PISCATAWAY
TOWNSHIP SCHOOLS

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LEAP STEAM

Content Area:	LEAP
Grade Span:	Grade 2
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COURSE OVERVIEW

Description

Second grade LEAP STEAM students will explore various STEAM (Science, Technology, Engineering, Art, Math) topics through individual, partner, small group, and whole class investigations, including research and presentation. Activities can be modified to be conducted in school with varying degrees of contact/collaboration or engaged in via remote learning. The topics explored are not covered in the second grade curriculum and are typically a year or more advanced to provide rigor and challenge for these students, and to foster intellectual curiosity.

GOALS

To guide students to the understanding that scientists must be open minded and willing to incorporate new knowledge. To encourage students to conduct independent research and keep notes, just as actual scientists do. To provide challenging tasks that are more rigorous and challenging than the general classroom tasks, and to foster intellectual curiosity.

Scope and Sequence

Unit	Topic	Length
1	Solar System	Full Marking Period
2	Simple Machine	½ Marking Period
3	Snap Circuits	½ Marking Period

Resources

Suggested Resources:
ReadWords, RazKids, Truflix
Robots – Botley, Snap Circuits, Rovers

UNIT 1: Solar System

Summary and Rationale

Grade 2 LEAP STEAM students will explore the Solar System as they travel through space through virtually visiting the planets. The topic of the solar system is an area of wonder and interest for students in the elementary grades, however the components explored in this unit are advanced for a typical grade 2 student, making them ideal for an enrichment program. The goals of this unit directly relate to multiple areas of the Standards, not only in Science but in Literacy, Math, Engineering, and Art as well. This unit will be conducted over one Marking Period, with the students meeting/working twice per week. The engaging lessons and element of student choice incorporated in the unit will foster student interest in this topic. Lessons are full of questions that will keep students thinking, and hands on activities that will expand their inquiry. The various types of lessons will meet the different learning styles of the group. Lessons use technology and include visual or hands on materials to meet the needs of diverse learners. Lessons incorporate websites, books, and videos.

Recommended Pacing

Grade 2 LEAP STEAM students will complete 2 lessons per week of approximately 50 – 60 minutes.

State Standards

- ESS1.A: The Universe and its Stars
  The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)
- ESS1.B: Earth and the Solar System
  The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)
- Patterns
  Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)
- Scale, Proportion, and Quantity
  Natural objects exist from the very small to the immensely large. (5-ESS1-1)
- Analyzing and Interpreting Data
  Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
- Engaging in Argument from Evidence
  Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).
  Support an argument with evidence, data, or a model. (5-ESS1-1)

Instructional Focus

Unit Enduring Understandings

- Earth is part of the Solar System.
- Planets can be grouped by attributes.

- While some planets can be discussed as part of a pair or group, each planet is unique.
- Scientists continue to study the Solar System.

Unit Essential Questions

- What is the Solar System?
- What is Earth's part in the Solar System?
- How are planets alike and different?
- Why do scientists continue to study the Solar System?
- Where and how can I find answers to my questions about the Solar System?

Objectives

Students will know:

- The planets that make up our Solar System, important data and trivia related to the planets, the difference between Inner and Outer Planets.
- Scientists continue to study the Solar System.
- How to conduct research to find answers to questions they have about the Solar System.

Students will be able to:

- Demonstrate gained knowledge regarding the planets and the solar system.
- Discuss the Solar System and inform others about aspects of the Solar System.
- Present their research on the planets in our Solar System.

Resources

Various websites, videos, books,
computers, etc.

UNIT 2: Simple Machines

Summary and Rationale

Grade 2 LEAP STEAM students will explore and learn about simple machines as they explore objects that are a part of their everyday life. While students in the elementary grades have experience with simple machines, they may not be aware of them or how the work. The components explored in this unit are advanced for a typical grade 2 student, making them ideal for an enrichment program. The goals of this unit directly relate to multiple areas of the Standards, not only in Science but in Literacy, Math, Engineering, and Art as well. This unit will be conducted over a half Marking Period, with the students meeting/working twice per week. The engaging lessons and element of student choice incorporated in the unit will foster student interested in this topic. Lessons are full of questions that will keep students thinking, and hands on activities that will expand their inquiry. The various types of lessons will meet the different learning styles of the group. Lessons use technology and include visual or hands on materials to meet the needs of diverse learners. Lessons incorporate Snap Circuits kits, websites, books, and videos.

