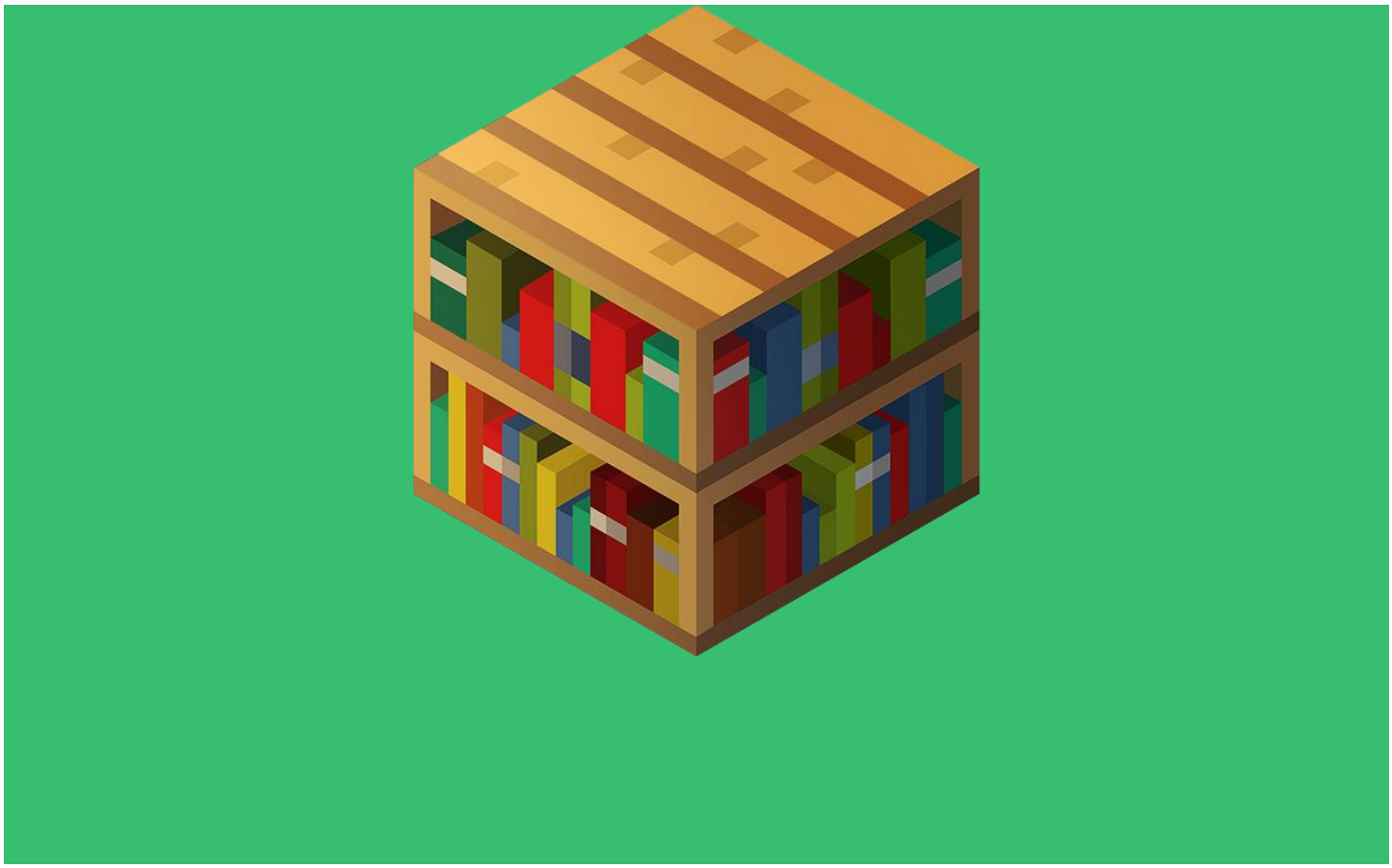


MINECRAFT EDUCATION EDITION

Educator Guide

Block 1 – Lesson 2
45 minutes
Single Student

Sea Turtle Assistance: Algorithms, Sequencing, and Loops

THEME OVERVIEW

Tell students that we are continuing in our work with the Animal Research Center (ARC) and going on our first assignment to the Galapagos Islands. We have received reports of tourists entering the nearby turtle nesting ground. We need to see if the reports are true and investigate the area for damage. Less than 1% of baby turtles make it to maturity. The slightest disruption of the local ecosystem can reduce that number even further. By utilizing the skills learned, students are going to make necessary repairs and clean up the area.

