START to STEM

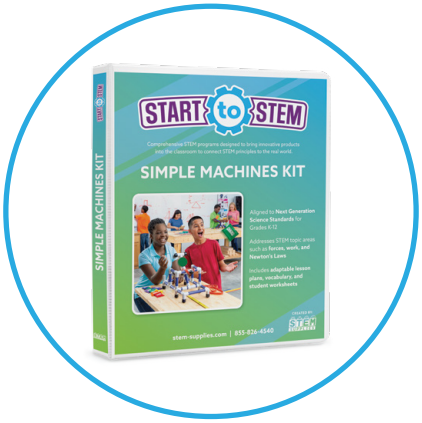
A turn-key solution to STEM!

What is Start to STEM?

Start to STEM is a comprehensive STEM program designed to bring innovative products into the classroom to connect STEM principles to the real world. You have the option to customize your program to create the best solution for your school. We offer:

Engaging STEM Products

- Equipment for a class size of 24
- Centralized around a core STEM topic area
- Reusable for years to come



Day-by-Day Lesson Plans

- Aligned to national education standards
- Scalable across different grade levels
- Includes lessons, vocabulary, equipment instructions, student worksheets, and more

Virtual Professional Development

- Live virtual training with a STEM expert
- Expanded overview of equipment and activities
- Opportunity to learn best practices in using the equipment and teaching real-world applicable STEM lessons

Ready to start your STEM journey?

Whether you're a STEM veteran or new to STEM teaching, we're here to help. The Start to STEM program was designed as a turn-key solution that focuses on real-world applications of STEM fields through hands-on and inquiry-based methods. We're here to provide you the best teaching and learning experience for classrooms, makerspaces, and everything in-between.

Contact Us Today!

stem-supplies.com/start-to-stem | orders@stem-supplies.com | (855) 826-4540

EARTH & SPACE SCIENCE

START to STEM
Comprehensive Curriculum Packages

Planets, moons, and earthquakes - oh my! The Start to STEM Earth and Space Science Kits include the materials and coursework for a deep exploration in everything related to space. By the end of two weeks, students will have a wealth of knowledge about the solar system, inner workings of the Earth, natural disasters, Earth's atmosphere, and our ocean. Students will explore these topics through hands-on experiments, engineering design challenges, physical activity, and even some edible lessons!

The Start to STEM Earth and Space Science Complete Kit includes hands-on equipment for 24 students, a comprehensive curriculum manual aligned to the Next Generation Science Standards, and a three-hour virtual professional development training. You also have the option to purchase the equipment or the manual alone, as well as the equipment and the manual without the training.

Top Subject Areas Covered:

Solar System

Earth Layers

Natural Disasters

Ocean

Lesson Objectives:

Daily Instruction Topics	Example Learning Objective
Exploring the Solar System	Understand that objects in our solar system are spaced out over vast distances.
Exploring the Moon	Differentiate between the different phases in the lunar cycle.
Into the Earth	Learn about the composition, thickness, temperature, and state of matter of each Earth layer.
Earthquakes	Create a seismogram and identify phenomena within an earthquake's wave pattern.
Volcanic Eruptions	Create a chemical reaction that models a volcanic eruption.
The Atmosphere	Understand that air is made up of matter and therefore has weight.
Earth's Oceans	Explore the effect an oil spill has on animals reliant on the ocean.
Space Modeling	Use the Engineering Design Process to make an accurate model depicting a system, process, or occurrence in space or on the Earth.

Learning Objectives

- Understand the impact of pollutants in the ocean.
- Explore the effect an oil spill has on animals reliant on the ocean.
- Determine and execute methods for cleaning animals after an oil spill.

Equipment List

- Ocean Trash Can Kit, 1 Ea
- CreateKit™ Team Bins, Set of 6
- Paper Roll, 1 Ea
- Milk jugs or other square containers, 6 Ea (not included)
- Motor Oil, ¼ cup (not included)

Suggested Timing

- 90+ minutes

SET UP

- If using milk jugs as your vessel, cut off the tops so that you have square containers.
- Fill your containers with water to within two inches of the top. Place 1 tablespoon of sea salt into each container.
- Split the items from the CreateKit™ Team Bins into six.
- Prepare the "oil spill" and "pollutants" baggies:
  - Label six bags "oil spill". In each bag, place two cotton balls, one feather, one 1' length piece of yarn, and one piece of fur.
  - Label six bags "pollutants". In each bag, place one 1/3 piece of straw, one hook made from the wire, one cotton ball, and two Styrofoam peanuts.

