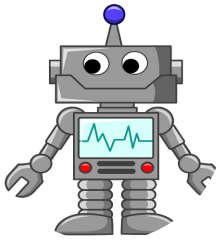

Misguided Algorithms: Amelia Bedelia Does It Again

Computer Science and Basics of Creating an Algorithm

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Grade Level	1st – Kindergarten Grade	**Time Frame**	35-minute sessions
Subject	English/Language Arts, Science	**Duration**	3-4 class periods

Essential Question

What is a computer program? Why do computer robots need programs? What do I need to know to write a program? Why is the sequence of instructions important?

Summary

Students discover what an algorithm is and the importance of writing clear directions in their algorithms by using a coordinate grid as a guideline. Students test their directions with classmates and then transfer this knowledge to writing codes for autonomous robots.

Snapshot

Engage

Engage students in a "mis-guided drawing" by having students draw a picture using simple shapes and lines. Guide students' drawing.

Explore

Read "Amelia Bedelia" by Peggy Parish and discuss whether Amelia follows the directions as written. Students discuss what problem-solving is and how Amelia used her problem-solving skills.

Explain

Students are introduced to the word *algorithm* and practice following one using a coordinate grid. Students then create an algorithm of their own and test it by having the partner follow it.

Extend

Part 1: Students create a program for a robot using a coordinate grid.

Part 2: Using an 8x8-foot grid, students play "Teacher, May I" and pretend to be robots and commanders. There are two variations to this game listed in the lesson.

Evaluate

Students use a coordinate grid with a start and end point and are given several algorithms as possible solutions. Students find the algorithm that correctly gets to the end in the fewest moves possible.

Standards

Oklahoma Academic Standards for Computer Science (Second Grade)

2.AP.C.1: With guidance, independently and collaboratively create programs to accomplish tasks using a programming language, robot device, or unplugged activity that includes sequencing and repetition.

Attachments

- Amelia Bedelia—Misguided Algorithms.pdf
- Amelia's Direction Cards—Misguided Algorithms - Spanish.docx
- Amelia's Direction Cards—Misguided Algorithms - Spanish.pdf
- Amelia's Direction Cards—Misguided Algorithms.docx
- Amelia's Direction Cards—Misguided Algorithms.pdf
- Coordinate Grid—Misguided Algorithms - Spanish.docx
- Coordinate Grid—Misguided Algorithms - Spanish.pdf
- Coordinate Grid—Misguided Algorithms.docx
- Coordinate Grid—Misguided Algorithms.pdf
- Evaluate Mazes Answer Sheet—Misguided Algorithms - Spanish.docx
- Evaluate Mazes Answer Sheet—Misguided Algorithms - Spanish.pdf
- Evaluate Mazes Answer Sheet—Misguided Algorithms.docx
- Evaluate Mazes Answer Sheet—Misguided Algorithms.pdf
- Evaluate the Algorithm Cat Maze—Misguided Algorithms - Spanish.docx
- Evaluate the Algorithm Cat Maze—Misguided Algorithms - Spanish.pdf
- Evaluate the Algorithm Cat Maze—Misguided Algorithms.docx
- Evaluate the Algorithm Cat Maze—Misguided Algorithms.pdf
- Evaluate the Algorithm Chicken Maze—Misguided Algorithms - Spanish.docx
- Evaluate the Algorithm Chicken Maze—Misguided Algorithms - Spanish.pdf
- Evaluate the Algorithm Chicken Maze—Misguided Algorithms.docx
- Evaluate the Algorithm Chicken Maze—Misguided Algorithms.pdf
- Evaluate the Algorithm Dog Maze—Misguided Algorithms - Spanish.docx
- Evaluate the Algorithm Dog Maze—Misguided Algorithms - Spanish.pdf
- Evaluate the Algorithm Dog Maze—Misguided Algorithms.docx
- Evaluate the Algorithm Dog Maze—Misguided Algorithms.pdf
- Evaluate the Algorithm Monkey Maze—Misguided Algorithms - Spanish.docx
- Evaluate the Algorithm Monkey Maze—Misguided Algorithms - Spanish.pdf
- Evaluate the Algorithm Monkey Maze—Misguided Algorithms.docx
- Evaluate the Algorithm Monkey Maze—Misguided Algorithms.pdf
- Evaluate the Algorithm Snake Maze—Misguided Algorithms - Spanish.docx
- Evaluate the Algorithm Snake Maze—Misguided Algorithms - Spanish.pdf
- Evaluate the Algorithm Snake Maze—Misguided Algorithms.docx
- Evaluate the Algorithm Snake Maze—Misguided Algorithms.pdf
- Extend Part 1 Robot Maze—Misguided Algorithms - Spanish.docx
- Extend Part 1 Robot Maze—Misguided Algorithms - Spanish.pdf
- Extend Part 1 Robot Maze—Misguided Algorithms.docx
- Extend Part 1 Robot Maze—Misguided Algorithms.pdf

