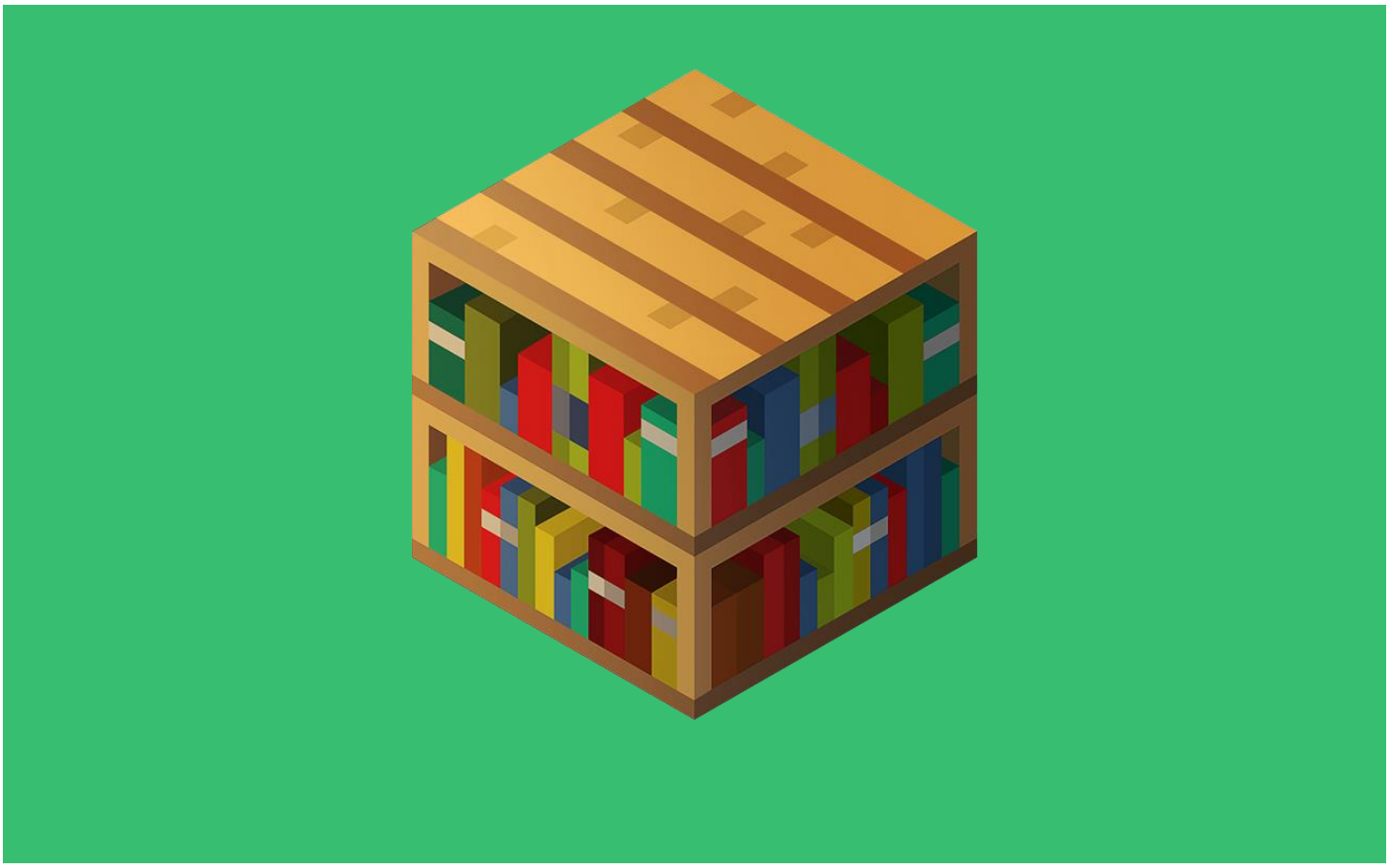


MINECRAFT EDUCATION EDITION

Educator Guide

Python Island 1

45 minutes

Single Student

Introduction to Python, Say, Variables and the Agent.

Causeway Digital

THEME OVERVIEW

Welcome to the Kingdom of the Floating Islands. This mystical kingdom floats high above the world below. Throughout this collection of lessons, students will learn the basics of Python, through a series of themed tasks in each world. Completing these tasks will allow the kingdom to develop further technologically.

LESSON OBJECTIVES

- Become familiar with the **Notebooks** interface.
- Understand the *say()* command and it's purpose for outputting information.
- Become familiar with **Variables** within **Python** and their basic uses.
- Get hands on with the Minecraft Agent, learning with it to
    - Move using *agent.move()*
    - Place blocks using *agent.place()*
    - Break blocks using *agent.destroy()*
    - Till ground using *agent.till()*
- 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 whistle in the first slot of their hotbar. This allows students to teleport their Agent to them at any point.
- Remind students there may be more than one solution for each of the activities.

MINECRAFT MECHANICS

C	**C** Summons the Agent and opens the Notebooks 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.