Recommended Pacing

Grade 2 LEAP STEAM students will complete 2 lessons per week of approximately 50-60 minutes.

State Standards

2020 New Jersey Student Learning Standards – Computer Science and Design Thinking

- 8.2.2.ITH.3: Identify how technology impacts or improves life.
- 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks.
- 8.2.2.ED.1: Communicate the function of a product or device.
- 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.

Instructional Focus

Unit Enduring Understandings

- Throughout history humans have developed several devices to make work easier. The most notable of these are known as the "six simple machines": the wheel and axle, the lever, the inclined plane, the pulley, the screw, and the wedge
- We use simple machines for:
- transferring a force from one place to another,
- changing the direction of a force,
- increasing the magnitude of a force, or
- increasing the distance or speed of a force.

Unit Essential Questions

- What is a simple machine? What is a complex machine?
- Why do we want to use machines? How do we use machines?
- What is the difference between a simple and complex machine?

Objectives

Students will know:

- What a simple machine is, and how two or more simple machines used together create a complex machine.
- Humans create and use machines to do work and to make work easier for us to do.

Students will be able to:

- Identify 6 simple machines: wheel and axle, lever, inclined plane, pulley, screw, and wedge.
- Identify/build/work with/ these 6 simple machines
- Build a complex machine using Gadgets & Gizmo kits

Various websites, Gadgets and Gizmo
kits, videos, books, centers (if in person)
and computers, etc.

UNIT 3: Snap Circuits

Summary and Rationale

Grade 2 LEAP STEAM students will learn about snap circuits as they explore how to make things work. Students will become engineers as they determine the steps necessary to build a vehicle and use it to perform various tasks. The components explored in this unit are advanced for a typical grade 2 student, making them ideal for an enrichment program. The goals of this unit directly relate to multiple areas of the Standards, not only in Science but in Literacy, Math, Engineering, and Art as well. This unit will be conducted over a half Marking Period, with the students meeting/working twice per week. The engaging lessons and element of student choice incorporated in the unit will foster student interested in this topic. Lessons are full of questions that will keep students thinking, and hands on activities that will expand their inquiry. The various types of lessons will meet the different learning styles of the group. Lessons use technology and include visual or hands on materials to meet the needs of diverse learners. Lessons incorporate websites, books, and videos.

Recommended Pacing

Grade 2 LEAP STEAM students will complete 2 lessons per week of approximately 50-60 minutes.

State Standards

2020 New Jersey Student Learning Standards – Computer Science and Design Thinking

- 8.2.2.ED.1: Communicate the function of a product or device.
- 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
- 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.
- 8.2.2.ED.4: Identify constraints and their role in the engineering design process.
- 8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem.
- 8.2.8.ED.2: Identify the steps in the design process that could be used to solve a problem.

Instructional Focus

Unit Enduring Understandings

- Engineers follow the Engineering Design Process.
- Designs/products perform a function.
- When a device stops working we can troubleshoot to try out ways to fix the problem.
- Electrical circuits play a role in designing devices

Unit Essential Questions

- What is a circuit?
- How do electrical circuits work?
- How can a device be built to conduct a task?

Students will know:

- Engineers use the Engineering Design Process to design products
- The difference between and open and closed circuit
- How to follow directions to assemble real circuits to create a device
- Snap Circuits can be used to build a device which can complete a task

- When a device stops working, we can brainstorm and troubleshoot to find a way to fix it

Students will be able to:

- Work with Snap Circuits Electronic Discovery Kits appropriately, which includes following written and illustrated step by step directions to assemble real circuit components to create working electronic circuits and devices.
- Explain the difference between an open and closed circuit.
- Conduct an experiment using Snap Circuits
- Explain what their device is designed to
- Attempt to solve the problem when a device is not working as anticipated

Resources

Various Snap Circuits kits, websites,
videos, books, computers, etc.