools they have at their disposal.

CODING ACTIVITIES: 30 minutes

Activity 1:

The students start at the front gates of the building (ARC). Students learn that before they may enter the facility that they need to pass a basic fitness test. They will see a gold block appear; so they'll need to move the mouse in Minecraft to look at the gold block. This will repeat 3 or 4 times until the system confirms their identity and opens the gate in front of them, instructing them to continue the rest of the fitness test.

Activity 2:

Past the gate, the students will have to navigate past a row of walls and into the facility itself. Inside the facility, the students will notice there is construction going on and will need to get past some construction materials. The students must make their way through the corridor to the maximum-security area at the end of the hall. During this process they become more familiar with using the **WASD** keys to move forward, back, left and right. Along the way there are various obstacles the student must navigate around. [Hints like "Climb ladders by holding W", "Jump by pressing **<spacebar>**" or "Press A or D to walk Left or Right" will help guide new students who may get stuck.] At the end of the hall they must press a button to enter maximum-security area.
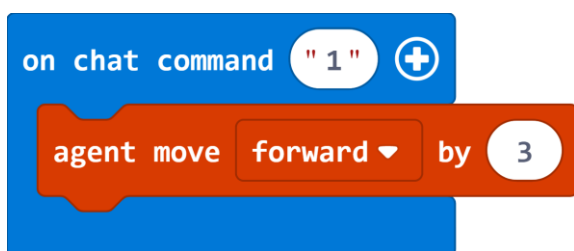
Activity 3:

The students enter the science lab, where a researcher will explain that they'll be given a tool that will allow them to control their very own research Agent. They'll be instructed to press C to open the Code Builder *(At the same time the "Press C to code" message will appear on their action bar. They'll also be instructed to hit the **X** in the top right corner of the device, or the **<esc>** button to close the coding interface)* and look at Testing Chamber A *(this is a platform where the Agent will appear)*.

Activity 4:

The students will be subjected to some challenges where they must move the Agent in different directions to reach a gold pressure plate (Agent move and Agent turn). Once they complete all the tests the researcher will congratulate them and move them onto the next challenge.

Test Chamber 1

Test Chamber 2

```
on chat command " 2 " ⊕
    agent turn  left ▾
    agent move  forward ▾  by  3
```

Test Chamber 3:

```
on chat command " 3 " ⊕
    agent turn  right ▾
    agent move  forward ▾  by  3
```

Activity 5:

The students are instructed to get their Agent to the gold pressure plate. Utilizing the On chat command block, Agent move and Agent turn blocks the student must navigate the obstacle using the commands from the drop-down menus in the command blocks. This is a multi-stage challenge with increasing difficulty that requires the Agent to move up and down. Once the challenge is successfully completed, the final room with the Bonus challenge will open.

Test Chamber 4:

Part 1

```
on chat command " 4 " ⊕
    agent move  forward ▾  by  1
    agent move  up ▾  by  1
    agent move  forward ▾  by  3
```

Part 2

```
on chat command " 4 " ⊕
    agent turn  left ▾
    agent move  forward ▾  by  1
    agent move  down ▾  by  1
    agent move  forward ▾  by  3
```

Part 3

```blocks
on chat command "4" ⊕
    agent turn right ▾
    agent move forward ▾ by 3
```

Part 4

```blocks
on chat command "4" ⊕
    agent turn right ▾
    agent move forward ▾ by 1
    agent move up ▾ by 1
    agent move forward ▾ by 1
    agent move up ▾ by 1
    agent move forward ▾ by 1
    agent move up ▾ by 1
    agent move forward ▾ by 2
    agent move down ▾ by 3
    agent move forward ▾ by 1
```

Pseudo Code: Explain to students that they are going to practice writing **pseudo-code** before entering the bonus activity room. As they enter the room, they need to look at the puzzle. Tell students that using paper they need to write out the code using what they have learned in the previous test rooms. Once they have their solution written out, put it in MakeCode and run it. The answers for this activity might differ.

Bonus:

After the student's complete activity 5, the student and the Agent gain access to the bonus challenge room. The researcher will congratulate and inform them they have learned what they need, to head out to the field, but there is an additional activity that they can try to complete. Using the commands learned so far, the student will have to cooperatively work with their Agent to complete the task. The student must code the Agent to reach a gold pressure plate again, but now they must get to their plate by traversing across a bridge. If the student falls off the bridge they will be teleported back to the beginning of the bridge.

LESSON CONCLUSION: 5 minutes

Upon completion of this lesson students should be able to answer the following questions:

1. What key on your keyboard summons your Agent?
   Answer: C
2. How many steps of pseudo code did it take to solve the Bonus Activity?
   Answer: Varies depending on student
3. What does the "On chat command" do?
   Answer: It is the command that causes the code to run
4. What did 'learning the directions the Agent moves in' help you accomplish in the Lesson 1?
   Answer: Made it possible to program the Agent to move from one place to another.

EDUCATION STANDARDS – LESSON 1

CSTA K-12	
1A-AP-11	Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions. (P3.2)
1A-AP-08	Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks. (P4.4)
ISTE	
5C	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
5D	Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.