



## ENGINEERING

### 5K

Structure and Function: Exploring Design: Students discover the design process and how engineers influence their lives. They explore the elements of structure and function by identifying products around them designed by engineers and asking questions engineers might ask. Students apply their knowledge from the module to design their own paintbrushes.

### FIRST GRADE

Animal Adaptations: Students explore animal adaptations for protection, camouflage, food obtainment, and locomotion. Students learn what it means for an organism to be adapted to its environment and how different adaptations can be categorized. Students are challenged to design the ideal shoe for travelers to wear in extreme environments, applying what they have learned and looking to plant and animal adaptations to guide their designs.

### SECOND GRADE

Materials Science: Properties of Matter: Students investigate and classify different kinds of materials by their observable properties, including color and texture, and heat conduction. Students learn about states of matter and properties of materials. They investigate which materials are good insulators and which are good conductors. After building their knowledge and skills throughout the module, students determine the best materials to use as they design a prototype to keep an ice pop frozen for at least 30 minutes.

The Changing Earth: Students explore how the surface of the Earth is always changing. They are introduced to different types of maps and explore how these maps convey different information about the world in which we live, including where water is found on Earth. Students investigate the different forces that shape the surface of the Earth and design solutions to limit the impact of erosion on this fictional community, which is located at the bottom of a hill that was recently destabilized by a fire.

Materials Science: Form and Function: Students research the variety of ways animals disperse seeds and pollinate plants. They expand their understanding of properties of matter as they consider the form and function involved in seed dispersal and pollination. Students apply their knowledge and skills to design, build, test, and reflect on a device that mimics a way in which animals disperse seeds or pollinate plants.

### THIRD GRADE

Stability and Motion: Science of Flight: In this module, students learn about the forces involved in flight. They design, build, and test an experimental model glider to find out how air and other forces affect its flight. Students apply the design process to the problem of delivering aid to an area where supplies must be airlifted in and dropped to the ground from an aircraft.

### FIFTH GRADE

Robotics and Automation: Students explore the ways robots are used in today's world and their impact on society and the environment. Students learn about a variety of robotic components as they build and test mobile robots that may be controlled remotely. Students are then challenged to design, model, and test a mobile robot that can remove hazardous materials from a disaster site.

## BIOMEDICAL SCIENCE

### FOURTH GRADE

Input/Output: Human Brain: Students discover how signals passing from cell to cell allow us to receive stimuli from the outside world, transmit this information to the brain for processing, and then send out a signal to generate a response. When Mylo experiences a concussion after falling off a skateboard while not wearing a helmet, he and his friends are motivated to raise awareness about concussions. Inspired by this design problem, students work as part of a team to design, plan, and create a video or podcast to educate children on identifying and preventing concussions.

### SEVENTH GRADE

Medical Detectives: Students play the role of real-life medical detectives as they collect and analyze medical data to diagnose disease. They solve medical mysteries through hands-on projects and labs, measure and interpret vital signs, examine nervous system structure and function, and investigate disease outbreaks.



## COMPUTER SCIENCE

### 4K

Spatial Sense and Coding: Students develop spatial sense as they engage in activities that explore directional movement – over, under, through, and around. They begin to develop coding skills as they plan a path, create wearable code, and code an interactive robotic device. Using the engineering design process, students create code that will lead them to the location of a hidden item.

### 5K

Animals and Algorithms: Students explore the nature of computers and the ways humans control and use technology. Students learn about the sequential nature of computer programs. Students are inspired by a story in which Angelina, Mylo, and Suzi make videos to teach preschoolers about animals in their habitats. Then, students work in small groups to design and program a simple digital animation about an animal in its habitat.

### FIRST GRADE

Animated Storytelling: Students explore the sequential nature of computer programs through hands-on activities. They explore the basic fundamentals of programming using ScratchJr, a block-based programming language to create their own projects. The Use-Modify-Create framework strengthens programming skills as students use a practice program, modify the program, and then create their own program according to the constraints provided. Applying skills and knowledge learned from the activities and project in this module, students work together to design and program a digital animated story.

### SECOND GRADE

Grids and Games: Students explore the sequential nature of computer programs through hands-on activities. Then, students develop an understanding of computer science, computer scientists, and the impacts of computing. After building an understanding of computer science, students create programs using a block-based programming language. Students follow the Use-Modify-Create Framework to write programs with sequences, loops, and triggers. Applying skills and knowledge learned from the activities and project, students work together to design and program a game that can be played on a digital device.

### THIRD GRADE

Programming Patterns: Students explore control structures such as events, loops, and conditionals. These structures specify the sequence in which instructions are executed within a program. Starting with computer-free activities and progressing to programming in a block-based language on a device, students learn how to think computationally about a program. Students are challenged to use computer programming to write a story with different endings. Combining their writing and programming skills, students develop interactive stories on a device with multiple plots.

### FOURTH GRADE

Input/Output: Computer Systems: In this exploration of how computers work, students are encouraged to make analogies between the parts of the human body and parts that make up a computer. Students investigate reaction time as a measure of nervous system function. Students apply what they have learned to build their own reaction-time measurement devices on tablets. This module has strong connections to the fourth grade Human Brain module.

### FIFTH GRADE

Robotics and Automation: Challenge: Students expand their understanding of robotics as they explore mechanical design and computer programming. This module focuses on developing skills needed to build and program autonomous robots. Angelina, Mylo, and Suzi are tasked with designing an automatic-guided vehicle to deliver supplies to a specific area in a hospital without being remotely controlled by a person. Inspired by this design problem, students work with a group to apply their knowledge to design, build, test, and refine a mobile robot that meets a set of design constraints.