



Educator Guide

Single Student

Coding Concept: SEQUENCING

Sequencing is critical to problem solving in almost any math and science real world problem. It is important to be able to identify the “path” through the solution. In the solution, one action must be taken before another. Working out of order may produce a different undesired solution.

Sequencing is the main component of an “algorithm.” Algorithms are key because understanding that code must be presented in a certain order is an important first step in learning to code.

For more information on **sequencing** see: <https://curriculum.code.org/csf-19/courseb/3/>

EDUCATION.MINECRAFT.NET

Sequencing in Minecraft:

Being able to program an agent to execute specific instructions successfully **on command** frees the player up to do other tasks simultaneously resulting in more productivity for the player. In survival mode, players benefit from being able to create enclosures and then capture/spawn animals for many purposes. An advanced player who can spawn animals as they need them will be better prepared to survive and to participate in a “goods-based” economy.

OVERVIEW

These learning activities are designed to provide the learner with flexibility and choice in his/her learning.

1. The learner will be introduced to three tutorials that are at three levels of difficulty (Novice, Intermediate and Expert) which are followed by an educational activity where he/she can apply coding skills.
2. Within each tutorial, the learner will have the option of selecting a coding language (Blocks, Javascript or Python).

The learner may choose a tutorial at his/her appropriate difficulty level and language OR choose to complete all tutorials and the educational activity. It will take approximately an hour to complete all the activities.

LESSON STRUCTURE

Novice Tutorial: Agent Move

Intermediate Tutorial: Build a Maze

Expert Tutorial: Ocelot Enclosure

Learning Scenario:

The learner is free to engage with activities in Block coding, Javascript and/or Python and does not need to complete all the activities.

The learner will model an example of a **closed circuit** using **Redstone**.

- An **open circuit** is one where electrons are unable to complete the pathway.
- A **closed circuit** is one where electrons are able to complete the pathway.

The learner will use the agent to build a **closed circuit** to turn on a light on the porch from inside the house.

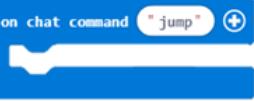


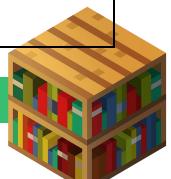
LEARNING OBJECTIVES

The learner will:

- Learn to code the agent and builder to move in various directions.
- Learn to code the agent and builder to set items as they move.
- Learn how the **sequence** of the code affects how the code runs.

CODING BLOCKS

Definition	Code
On chat command: Runs the code when the student types the chosen text in the chat window.	Block:  JavaScript: <pre>player.onChat("", function () { })</pre> Python: <pre>def on_chat(): pass player.on_chat("", on_chat)</pre>
Agent move: Tells the agent to move in a certain direction by a defined amount.	Block:  JavaScript: <pre>Agent.move(FORWARD,1)</pre> Python: <pre>agent.move (FORWARD, 1)</pre>
Agent place: Tells the agent to place an item or block, in the Minecraft world, from the agent's currently selected inventory slot, in a defined direction.	Block:  JavaScript: <pre>agent.place(FORWARD)</pre> Python: <pre>agent.place (FORWARD)</pre>
Builder: Tells the builder to move in a certain direction by a defined amount.	Block:  JavaScript: <pre>builder.shift(1, 1, 1)</pre> Python:



Definition	Code
	builder.shift(1, 1, 1)

KEYWORDS (OR PHRASES)

1. **Agent** - A mob in Minecraft that appears when you first open the code connection. It can be programmed to run tasks inside of the Minecraft world.
2. **Boolean** - A data type with 2 possible values: true or false.
3. **Position** - The location of an entity (player, agent or mob) in the Minecraft world.
4. **Spawn** - To appear
5. **Random** - Made, done, happening, or chosen without method or conscious decision.

