Moon Base

WeDo 2.0 Core Set

LTG- Grades 3-5

Design a solution for a robot that would assemble a base on the moon.

Teacher Support for Moon Base Unit

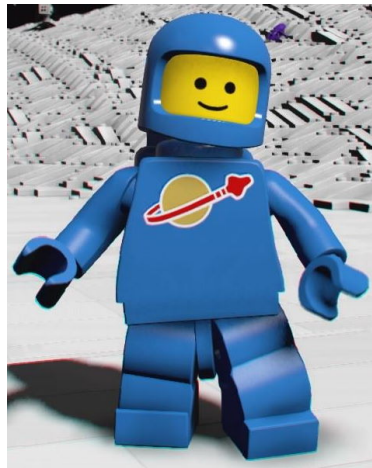
Key Objectives:

SWBAT:

- Explore why and how we could set up a base on the moon
- Create and program a robot to move on the surface of the moon
- Test your code to assemble the moon base at a specific location
- Share your code and strategies to succeed in this mission

Resources for Success:

- LEGO® Education WeDo 2.0 Core Set
- WeDo 2.0 Software or Programming App
- Intro to WeDo 2.0 Computational Thinking
- Curriculum Links
- Assessment



Teacher Preparation

(30 Minutes)

- Read the project and the relevant Teacher Assistant material.

- Define how you would like to introduce this project. You can use the video provided with the project or use your own material.

- Determine the end result of this project. For example, define the parameters of your students' presentations and the specific elements that they should include in their documents.

Explore Phase

(45 minutes)

Video Link

- The moon is the natural satellite of the earth and the closest place in space that we can go to. Establishing a base on the moon, on Mars or on another planet is a quest for humanity. As humans have already been to the moon, some challenges may have known solutions. Other challenges would have to be solved before we can reach this goal. For example, our ability to move objects around in space is definitely one of these challenges.
- Rockets are used to send both people and materials into space. To ease astronauts' tasks in space, robots of various functions have been developed. For example, robots can be programmed to move on their own or to grab objects. Designing robots for moon usage starts on Earth, testing behaviors and adjusting designs before sending the robots into space.

- **Questions for discussion**

1. How can things be sent to the moon?

Things can be sent to the moon or to other places using rockets.

2. How could things land on the moon?

Many methods, such as parachutes, balloons and rockets have been invented in order to safely land packages. The moon's atmosphere is very thin, so parachutes are not a good solution. Rockets have traditionally been used.

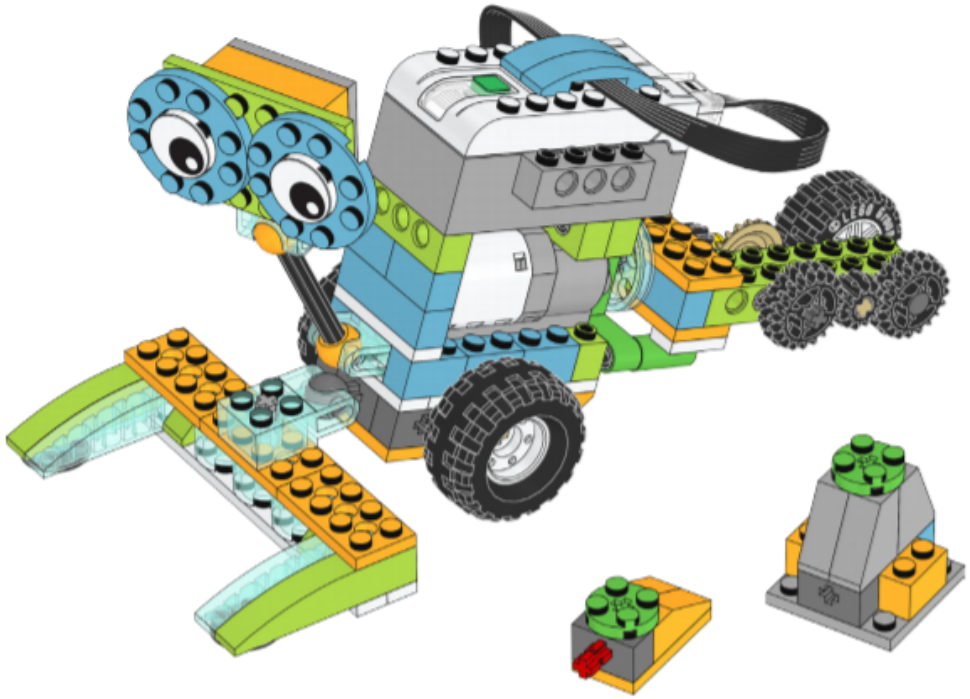
3. What is a good way to create and build a base on the moon?

Robots are often used for tasks that are too dangerous for humans to execute.

Create and Test Phase (60 minutes)

- **Build and program**
  The students will build a robot that can drive and turn, and then they will program it to move on a surface.
- **Team Building option**
  If you have extra devices, you can reduce the building time for this model by having each student build a part of their team's robot
- **Plan and try a solution:**
  Define the path that your robot should follow in order to reach the first moon base module
- **Try and modify your solution:**
  Plan the path that your robot should take in order to reach the first and second moon base modules

- Building Instructions



Share Phase

(45 minutes)

- The students should take some time to compile the information that they have collected throughout this project.
- Depending on which skill(s) you would like to focus on, you might ask each team or student for one or more of the following:
  - A sketch of their strategy (Decomposition)
  - A video of their robot collecting the moon modules (Evaluation)
  - A video of them explaining their solution (Abstraction)
  - A screen capture of their programming string (Algorithmic Thinking)
  - An explanation of their program (Algorithmic Thinking)
  - Pictures and explanations of some of the tests that they carried out during the project (Evaluation)
- Organize a session in which each team can present a demonstration of their solution(s).

Differentiation

This project can be made more challenging by adding one or more of the following requirements:
- Use more than two modules
- The trajectory must be completed within one minute
- The robot can only turn 90 degrees right during the trajectory

The following math-related problems could be formulated:
- Two of the modules have landed perfectly on the moon. The other two modules have landed in a line that is parallel to the previous two. Demonstrate where the modules could have landed and program the robot to pick up the modules.

Two modules have landed at a distance of 20 cm of each other. The other two modules have landed so that the for modules in total create a rectangle with a perimeter that is smaller than 60cm. Demonstrate where these modules could have landed and program the robot to pick them up.

The four modules need to be picked up by two different robots, but they have to arrive at the base at the same time.

Have the students build their own modules and create their own mission about building a base on the moon.