PYTHON COMMANDS

say("Message")	**Say command** Output a message in chat
agent.move("Direction")	**Agent move** Tells the Agent to move in a certain direction 1 block.
agent.place(1, "Direction")	**Agent place** Tells the Agent place a block from inventory slot 1, in a certain direction.
agent.destroy("Direction")	**Agent destroy** Tells the agent to destroy/break a block in a certain direction.
agent.till("Direction")	**Agent till** Tells the agent to till a block of dirt ready for planting seeds, in a certain direction.

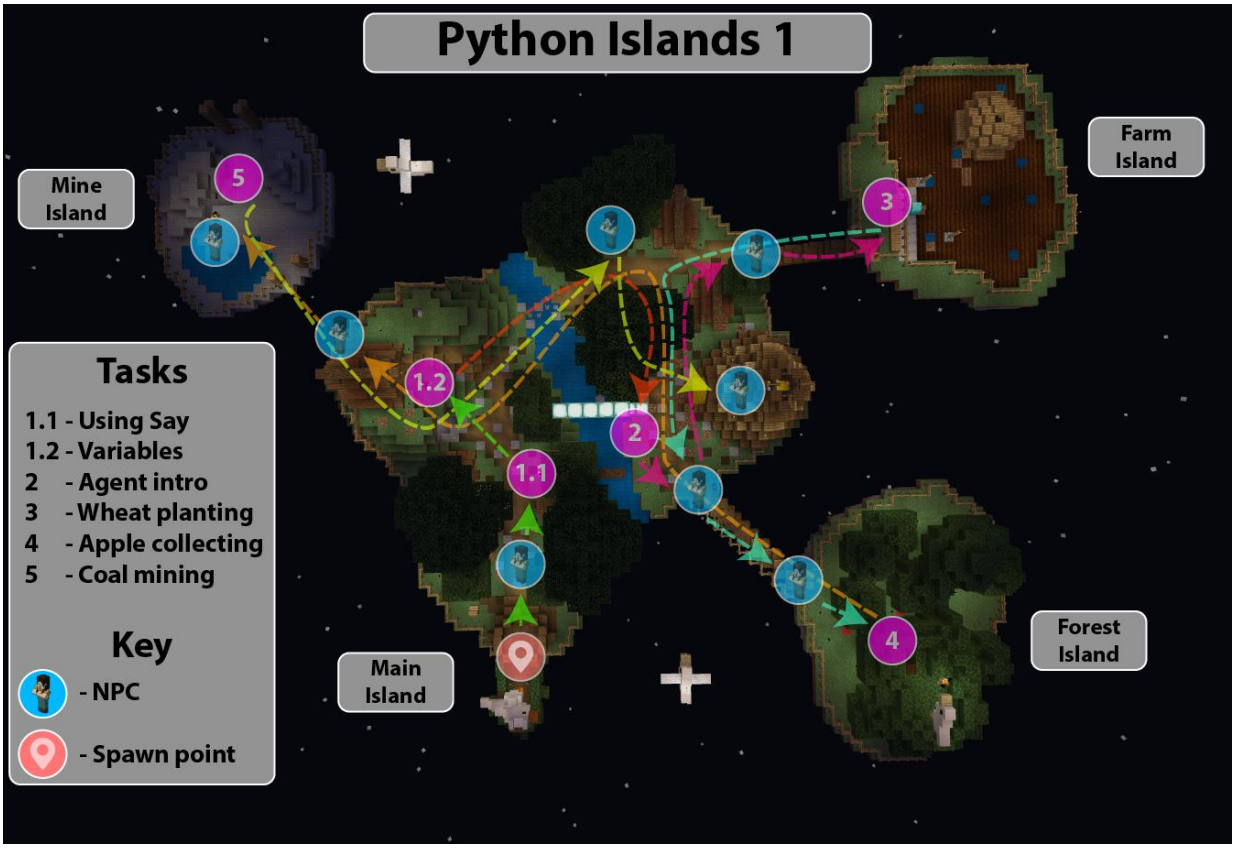
KEYWORDS

Notebooks – The Python coding environment 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.

START OF LESSON PROCEDURE

Number of Activities: 5

Optional Activity: 0



INTRODUCTION AND LEAD-IN: 5 minutes

Introduction:

Welcome to Python Islands, a place to learn all about the basics of the Python programming language. We are going to spend time learning these ideas in Minecraft: Education Edition. To help us on our journey we will use the Notebooks interface along with the in-game Agent.

Lead-in:

Explain to students that they have come to the mystical floating islands kingdom to help the residents develop their understanding of technology. Before students can move forward to the more technologically advanced versions of the civilisation, they must start off in Neolithic times.

CODING ACTIVITIES: 30-45 minutes

Activity 1:

The students start at the landing spot for the island, where a great bird has dropped them off. From here, they will meet a welcoming villager who will tell them to speak with the two researchers on the island. The first researcher, Pete, will explain how to use the **say()** command in Python programs, to output a message. The second researcher, Tom will explain how **variables** are used within Python to store data being used.