GUIDING QUESTIONS

1. What are the steps to make a PBJ sandwich? Check to see if your steps are same as a classmate. Is the PBJ sandwich the same at the end of the steps?
In most cases, the students are going to have some steps that are different than the others. Really draw attention to doing the steps EXACTLY as said and seeing how each outcome could be slightly different.
2. Are there rules in English that have to be followed in order to spell words correctly? Name 2 rules and give an example of each rule. (Other languages may be substituted for English).
Some examples are I before E except after C, every word must have at least 1 vowel, Q is always followed by a U, etc.
3. In Mathematics, what is the order of operations? What happens when the order of operations is not followed?
The order of operations are Parentheses, Exponents, Multiply, Divide, Add, and Subtract. If you don't follow the order of operations, you will not get the correct answer.
4. How does changing the sequence of the code affect how it runs?
Code is run in the order it is written. If you write it out of order, the code will run incorrectly or draw an error.



TUTORIAL 1: AGENT MOVE (Novice - 5 minutes)

Main objective:

The learner will utilize the **chat commands** to code the **agent** to move in various directions around the Minecraft: Education Edition world.

Answer Key: https://makecode.com/_1E11MUiWc6EW

TUTORIAL 2: BUILD A MAZE (Intermediate - 10 minutes)

Main objective:

The learner will code the **agent** to move following a specific set of instructions while placing blocks at a specific location in the **agent's** path. The **agent** will respond to several different **on chat** commands.

Answer Key: https://makecode.com/_cEzDcoFUYV0C

TUTORIAL 3: OCELOT ENCLOSURE (Expert - 15 minutes)

Main objective:

The learner will code the **Builder** to move following a specific set of instructions while placing specific blocks along the perimeter of their path. Then they will spawn several animals into the area previously fenced in.

Answer Key: https://makecode.com/_1RJAUagka20x

EDUCATIONAL APPLICATION (15 minutes)

Subject Area: Physical Science

Main purpose of the activity:

The learner will model an example of a **closed circuit** using **Redstone**.

- An **open circuit** is one where electrons are unable to complete the pathway.
- A **closed circuit** is one where electrons are able to complete the pathway.

The learner's challenge is to use the **agent** to build a **closed circuit** to turn on a light on the porch.

Outcome of This Activity:

The learner will have successfully coded the **agent** using **chat commands** to build a **closed circuit** that turns a light on when a button is pushed.

Possible Solution for this Activity: https://makecode.com/_fg81z0YrUUYY

LESSON CONCLUSION/REFLECTION (5 minutes)

Ask the learners about new skills that they have practiced during the activity to reinforce the concepts.

1. What does **agent detect** do?

Agent detect can determine if an item is around.

2. What is a **Conditional**?

A conditional is a statement that tells a program to do different actions depending on whether a condition is true or false.

3. What does the term **Sequencing** imply or require?



Sequencing requires that steps to a problem's solution be done in a specific order to produce a specific result (finished product).

- How did the **agent** use **Boolean logic** to successfully build the maze?

The agent place on move commands required the evaluation of a Boolean true in order to execute.

- How was the **random generator** used to help the **Builder** spawn animals inside the fenced areas?

*The pick random position function was given a set of parameters that were carefully chosen so they would be inside the fenced in area walked by the **Builder**.*

OPPORTUNITIES TO EXTEND THE LEARNING:

Minecraft: Education Edition offers many opportunities for teachers and learners to extend and enrich the learning experience beyond this lesson.

- Consider having learners use the book and quill and camera to document their learning as they progress through the coding tutorials and the learning scenario.
- Learners could create their own learning scenario focused on sequencing and create a puzzle for a classmate to solve.
- Consider using “unplugged” coding activities from code.org, like [Move It, Move It](#) to add a tactile experience for the learner.

EDUCATION STANDARDS

NEXT GENERATION SCIENCE STANDARDS (NGSS) <https://www.nextgenscience.org/>

PS3B: Conservation of energy and energy transfer

COMPUTER SCIENCE TEACHERS ASSOCIATION (CSTA) COMPUTER SCIENCE STANDARDS K-12 <https://www.csteachers.org/Page/standards>

1A-AP-08: Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.

1A-AP-11: Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.

1A-AP-12: Develop plans that describe a sequence of events, goals, and expected outcomes.

INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION (ISTE) STANDARDS FOR STUDENTS <https://www.iste.org/standards/for-students>

5D: Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

