PITSCO EDUCATION

Whole-Class Solutions

STEM Units

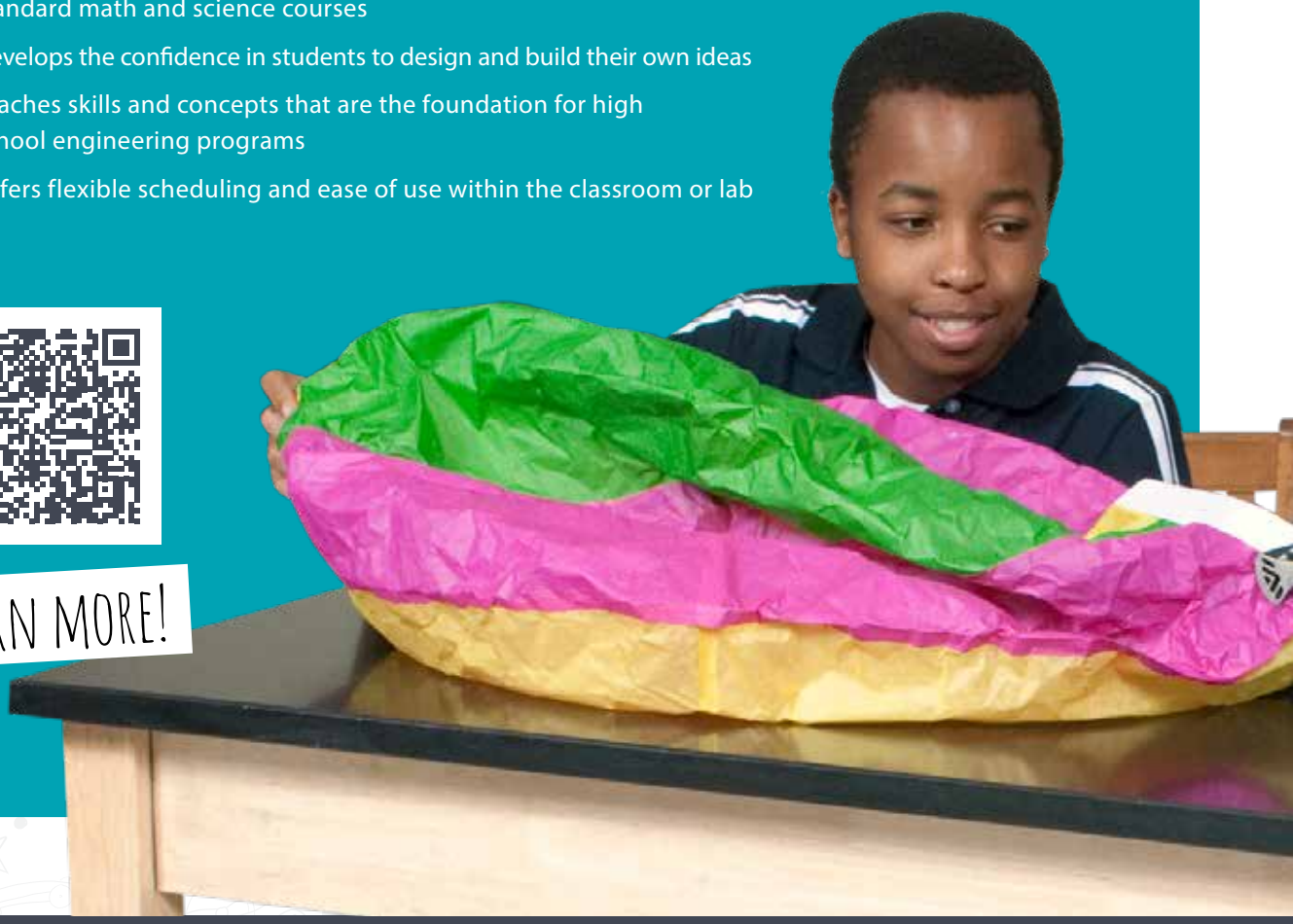
Effective and Flexible **STEM** Learning

Whole-class, hands-on STEM Units provide opportunities for middle school and high school students to make connections between the four areas of STEM learning. Science, technology, engineering, and math concepts are interwoven into the unit activities and provide effective brainstorming and problem-solving skills necessary to prepare students for the future.

Designed to offer optimum flexibility, the STEM Units can be incorporated in support of existing curriculum or as an entire course on their own. They fit into existing labs or classrooms and are easy for teachers to use and store.

ADVANTAGES:

- Gives students a real-world understanding for the STEM concepts they learn in standard math and science courses
- Develops the confidence in students to design and build their own ideas
- Teaches skills and concepts that are the foundation for high school engineering programs
- Offers flexible scheduling and ease of use within the classroom or lab



Learn more!

Making STEM Learning Come to Life

Providing students with a STEM experience in which all four subjects are integrated and presented in a real-world manner is the central objective of the titles. This program focuses on students' taking concepts learned in other classes and applying them to realistic engineering challenges.

Our STEM Units can be used to supplement existing curriculum, or several units can be combined to create a semester-long or even yearlong course.

There are no prerequisites, and units can be completed in any order desired. Additionally, these units can be incorporated into a traditional classroom, a technology lab, or a science setting.

Sample Schedule

STEM Units can be implemented in a recommended order or combined in a sequence that accommodates school schedules and requirements. The flexibility of the units allow for easy modification to meet student needs.

