

Grade 3: Rocks and Minerals

Lesson 4: Retrieving the Core

Lesson Objective:

- To retrieve a sample of the magnetic core of the Earth.

Learning Objectives:

- To build a retrieving device for the Magic School Bus to grab a sample of the core of the Earth.
- To program in Robolab: Programmer, Pilot 4 to travel to the Core, retrieve the sample and travel back to the surface of the Earth.

Materials:

- Engineer's design sheet
- Pre-built sturdy cars (with two motors)
- Robolab software
- RCX
- Additional motors
- Lego building pieces
- Pre-built model of the Earth's core with magnets (the rock samples) dispersed around
- The Magic School Bus Inside the Earth by Joanna Cole
- Lego Reflection Response Sheet
- Engineer's Design Sheet

Vocabulary:

- Invention
- Earth's core
- Magnetic
- Magnet

Procedure:

- The lesson begins with a review about the inside of the Earth. Questions you might ask could include:
 - What are the layers inside the earth called? (crust, mantle, outer core, inner core)
 - What is the crust made of? Who can name the 3 types of rocks found there?
 - Who can tell me about the mantle? The core?
- Discuss the core of the Earth, explaining the difference between the outer core and the inner core. Review what the children know about magnets.
- Divide the class into teams of two students. Explain that they will be using the Magic School bus (the RCX car) from the previous lesson for this challenge.
- Introduce the challenge:

Your design challenge is to design an invention to build on your Magic School Bus to collect a magnetic sample from the core of the Earth.

- Write this challenge on the easel. Using the model of the core, explain that their Magic School bus must travel to the core with the passengers from the previous lesson. Once in the inner core, the collecting invention must collect a sample from the core. Then the Magic School bus must travel back to the surface of the Earth to the lab with the sample.
- Brainstorm with the group some ideas of what might work to retrieve the rock sample. Write these ideas on the easel for future reference. Explain that another motor may be need for this revise. Have additional motors available as well as an assortment of Lego building blocks.

- Distribute the "Engineer's Design Sheet" to each child. Model how the children should complete the sheet. Ask the children to have their design sheet checked with a teacher before starting to build.
- After the groups have completed the design sheet, and have them checked with a teacher, allow them to work on building their invention. Projects should be stored until the next class period when finished or when time is up. Engineer's Design Sheets should be stored in journals until next class period.

The next class period:

- Bring up Robolab software on the computer & mirror it on a TV monitor so all the children can see. Click on the "Programmer" icon. Tell the children that they will be using "Pilot 4" for this activity because it has multiple steps available. Click on Pilot 4. Show the children how to add additional steps to their program. Explain when they are finished building their invention, they will be given an "Engineer's Programming Sheet" to complete before they program their RCX.
- Pass out the "Engineer's Programming Sheet" and the "Programmer's Icon Sheet" to each child. On an overhead, demonstrate how to cut and paste a program on the "Engineer's Programming Sheet". Tell the children that after they have cut and pasted a program, they will get on a computer & select their choices on the Pilot 4 program. They will then download the program on to their RCX and complete the challenge.
- After answering any questions, let the groups work on the challenge at their own speed. If groups finish before the class is over, the children can work on the extensions listed below.
- When class is over, the children should return the cars for further lessons and store their data sheets in their journals for discussion during the next class period.

- Begin the next class period with the "Lego Reflection Response Sheet". After the children have completed this, hold a discussion about their experiences.

Extensions:

- After retrieving the sample of the core, turn your Magic School Bus around & go back through the mantle and the crust to get back to the surface.

Assessment:

- Student journal (design sheet)
- Completion of the challenge with teacher interview and observations

Resources:

- CEEO Curriculum Website - <http://www.ceeo.tufts.edu/robojabatceeo/>
- Magic School Bus: Inside the Earth by Joanna Cole