TEACH

- Split the students into six groups of four and give each group a salt water container, a "pollutants" bag, an "ocean spill" bag, and an Ocean Pollution Experiment student worksheet.
- Following the student worksheet, have students predict which items from their "pollutants" bag will float or sink.
- Place all items from the "pollutants" bag into the water. Record in the worksheet which float.
- Remove all the pollutants from the container. Then add a small amount of motor oil (1/2 tsp) to the edge of the water container. Record observations in the worksheet.
- Place a feather and a piece of fur into the water.
- Place a teaspoon of oil into a paper candy cup – this is a "tanker". Place the tanker into the "ocean" and make an oil spill.
- Using items from the "oil spill" bag and from the CreateKit™ Team Bins, devise and execute a method to clean up the oil spill. Then try cleaning up the "animals" (feather and fur).

REFLECTION QUESTIONS

- Why do some items float and others sink?
- How does the oil spread in water?
- Which is denser: oil or water?
- Which materials work best for containing a spill? Which work best for removing oil?

NGSS Alignment

LS2.C: Ecosystem Dynamics, Functioning, and Resilience
Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.

ESS3.C: Human Impacts on Earth Systems
Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Vocabulary

- **Buoyancy** – the ability to float in a liquid
- **Pollution** – the presence of a harmful or poisonous substance in an environment
- **Density** – the quantity of mass per unit volume

Worksheets

- Ocean Pollution Experiment, p 29

TEACHING SUGGESTIONS

- Protect each workspace by placing paper from the paper roll over each table before the experiment.
- Add more materials to the "pollutants" and "oil spill" bags:
  - Additional pollutants – paper towels, crackers, soda can rings, straws, etc.
  - Additional oil spill materials – spoons, paper towels, wax paper, etc.
- Students will also use items from the CreateKit™ Team Bins on Days 9 and 10. You can limit supplies in this activity to prepare for those days.

ADDITIONAL LESSON OPTIONS

- Determine which category each pollutant falls into before performing the oil spill: debris, toxics, particulates, dissolved nutrients, oil. Each of these is described in detail within the Ocean Trash Can Kit's Teacher Manual.
- Create a larger spill in a container. Discuss how the size of the spill impacts the ability to contain or clean the spill.
- Repeat the experiments using water that does not contain salt. Determine if saltwater changes the buoyancy of materials or has an impact on oil spread.

TEACHER REFLECTION

OCEAN POLLUTION EXPERIMENT

Name(s): _____

In the table below, list the name of the pollutant you will be testing in the water (e.g., a feather). In the second column, make a prediction if that item will float or sink when placed on the surface of the water. Test the item in the waterand record if it floats or sinks. Then determine if this item behaved as you predicted. See example in row 1 of the table below.

Pollutant Name	Prediction: Floats or Sinks	Test Results: Floats or Sinks	Did This Item Behave as You Predicted?
Straw	Sinks	Floats	No

Why do some items float and others sink?

_____

_____

What types of materials float in water?

_____

_____

NEXT GENERATION SCIENCE STANDARDS

The Next Generation Science Standards* (NGSS) are widely accepted K-12 science and engineering content standards. They outline the expectations of what students should know and provide a research-based approach to teaching science. To help you in your classroom, we have mapped relevant NGSS to key concepts found in this curriculum manual such as electricity, information technology, and planetary motion.

As you read these standards, you will encounter the standard number (e.g., K-PS2-1), its description, and its connection to the three dimensions of science learning covered by the Next Generation Science Standards:

Science & Engineering Practices – describe what real scientists and engineers do

Disciplinary Core Ideas – the core ideas in science with importance across multiple science/engineering disciplines

Crosscutting Concepts – help students explore concepts between the four areas of science including Physical Science, Life Science, Earth and Space Science, and Engineering Design

EARLY ELEMENTARY CONNECTIONS

K-2 NGSS PERFORMANCE EXPECTATIONS

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.	• Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. • Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.	• Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.	• Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.	• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.