

**Computer Science**  
**Lesson Plan**  
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Grade: 4-6

Essential Question:

What measures can we implement to write successful code?

Purpose: "The bridge from algorithms to programming can be a short one if students understand the difference between planning out a sequence and encoding that sequence into the appropriate language."  
-Excerpt from Code.org This activity will help prepare students to write code more effectively.

Learning Objective - SWBAT:

-Create visual-aid and pseudocode for algorithms.  
-Use a Key to Success coding strategy to write effective algorithms in unplugged activities.

NYS K-12 Computer Science & Digital Literacy Standards:

Algorithm and Programming –

- *4-6.CT.10 Describe the steps taken and choices made to design and develop a solution using an iterative design process*
- *4-6.CT.6 Compare two or more algorithms and discuss the advantages and disadvantages of each for a specific task.*
- *4-6.CT.4 Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.*



Materials:

1. Unplugged materials: maze, pencil/pen, drawing & lined paper
2. Block Code program

Motivation:

Teacher asks for one volunteer to stand in a specific location in the room. Students are asked to work in groups of three to provide instruction to get *the volunteer out of the room*. After a few minutes, Teacher will ask for

Get our volunteer out of the door!  
Hurry...the bathroom is calling!



- Teacher will review the purpose of the motivation: to give clear explicit instructions in order for computers to complete a task and connect that to the vocabulary word: Algorithm.

- Teacher will explain what the phrase, "Keys to Success" is and that there are various strategies that can lead one to writing successful code such as: Drawing pictures, writing pseudocode, acting out the task/scenario, first. Teacher will use the "Act-it-Out" strategy for this activity.

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## GRADUAL RELEASE OF RESPONSIBILITY:

### "I" Section

- Teacher will use the provide examples of effective algorithms vs non efficient algorithms to solve the motivational task.
- Teacher will demonstrate a form of *Live Coding* by thinking aloud to demonstrate the thinking aloud process when preparing to code:

#### ***How do we get this volunteer out of the room?***

Demonstrate Ineffective algorithm:

Ex. *"Walk straight, turn right, grab the door."*

-Teacher will explain that whether in giving direction or writing code, you want to break up the code and be very clear and concise:

- a. *"Walk straight"* in computer coding is infinite unless given a new command.
- b. *"What does straight mean?"*
- c. Teacher will ask one volunteer to walk in a zigzag line to demonstrate how explicit we have to be with wording.
- d. Then re-ask, *Do we wish for the volunteer to walk in a straight line vs a zigzag line? Or do we wish for the volunteer to walk in a specific direction - forward, backwards, or use cardinal directions etc."*
- e. *"Turn right"* is not specified to a moment/time. Teacher will ask: How can we make this an effective algorithm? Teacher will think aloud to demonstrate an effective strategy.

*"To make this an effective algorithm, I would need to specific the number of steps the person needs to make and the direction - or specify a clause 'Walk straight until you an object is in your way.'"*

Have students "Turn & Talk" to decide and explain which of the options they would choose.

### "We" Section

- Teacher will transition the responsibility- allowing students to engage in group discussions to figure out how to complete the "code" for an effective algorithm.
- Teacher asks: *Is "Turn Right" a clear and specific instruction for this algorithm? Does it need to be more specific? If so, how?*

