Simple Machines

v2.1

Simple Machines | Unit Overview

Unit Overview:

In this unit, students will develop a conceptual understanding of how simple machines work and how they can be used to improve our lives.

Recommended Grade Level:
6 - 8

Kid Spark STEM Lab:
Engineering Pathways OR
Young Engineers

Alignment to STEM Standards:

The table below highlights how this unit is aligned to the Next Generation Science Standards (NGSS) and the International Society for Technology in Education Standards (ISTE).

- NGSS Disciplinary Core Ideas (DCI) are standards related to content knowledge.
- NGSS Science and Engineering Practices (SEP) and Crosscutting Concepts (CCC) provide a foundation for all scientific and engineering disciplines and are particularly important to develop in young students.
- ISTE standards are designed to prepare students to thrive in a constantly evolving technological landscape. Click here to view ISTE standards.

Lessons & Assessment	NGSS DCI	NGSS SEP	NGSS CCC	ISTE
Lesson 1: Inclined Plane (120 Min.) In this lesson, students will assemble an inclined plane and learn how it's used to multiply force. Then, students will design and engineer a custom inclined plane to solve a challenge.	Engineering design	Developing & using models	Cause & effect; mechanism & explanation	Innovative designer, Creative communicator
Lesson 2: Wedge (120 Min.) In this lesson, students will assemble a wedge and learn how to calculate its mechanical advantage. Then, students will develop a custom design that includes a wedge.	Engineering design	Planning & carrying out investigations	Scale, proportion, & quantity	Innovative designer, Creative communicator
Lesson 3: Lever (120 Min.) In this lesson, students will assemble three different types of levers and learn how to calculate the mechanical advantage of each. Then, students will work as a team to design and engineer a custom catapult that includes a lever.	Engineering design	Constructing explanations & designing solutions	Patterns	Innovative designer, Creative communicator
Lesson 4: Wheel & Axle (120 Min.) In this lesson, students will assemble a wheel and axle and learn how it is used to increase speed or create mechanical advantage. Then, students will work as a team to create a design that includes a wheel and axle.	Engineering design	Obtaining, evaluating, & communicating information	Scale, proportion, & quantity	Innovative designer, Creative communicator
Lesson 5: Screw (120 Min.) In this lesson, students will assemble a screw and learn how to calculate its mechanical advantage. Then, students will work as a team to design and engineer a custom design that includes a screw.	Engineering design	Using mathematics	Cause & effect; mechanism & explanation	Innovative designer, Creative communicator
Lesson 6: Pulley (120 Min.) In this lesson, students will explore how fixed and movable pulleys can be used to make work easier. Then, students will design and engineer a custom pulley system to solve a challenge.	Engineering design	Asking questions & defining problems	Systems & system models	Innovative designer, Creative communicator
Unit Assessment: Simple Machines In this assessment, students will answer a series of questions to demonstrate an understanding of the core ideas and concepts that were covered throughout this unit.				

Target Vocabulary

The following key terms will be used throughout this unit. It may be helpful to explain these terms as they show up in lessons and challenges.

Axle	Fulcrum	Pi	Screw thread
Circumference	Inclined plane	Pulley	Separate
Diameter	Lever	Radius	Simple machine
Effort	Leverage	Rise	Wedge
Force	Load	Screw	Wheel
Friction	Mechanical advantage	Screw pitch	Work

Teaching Lessons Over Multiple Class Periods

Each lesson in this unit follows Kid Spark's convergent to divergent lesson format. Lessons can easily be taught over the course of two class periods.

Class Period 1 - Convergent Learning Activity

Students building the same models, learning the same content.

Class Period 2 - Divergent Learning Activity

Students applying their knowledge through open-ended design challenges.

Prerequisite Kid Spark Units

We highly recommend students complete the following Kid Spark units prior to starting this unit.

Elementary Program Units

Applied Mathematics

Students should demonstrate an understanding of metric measurement, dimensions, ratios, and proportions.

Middle School Program Units

Kid Spark Basics

Students should demonstrate a basic understanding of how to use Kid Spark engineering materials, as well as the Kid Spark Design & Engineering Process.