

Unplugged coding for climate change

To communicate with some form of technology, we need to write out very specific instructions using a coding language. These instructions need to be broken down into very simple steps, easily organized in the order they are to be carried out. This is called an algorithm.

In this activity, students will take turns being a robot and they will have to execute the algorithms written by their classmates to successfully navigate a grid to complete a goal.

Objectives

1. Create an algorithm that will successfully get a robot to a goal point within a grid while avoiding the obstacles.
2. To learn about climate mitigation and climate adaptation

Materials

- Chalk, tape or rope
- Lots of space!
- Paper and pencil
- Obstacles or obstacle cards to place in a grid on the floor (or you can draw those with chalk)

Key Questions

- Is there more than one way to complete the goal?
- What was the hardest part about writing the algorithm for your robot?
- Which actions for climate change can you take? Which can be taken by your school?

What To Do

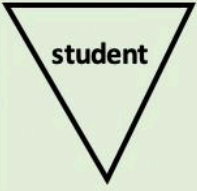
1. Print or draw the grid on paper
2. Draw or tape the same grid on the floor. Or use rope. Designate a starting square, a goal square, and add a few obstacles to the grid as well.
3. Explain the causes for climate change to your students:
“Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil and gas), which produces heat-trapping gases.”
4. Explain what kind of actions we can take to avoid climate change? Explain there are 2 categories:

A/ **Mitigation** of climate change means reducing the impact of climate change on our planet: use renewable energy (solar panels, wind mills), eco-friendly transportation (walking or using bike rather than car), avoid eating red meat,

B/ **Adaptation** to climate change means adjusting to the effects of change on our planet: forest protection and planting trees, land use changes, flood barriers, community engagement, etc.

5. Put students in groups of 2 or 3. Have your students write down their algorithms to navigate their “robot” partner through the grid on paper. The students are not comparing their solutions.
6. Have the students testing out each other’s codes while walking through the grid. Invite them to reflect on the process. Did their robot interpret their code in an unexpected way?
7. There are different ways to navigate through the grid. Have the students compare their algorithms.
8. Coding has to be efficient. Which algorithm takes the least amount of steps? Were there any bugs in their code? How did they go about debugging them?
9. Having all the algorithms ready, the students have to try to simplify the algorithm using these rules:
 - In case they have to repeat a certain step, they have to write “R2 forward” or “R3 turn right” in which 2, 3, 4 expresses the amount of repeats.
10. Students from all groups compare their group’s best algorithms. Are there any differences?

Grid to be printed and drawn on the playground:

	 student				
		Eating red meat			
Eating red meat			Solar panels and wind mills	Flood protection	
	Reforestation				
			Eco-friendly transportation		
		exit			

Exercise 1: getting started

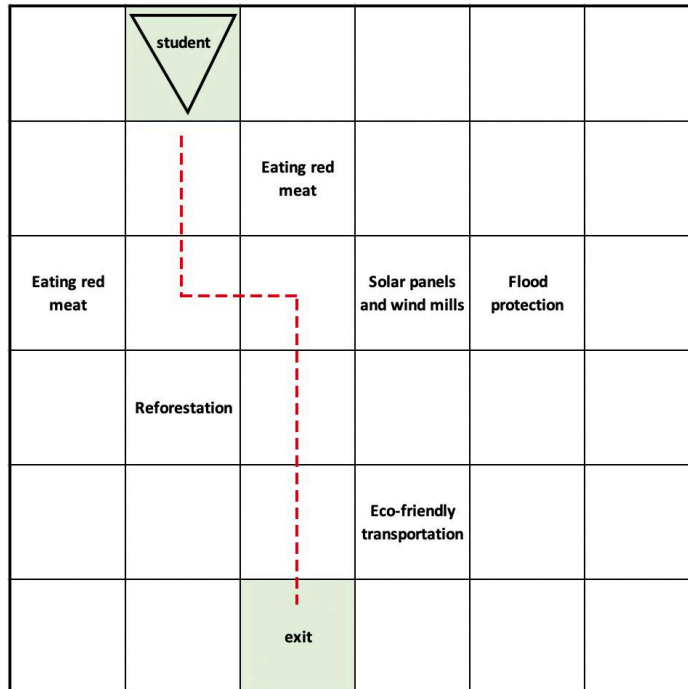
try to reach the exit without touching any of the obstacles. Congratulations, you are a climate denier 😞

Potential solution:

- Forward
- Forward
- Turn left
- Forward
- Turn right
- Forward
- Forward
- Forward

Improved algorithm:

- R2 Forward
- Turn Left
- Forward
- Turn Right
- R3 Forward



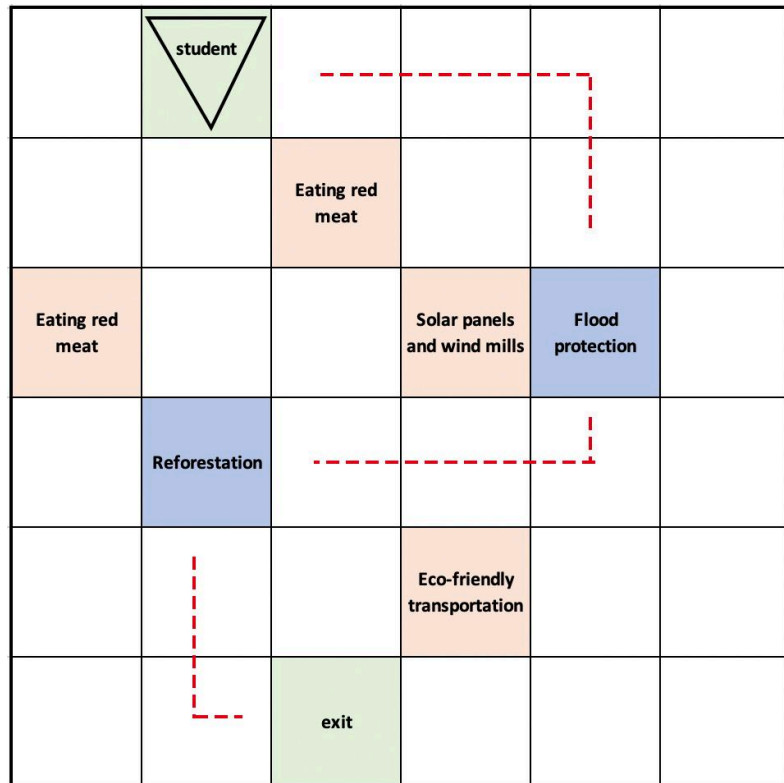
Exercise 2: climate adaptation

Make sure to step on every solution which is part of climate adaptation.

Congratulations, you are adapting to climate change. Now, let's make to avoid climate changing by mitigating.

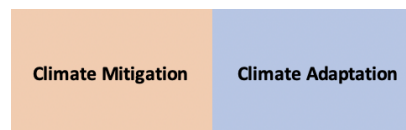
Potential solution:

- Turn left
- Forward
- Forward
- Forward
- Turn right
- Forward
- Forward
- Forward
- Turn right
- Forward
- Forward
- Forward
- Turn left
- Forward
- Forward
- Turn left
- Forward



Improved algorithm:

- Turn left
- R3 Forward
- Turn right
- R3 Forward
- Turn right
- R3 Forward
- Turn left
- R2 Forward
- Turn left
- Forward

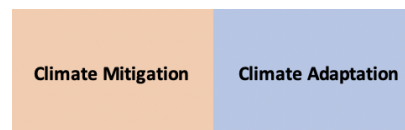
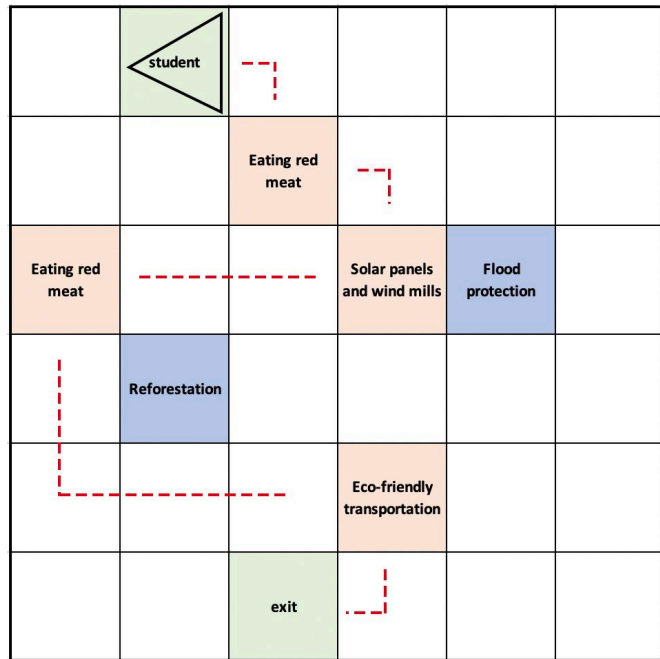


Exercise 3: climate mitigation

Make sure to step on every solution which is part of climate mitigation.
 Congratulations, you taking steps to avoid climate change! You rock!

Potential solution: Improved algorithm:

- | | |
|--------------|----------------|
| - Turn left | - R2 Turn left |
| - Turn left | - Forward |
| - Forward | - Turn right |
| - Turn right | - Forward |
| - Forward | - Turn left |
| - Turn left | - Forward |
| - Forward | - Turn right |
| - Turn right | - Forward |
| - Forward | - Turn right |
| - Turn right | - R3 Forward |
| - Forward | - Turn left |
| - Forward | - R2 Forward |
| - Forward | - Turn left |
| - Turn left | - R3 Forward |
| - Forward | - Turn right |
| - Forward | - Forward |
| - Turn left | - Turn right |
| - Forward | - Forward |
| - Forward | |
| - Forward | |
| - Turn right | |
| - Forward | |
| - Turn right | |
| - Forward | |



Want to know actions you can take? Please install the [EarthProject](https://www.earthproject.org) app on your iPhone or Android phone. It's free. www.earthproject.org

Resources:

Climate mitigation vs adaptation:

<https://www.climateimpactstracker.com/climate-change-adaptation-vs-mitigation-whats-the-difference/>