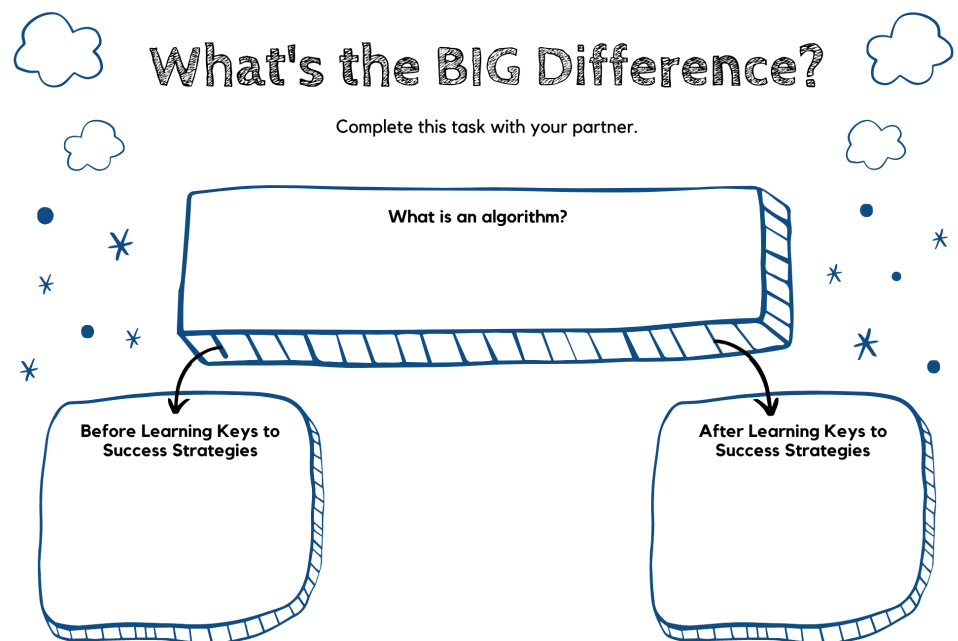
- Students will apply the “Think Pair Share” strategy to answer the questions posed and clarify the direction if needed: “*Turn Right.*”
- After a few minutes, Teacher will call on several groups to demonstrate their thinking and share their modified algorithms. Ex. *Turn Right 90 degrees or Turn Right, Walk forward until... Walk forward # steps.*

### Medial Summary:

Teacher will draw students’ attention to the learning objective to review the goal: *Use a Key to Success coding strategy to write effective algorithms.*