Materials

- White drawing paper
- Pencils
- "Amelia Bedelia" by Peggy Parish book or linked PDF
- Blank Coordinate grids (attached)

- Coordinate grids with a path marked and algorithms to test (attached)
- Painters' tape/sidewalk chalk
- Optional: simple code-able robots
    - Bee-Bot
    - Code and Go Mouse
    - Dash and Dot

20 minutes

Engage

Engage students in a "mis-guided drawing" by having students draw a picture using simple shapes and lines.

You will need to instruct students by following these steps:

Start by telling students they must follow your directions to make their drawing look as close to yours as possible. You will want them to work independently, and not look at others' work.

1. Fold your paper in half and half again.
2. Write your name on the paper.
3. Turn your paper over and draw a circle at the top of your paper.
4. Draw a square with a triangle on your paper.
5. Draw a rectangle in the square.
6. Draw two clouds and add some grass.
7. Once the drawing is complete, have students share it with their Elbow Partner and discuss similarities and differences.
8. After a few minutes, display your "*Teacher Drawing.*"
9. Ask if anyone has a drawing that is exactly like the teacher's drawing. Why weren't the pictures identical?

You are hoping to get responses such as: *You didn't tell us exactly where to put the shapes; we drew the clouds and shapes differently; I had my paper turned a different way; and so on...*

25 minutes

Explore

Read “Amelia Bedelia” by Peggy Parish, discussing whether or not Amelia follows the directions as written or not. When you have finished the read-aloud, have students discuss with an Elbow Partner the following questions about the humor in the book.

- What makes the book funny?
- Does Amelia Bedelia think she is funny?
- Do other characters think she is funny?

After this discussion, have the class share what they think "problem-solving" means.

Next, give each group of students a card with one of the directions that Amelia messed up. Ask students to discuss how Amelia Bedelia solved her problem and what she was really supposed to do. Use the following questions to deepen the conversation:

- Do you think Amelia Bedelia gets frustrated?
- Do other characters get frustrated?
- What advice would you give Amelia Bedelia about solving her problems?

15 minutes

Explain

Start this part of the lesson by writing the word **“algorithm”** on the board and pronouncing it together. Then, ask students what they think an algorithm is. Help them define an *algorithm* as an *exact list of step-by-step instructions to complete a task*.

To give students an active and multi-step demonstration of using an algorithm, play the game "Simon Says." For example, say, "Simon Says, stand up and hop on one foot." "Simon says, stop." "Simon says, turn left and take one step forward," etc.

Teacher's Note

For this part of the lesson, you may want students to use a folder or desk office to keep their work hidden from their partner. Also, laminate the grids beforehand so they can be wiped off and reused.

Vocabulary: During this lesson students use the following vocabulary: *Forward, backward, horizontal, right, left, problem solving, algorithm, programming, robot, maze, path.*

Next, give students coordinate grid paper (attached) and a counter or marker. You will first need to model this as a whole group activity.

