Lesson 3 - Algorithms and Pattern Recognition

Objectives

I can understand the concept of decomposition by breaking problems down into codable solutions for the Agent.

Standards

- 4-6.CT.4 Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.
- 4-6.CT.5 Identify and name a task within a problem that gets performed multiple times while solving that problem, but with slightly different concrete details each time.
- 4-6.CT.8 Develop algorithms or programs that use repetition and conditionals for creative expression or to solve a problem.

Gradual Release of Responsibility (I do/We do/You do)

I Do/We Do

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.

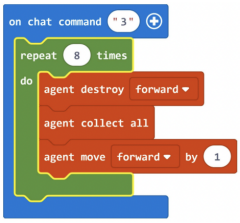
• In MakeCode students will use the repeat coding block. This block repeats code (steps recognized as a pattern). The repeating code is called Loops.

You Do: Coding Activities

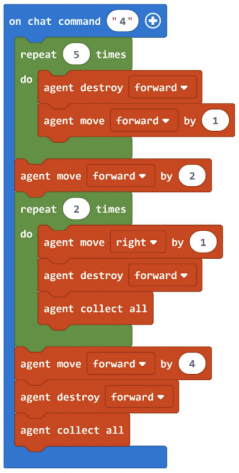
Activity 1: Tell students that after sea turtles lay eggs, they often leave tracks back to the water. Students need to program the Agent to follow these tracks to find where the rest of the nests are. Instruct students to be careful not to disturb the area by keeping the Agent from straying off the tracks. 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: 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:

Exit Ticket

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