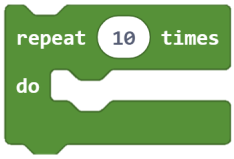
CODING OBJECTIVES

By the end of Lesson 2 the students will have learned about the concepts of **Pattern Recognition, Algorithms, Sequencing,** and **Loops.**

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.
- Should you want students to take a screenshot of their coding solutions and include their explanations, please use the handout.

NEW CODING BLOCKS

	**Agent destroy** Tells the Agent to destroy in certain directions.
	**Agent collect all** Tells the Agent to collect items.
	**Repeat** Runs the code a defined number of times.

KEYWORDS

Pattern Recognition - Finding similarities or patterns that help us solve larger problems.

Algorithm – Detailed step-by-step instructions or formulas for solving a problem or completing a task.

Sequencing – The order the steps should be done in to complete a task.

Loop - a structure that repeats a set of instructions (algorithms) until it is told to stop.

START OF LESSON PROCEDURE

Number of Activities: 4

LESSON REVIEW: 5 minutes

Recap of what was taught in the previous lesson: We learned to move around in Minecraft, summon the Agent, and give it basic commands. Ask the students:

1. Q. What were 4 keys on the keyboard that move you around in Minecraft?
   A. WASD
2. Q. What did 'learning the directions the Agent moves in' help you accomplish in the Lesson 1?
   A. Made it possible to program the Agent to move from one place to another.
3 Q. To open doors, push levers or buttons which mouse button do you use?
   A. Right click
4. Q. What key on the keyboard summons the agent?
   A. C.

LESSON INTRODUCTION AND LEAD-IN: 5 minutes

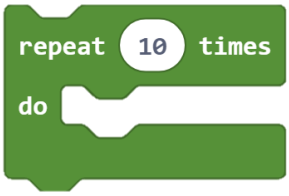
Coding Practice - Algorithms, Sequencing, and Loops:

In our previous lesson we learned to put commands together for the Agent to move where we wanted it to go. Those steps in the On chat command bracket were an **algorithm**. For the code to work, the steps had to be in the correct order, which is **sequencing**. We are going to continue to practice those skills and learn about **loops** which will help you and the Agent work more efficiently.

Lead-in:

Tell the students they are heading to the Galapagos Islands. In order to help newborn sea turtles, we are going to use our expanding knowledge of **Sequencing**, **Algorithms,** and **Pattern Recognition** to help sea turtles get safely to the ocean. To help be more efficient in our coding we will be learning about **Loops.**

- Review **Decomposition:** ask students to imagine fixing a bowl of cereal and eating it. How does this activity break down into steps? Here is an example answer:
  - Step 1: Get the cereal
  - Step 2: Get a bowl
  - Step 3: Pour cereal into a bowl
  - Step 4: Get milk out of the fridge
  - Step 5: Pour milk over cereal in the bowl
  - Step 6: Get a spoon
- Using **Pseudo Code**, write out all the steps. The result is called **Algorithm**.
- Ask students if the steps in the first tasks were mixed, would this recipe provide the intended outcome? Answers: No. Telling computer what to do in a specific order is important, otherwise we cannot expect the intended result. This is called **Sequence**.
- As students review the code, ask students to look for repeating steps, reinforcing **Pattern Recognition**.
- In MakeCode students will use the repeat coding block. This block repeats code (steps recognized as a pattern). The repeating code is called **Loops**.



CODING ACTIVITIES: 30 minutes

Activity 1:

Tell students that after sea turtles lay eggs, they often leave tracks back to the water. Students need to program the Agent to follow these tracks to find where the rest of the nests are. Instruct students to be careful not to disturb the area by keeping the Agent from straying off the tracks.
Use Agent move to have your Agent follow the tracks.