- Say, "Start at A:1."
- Now move forward horizontal 2 spaces.
- Turn left "stay in your space."
- Now, move 4 spaces forward.
- Turn right, stay in the space to turn.
- Move 4 spaces forward, turn left.
- Move one space forward, turn right.
- Move 2 spaces forward.

Ask, **"What space did you end up on?** Was it H5? Discuss what skills they used to follow the directions. (*Listening, following directions, understanding the terms for forward, turn, horizontal, left, and right)*

Students are now ready to independently create a set of directions for their partners to follow. They must start on the left side of the grid and end on the right side. Students may draw arrows on their grid to map their directions and then take turns giving and following directions.

After the class has had time to practice with their partners, bring the group back together to discuss what they have learned about the sequence of the steps.

10 minutes

Extend, Part 1

Show students the robot and tell them it is a type of computer and will only do what you tell it to do. So, we are going to create a program for the robot.

Give students a coordinate grid with a maze laid out. Students will use simple *forward, turn left, turn right,* and *reverse* commands to create a simple algorithm to program the robot to follow and complete the maze. After students have completed this task, have them create their own path or maze and write the algorithm/program that tells their robot how to complete the maze.

Students will follow these steps:

1. Draw your maze/path on the grid.
2. Write your algorithm.
3. Program the robot by inputting their algorithm.
4. Test it out! What worked? What didn't work?
5. Improve the algorithm and test again.

25 minutes

Extend, Part 2

Play "Teacher, May I."

Use tape to make an 8-foot by 8-foot grid on the floor, or if outside, you could use sidewalk chalk. Place tokens (candy, stickers, blocks, stuffed animals, etc.) randomly on the grid.

(Option 1) Identify one square as the start square.

- Students line up behind the start square.
- The first person in line says, "Teacher, May I take... (two steps forward, turn right, and one step forward).
- If they say, "Teacher, May I," reply, "Yes, You may."
- If students end on a token, they may collect it and go to the end of the line.
- If they do not end at a token, they remain on the grid, and the next person takes a turn.
- No two people may occupy one space.
- If a student does not say, "Teacher, May I..." the answer is "No, you may not; please go to the end of the line."
- If a student ends off the grid, they go to the end of the line.

(Option 2) Divide the class into four teams, each starting in a different corner. Choose one person to be the robot. Groups ask the teacher for permission to move their robot. The goal is to collect as many tokens as possible. Groups can collect only one token per turn.

(Option 3) Use simple robots such as "Code and Go Robot Mice," Bee-Bot Programable Floor Robot," "Dash and Dot," etc. teams take turns programming their robot to stop on squares with tokens.

15 minutes

Evaluate

Give each student a coordinate grid with a maze or path marked from the starting place to the end point.

Below the grid are three algorithms/programs for students to choose from to complete the maze. Students must find the algorithm that correctly gets their robot to the end using the fewest moves possible.

20 minutes

Differentiation for Advanced Learners

If students have access to a robot, have students complete the following challenges:

- Write a program that tells the robot to make a square or another closed shape.
- Write a program that tells the robot to create a specific pattern.
- Use Loops, repeat, backward, reverse, and pauses in their algorithm or program.

Some students may be interested in reading, “National Geographic Readers: Robots” by Melissa Stewart, which is also available on Epic: https://www.getepic.com/app/read/15147.

Resources

- Hour of code
- Kodable
- Osmo -Coding Jam
- Cover image: https://cdn.pixabay.com/photo/2013/07/13/12/04/android-159109_640.png
- Epic https://www.getepic.com/app/read/15147
- K20 Center. (n.d.). Elbow Partners. Strategies. https://learn.k20center.ou.edu/strategy/116
- Parrish, P.; Siebel, F. (1963). *Amelia Bedelia.* New York: Harper & Row.