

Grade 2

Topics:

Magnet Mania and Maglev Design
Soil
Trees

Unit 1

Magnet Mania and Maglev Design Challenge

Magnets are the feature of many toys – but more than that, magnets are a useful tool and magnetism is a form of energy. In the first part of this unit, second graders will learn about the science of magnetism through experimentation, observation, and data recording. In the second part of the unit, students will use this knowledge of magnetism to create a working Maglev Train model.

Part 1: Magnet Mania

Key activities include:

- Experiment to see which part of the magnet will hold the most paperclips. Compare and contrast results to form a theory of why this happens.
- Examine five toys that use magnets, and identify how they work.

Main Concepts: Through experimentation, recording data and discussion, students will understand that:

- Magnets attract materials made of iron (nickel and cobalt).
- Like poles repel, opposite poles attract.
- Magnets are found naturally within the Earth and can also be manmade.
- Magnetism is a form of energy.

Goals: By the end of the unit, students will be able to:

- Experiment with magnets and record observations in words and sketches.
- Identify the properties of magnets (like poles repel, unlike poles attract, strongest forces at the poles, magnetic field around

- magnets).
- Students will be able to use observation as evidence to explain the properties of magnets.

Part 2

Maglev Design Challenge

“Maglev” is short for *magnetic levitation*, which means that these trains will float over a guideway using the basic principles of magnets to replace the old steel wheel and track trains”. (From Howstuffworks.com). In the Maglev Design Challenge, students will work in groups to build models of Maglev trains.

Key activity: Using their knowledge of magnets, students will work in groups to plan and build a Maglev train.

Main Concepts: Students will:

- Understand that knowledge of magnetic fields and forces can be useful in designing a maglev system.
- Understand that technology is anything that is created to meet a need or solve a problem.
- Learn that engineers design and use the engineering design process.

Goals: By the end of the unit, students will be able to:

- Work collaboratively in a group to solve a design challenge.
- Implement each step of the design process.
- Use knowledge about magnets to create a maglev train.
- Suggest improvements to maglev transportation system.

Unit 2

Soil

From digging in the backyard to turning cartwheels in the park, students have years of experience with soil, but limited knowledge. In this unit, second graders explore why soil is important, how it is created and look at the value of healthy soil to the ecosystem.

Key activities include:

- Learning to use the “smudge test”, smearing soil on paper. Using a color chart, compare Needham’s soil to those found around the world. Determine what soil is common to New England.
- Comparing soil temperature under a tree with that in the sun.

Main Concepts: Students will learn that:

- Geologists are scientists that study soil.
- Soil is a mixture of organic matter, inorganic matter air and water.
- Dirt contains only inorganic matter.
- Soil is necessary for life; it can be healthy or sick.
- Soil has layers.
- Burrowing animals contribute to soil health.

Goals: By the end of the unit, students will:

- Understand that soil is on the Earth’s surface. It forms slowly and is important to plants and animals.
- Be aware of decomposition and be able to explain the difference between organic and inorganic matter.
- Participate in explorations and investigations about soil classification, soil filters and composting.
- Collect record and analyze data from investigations and report on it by speaking and writing.

Unit 3

Tree Study

Trees grow and change through the seasons and through their life cycle. In these mini-units, students head outdoors to observe the trees around their school. By recording and looking at information over the year, they begin to form ideas about the importance of trees to animals, humans and the environment.

Key activities include:

- Adopt a tree and observe it change and grow over the school year. Notice how it provides a habitat, how it creates seeds,

buds and handles the seasons.

- Explore how the needs of humans are linked to trees by making paper or going maple sugaring.

Main Concepts: Through observation, students will discover that:

- Trees grow and change. Trees have life cycles.
- Trees are plants; they create their own food using sunlight, water and nutrients from the soil (photosynthesis).
- There are many types of trees, trees provide habitats for many living creatures and are part of the greater ecosystem.
- Humans need trees and use them for a variety of important products. Human have an impact on forest health.

Goals: By the end of the unit, students will be able to:

- Explain that there are many types of trees and trees begin as seeds, grow, change and produce new seeds.
- Label the parts of trees and explain the function of each part.
- Understand that trees are part of a larger ecosystem.
- Observe trees using magnification tools and record using words and sketches.