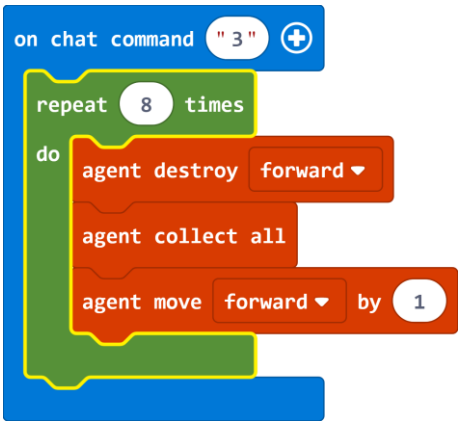
Activity 2:

Tell students that it seems like the turtle had to change direction along the way to get around the obstacles. Students need to program the Agent to continue moving along the tracks.

Activity 3:

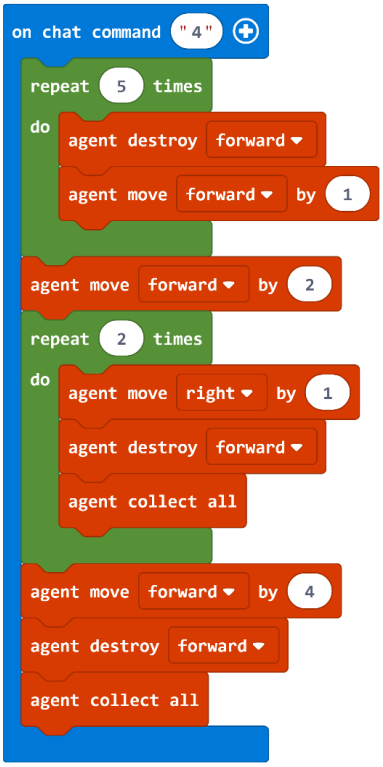
As students get closer to the beach, they could start seeing more nests. Tell students that it looks like the storm that came through last night blew down some trees. Students need to program the Agent to clear some of these paths for when the baby turtles hatch. Introduce a new block to help get things out of the turtles'/ Agent's path, Agent destroy and Agent collect all.

Here is a good opportunity to introduce a Repeat block. Instruct students to use their **pseudo code** skills, look ahead, and count how many times the Agent needs to move forward, destroy and collect? There is a pattern that can be recognized.



Activity 4:

Tell students that it seems like the reports are true, there's trash that's been left along this path by tourists. They will need to program the Agent to destroy trash and have the Agent collect it so they could properly dispose of it.



Bonus activity

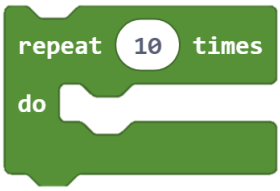
Tell students that there is still a lot of trash on the beach that will block the baby turtles' path to the water. Using the blocks and skills they have learned, they need to program the Agent to destroy and collect all the trash and get the Agent to the beach. Then they will have time to enjoy watching the baby turtles move towards water.

There are multiple ways to solve the puzzle. Here is how students can approach solving this activity:

LESSON CONCLUSION: 5 minutes

Ask the students about the skills that they have learned during the lesson, to reinforce the concepts.

1. Q. What coding block repeats a piece of code a set number of times?
   A. The repeat coding block.



2. Q. What coding block commands the Agent to destroy an item?
   A. Agent destroy.
3. Q. What is it called when we repeat code over and over?
   A. A loop.
4. Q. What are detailed instructions or formulas for solving a problem or completing a task?
   A. Algorithms

REFERENCES:

- http://www.bonaireturtles.org/wp/explore/why-are-sea-turtles-endangered/
- https://www.worldwildlife.org/species/sea-turtle#threats
- https://www.natgeokids.com/uk/discover/animals/sea-life/green-sea-turtle-facts/

EDUCATION STANDARDS - LESSON 2

CSTA K-12	
1A-AP-08	Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.
1A-AP-09	Model the way programs store and manipulate data by using numbers or other symbols to represent information.
1A-AP-12	Develop plans that describe a sequence of events, goals, and expected outcomes.
1A-AP-14	Debug, (identify and fix) errors in an algorithm or program that includes sequences and simple loops.
1B-AP-08	Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
1B-AP-10	Create programs that include sequences, events, loops, and conditionals.

1B-AP-11	Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
ISTE	
3D	Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
4A	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
5C	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.