### “You” Section

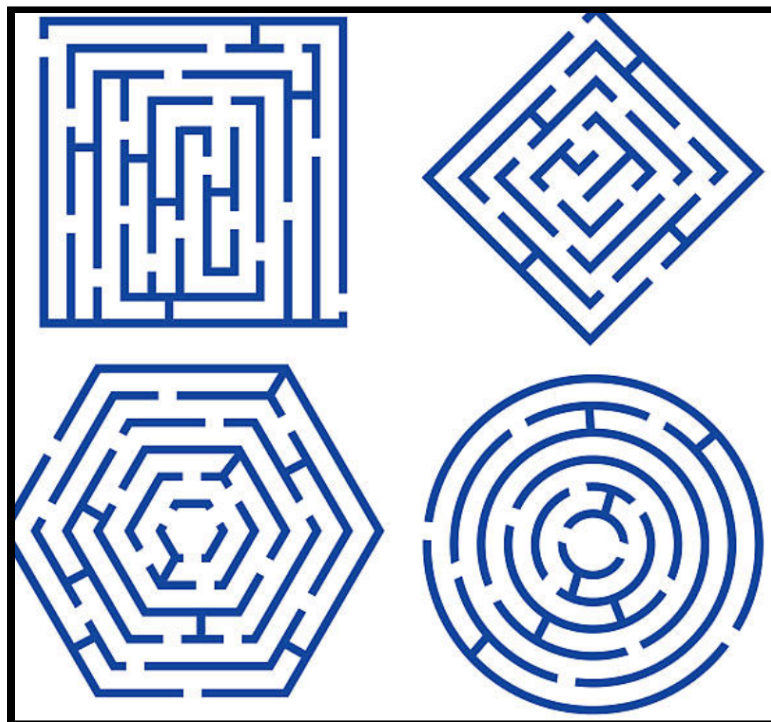
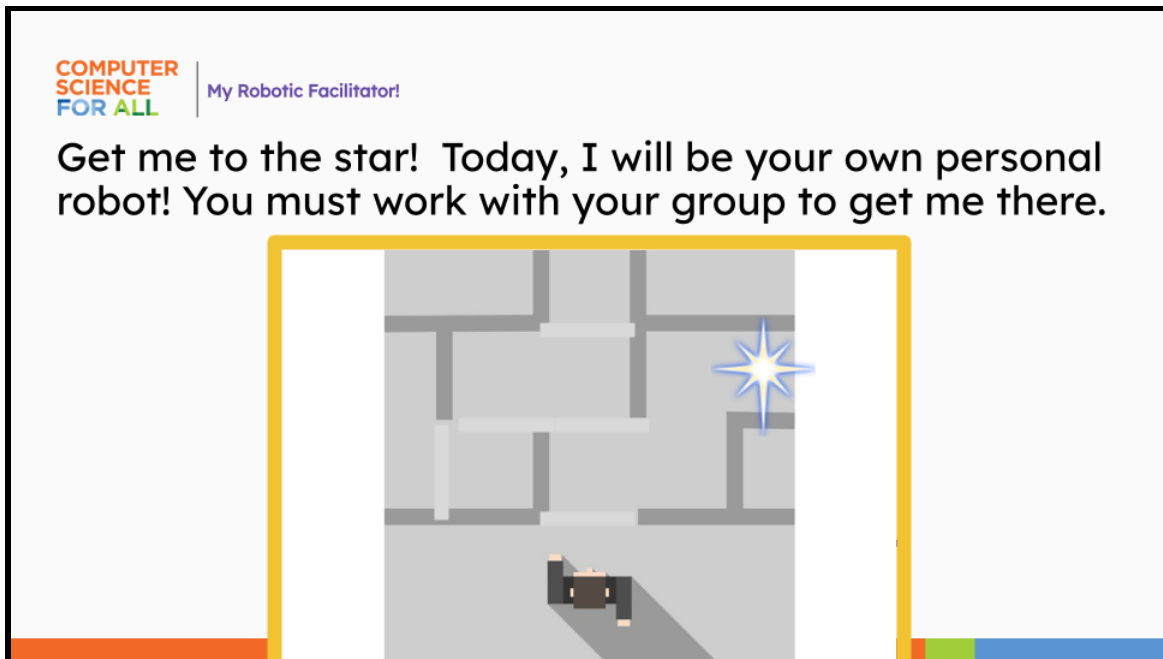
- Teacher will transition responsibility, allowing students to engage in group discussions to figure out how to complete the task of getting the volunteer out of the room. Teacher will reiterate the importance of using “Keys to Success” and using clear and concise directions when giving directions. After 10-12 minutes, Teacher will ask for group volunteers to display their algorithms/code.
- Students will independently complete a “What’s the Big Difference?” worksheet that asks them to compare and



contrast their algorithms before and after the Keys to Success strategies and directional keywords.

- Activity #2: Maze

Students will select a maze card. On the card, students will place a star in one section and a token that represents a person in another. Afterwards, students will choose to work in pairs or independently to write specific concise algorithms on getting the person from the start to the star.



Your Turn! **(Classwork)**

The output is to get me to the start.

List the set up inputs that will guide the group to get me to the star.

Step 1	
Step 2	
Step 3	
Step 4	
Step 5	
Step 6	

Homework:

Create algorithms, teaching your classmates, how to make your favorite sandwich or play/do your favorite hobby craft.

## Your Turn! (Homework)

The output is to teach us how to make your favorite sandwich.  
List the set up inputs that will guide us in making that sandwich.

Step 1	
Step 2	
Step 3	
Step 4	
Step 5	
Step 6	

### Evaluation

To assess the students' ability to write algorithms, Teacher will walk around and probe their thinking through questioning. Teacher will use conference notes to record data.

Teacher will evaluate what the students have learned through teacher observations: verbal responses, student interactions, and their independent response.

Resources:CS4ALL