Activity 1.1 Final Solution

`# Final code`
`# Must be run once`
 	
`say(23)`
`say(74.2)`
`say(False)`

Activity 1.2 Final Solution

`# Final code`
`# Must be run once`
 	
`my_amazing_variable = "Bad news"`
`my_amazing_variable = "Good news"`
`say(my_amazing_variable)`

Activity 2:

After speaking with these researchers, the students are left without clear guidance of what to do next. They can start exploring and speaking with the different characters on the island. If they speak with the farmhand, he will inform them they need to get an agent certification to visit the farm. The agent certification character can be found beside the lake. On speaking with this character, the students will be presented with a simple moving task for the agent, where they must use **agent.move()** to move their agent onto two pressure pads one after each other. On completion of this, they will receive a certificate which can be taken to the farmhand.

The game particles will suggest the students speak to the forest bridge builder. He will inform them that he is hungry for a sandwich, which he needs to finish the bridge. Perhaps the students should go and check up on the farmer.

Activity 2.1 Final Solution

```
# Final code
# Must be run once

agent.move("up")
agent.move("forward")
agent.move("forward")
agent.move("forward")
agent.move("right")
agent.move("right")
agent.move("right")
agent.move("right")
agent.move("right")
```

Activity 2.2 Final Solution

```
# Final code
# Must be run once

agent.move("left")
agent.move("down")
agent.move("back")
agent.move("left")
agent.move("left")
agent.move("left")
agent.move("left")
agent.move("left")
agent.move("left")
agent.move("left")
```

Activity 3:

The students are then encouraged to speak to the Farmhand, who will verify they have completed the agent certification and if so, allow them to progress up to the farm. On arrival, students should speak with the Farmer, who will ask them to till 3 blocks using **agent.till()** and then use the provided 3 seeds, to plant 3 pieces of wheat on these newly tilled blocks using **agent.place()**. On completion of this, the farmer will give the students a sandwich which they can take to the forest bridge builder.

Activity 3 Final Solution

```
# Final code
# Must be run once

# Complete the code below
agent.move("left")
agent.move("left")
agent.move("left")
agent.till("down")
agent.place(1, "down")

agent.move("right")
agent.move("right")
agent.move("right")
agent.move("forward")
agent.till("down")
agent.place(1, "down")

agent.move("right")
agent.move("right")
agent.move("right")
agent.move("right")
agent.move("forward")
agent.till("down")
agent.place(1, "down")
```

Activity 4:

On speaking to the forest bridge builder, he will finish the repair work on the bridge, unlocking the forest. Students should then speak with the character on the other end of the bridge, who will inform then he is concerned about smoke coming from one of the trees.

To get up to this tree, students must use **agent.place()** to repair the ladder blocks.

On completion of this, students should climb the ladder to find Nicole and Marvin the bird. Nicole explains Marvin is hungry and asks if the students can collect for him 5 apples using **agent.destroy()**.

On completion of this and after returning to Nicole, Nicole lets the students know that she is grateful and perhaps she can help the students out, but helping them across the gap between the main island and the Mine island.

Activity 4 Final Solution

`# Final code`
`# Must be run once`
 	
`agent.move("forward")`
`agent.place(1, "forward")`
`agent.move("up")`
`agent.move("up")`
`agent.move("up")`
`agent.place(1, "forward")`

Activity 5:

Students are then encouraged to find the entrance to the mine (which is in the cave near the researchers). On arrival at the bottom of the cave, they will find Marvin and Nicole once again, who are ready to provide the students with a lift over to the Mine island.

On arrival at the Mine island, they are met by the Miner. The Miner asks if Marvin and Nicole might be able to help you collect some Coal blocks, down on the side of the island. Students use the **agent.destroy()** command to break 3 Coal Ore blocks to complete the task. This task contains only limited guidance, testing students' previous knowledge they have built up from previous tasks.

Activity 5 Final Solution

`# Final code`
`# Must be run once`
 	
`agent.move("forward")`
`agent.move("forward")`
`agent.move("down")`
`agent.move("right")`
`agent.destroy("forward")`
`agent.move("up")`
`agent.destroy("up")`
`agent.move("up")`
`agent.move("left")`
`agent.move("left")`
`agent.move("up")`
`agent.destroy("up")`

Completion:

Once the student completes activity 5, they are provided with a Coal Ore block. If they take this to the Wizard, he is able to convert it into a piece of Coal, which once taken to the Chieftain, completes the world.

LESSON CONCLUSION: 5 minutes

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

1. What key on your keyboard is used to open the Codebuilder window?
   Answer: C
2. How many steps were required to complete the final Mine task?
   Answer: Varies depending on student.
3. What do "Variables" do?
   Answer: They allow for storing data temporarily inside a program.
4. What command is used to move the Agent left?
   Answer: agent.move("left")
5. What command is used to output a message in the game from Python?
   Answer: say("My amazing message")

CSTA STANDARDS

The following Computer Science Teachers Association K-12 Computer Science Standards (2017) are covered by this lesson.

Identifier	Standard
1A-AP-11	Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.
1B-AP-09	Create programs that use variables to store and modify data.
1B-AP-15	Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.