

Robot Programming I: Think Like a Robot

Grade Levels

This activity is intended for students grades 3rd-6th.

Objectives and Topics

This purpose of this activity is to introduce students to robotics, programming, and how robots (computers) interpret commands. Students learn the necessity of the precision of their statements (Mathematical Practice #6) and must cooperate in tandem to complete a task.

Materials and Resources

- Note cards with robot commands ([see below](#))
- [NXT simple wheeled vehicle](#) (optional)
- Computers with NXT Mindstorms Programming software installed (optional)

Introduction and Outline

To lead this activity, please read through and have a thorough understanding of the forthcoming activities to motivate discussion. Here's a brief introduction about robots:

Robots can perform amazing tasks. Robots can be programmed to carry out a series of instructions, which are carried out as a machine. They can also use their sensors to gather information from the environment, and intelligently decide a course of action: these are called autonomous robots since they are acting on their own. To program these robots, you have to learn to think like a robot.

Robots have to be given instructions in a very specific way. They cannot understand complex instructions, so we must break a job down into simple parts that a robot can perform. To do this, we will practice giving instructions to a human robot.

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Think Like a Robot

Select two students: a robot body and a robot brain. The body will carry out instructions given by the brain. The possible instructions are given on the note cards.

Give a task to the robot team. This should be something simple, such as move from one location in the classroom to another. Give the brain a minute or two to think, then the brain will issue commands to the body in order to complete the task. Have the brain read the note cards to the class, so that everyone knows what sort of commands the brain is able to issue. The brain should be the main decision-maker, but can take hints from the class as a whole.

Upon successful completion, briefly discuss the outcome, and pick a new pair to complete a new task. This can be repeated as many times as time/interest permits. The tasks can increase in difficulty.

Discussion

Lead a class discussion on the activity. What went right/wrong? Other interesting points?

By completing this activity, students are beginning to think like a robot. To program, we must always translate a task into a language a robot can understand. In the future when the students will program robots to complete a task, they will be using these exact skills.

Simple NXT Programs

This section is optional purely based on the availability of resources.

Once the student activity is finished, the students may then be given simple tasks for the NXT simple wheeled vehicle to execute. This can be the same or similar tasks to those the students were previously handed as the robot body and brain. If the students are new to the NXT programming software, this would also be an appropriate time to give them a tutorial on using the software.

For Instructions on how to build NXT vehicles, check out the Lego NXT Constructopedia:

<http://www.education.rec.hawaii.edu/content/lego/building/media/Constructopedia%20.pdf>

Cards below

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<p>Turn _____ for _____ degrees</p>	<p>Go forward/ backward for _____ steps</p>
<p>Turn _____ for _____ degrees</p>	<p>Go forward/ backward for _____ steps</p>
<p>Turn _____ for _____ degrees</p>	<p>Go forward/ backward for _____ steps</p>
<p>Wait for _____ seconds</p>	<p>Keep going until _____ _____</p>
<p>Repeat the next _____ cards _____ times</p>	<p>Repeat the next _____ cards _____ times</p>