Semester Implementation

Green Machines	Green Future	Bridges	Medieval Machines	Model Airplanes	Basic Structures
3 WEEKS	3 WEEKS	3 WEEKS	3 WEEKS	3 WEEKS	3 WEEKS

"It is the students' assignment to dream big dreams, and it's our assignment as educators to make sure they have realized their dreams regardless of what those dreams are, and STEM is one way that allows that to happen,"

- Superintendent Austin Obasohan, Duplin County (NC) Schools.

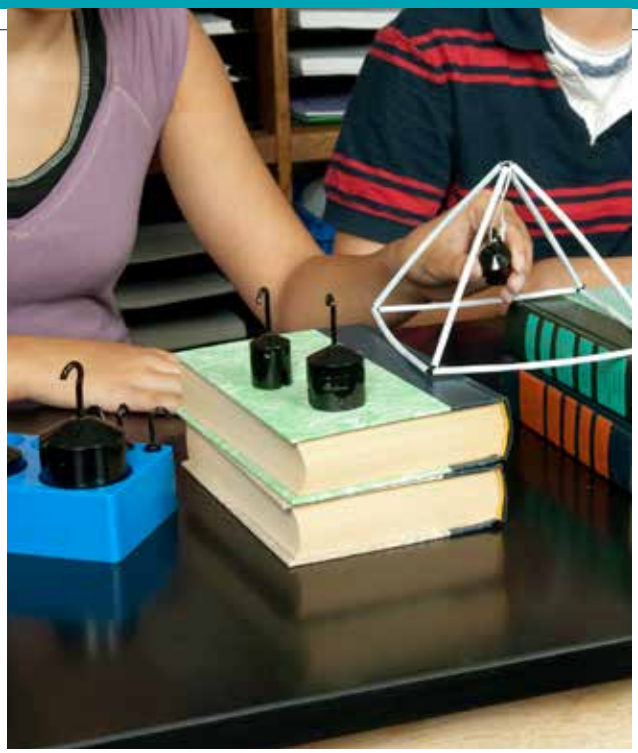
3 WEEKS

AIR ROCKETS

Introduce students to experimenting with variables and finding velocity with this unit on air-powered rockets. In the first section, students build simple straw rockets and test how different rocket lengths and launch angles affect flight. Students record the resulting data and use it to calculate velocity. In the second part, the class turns to rockets launched by the powerful AP Launcher. These tube rockets are ideal for outdoor or gymnasium launches that help students explore fin placement and design their own rockets. Finally, students build and launch rocket-boosted gliders.

39850

3 WEEKS

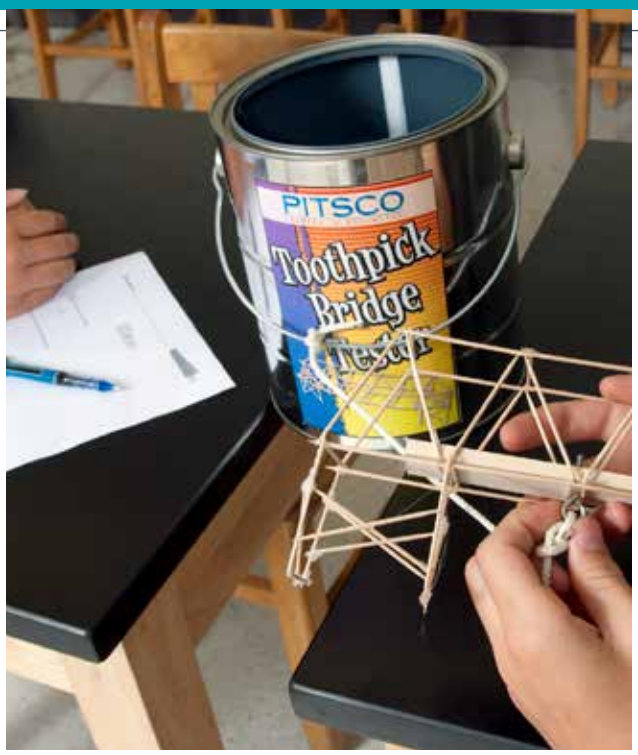


BASIC STRUCTURES

By combining geometry, material science, and graphic design, Basic Structures delivers great learning potential. After building structures from straws and pipe cleaners, students compare the strengths of three different polyhedrons and then calculate the efficiency of each. Then, they are challenged to construct the tallest self-supporting straw tower possible. In the second part of the unit, students enter the world of package design to create a telescoping box with a tessellation design. Then, they test the strength of different bonding materials used in packaging and design and build a box to hold a specific volume.

39852

3 WEEKS



BRIDGES

Bridge the gap between construction and engineering with this unit. Students start by constructing toothpick bridges and testing them to the point of destruction. Then, they use the test data to calculate each bridge's efficiency. Moving on to the more detailed balsa bridge construction, students learn about material strength. As the culminating activity, students design and build a bridge to strict specifications with the goal of holding the maximum load possible.

39854

3 WEEKS

GREEN FUTURE

The future is bright – bright green. So prepare students for that future by introducing them to key technologies for the future: fuel cells and magnetic levitation. The first half of this unit focuses on magnetic levitation – or maglev – vehicles. Maglev transportation has been popular in Europe for years, and now students can learn about the concepts behind the technology right in the classroom. They calculate acceleration, investigate friction, and then design their own maglev vehicles to race against classmates' vehicles. In the section on fuel cells, students work with a model car powered by a small fuel cell. Experiments with electrolysis, efficiency, and resistance help them connect scientific concepts with the real-world applications of fuel cells.

39846

3 WEEKS

GREEN MACHINES

Everyone has heard of windmills and solar panels, but most of us don't know how they work. Help students understand how these technologies use mechanical and electrical engineering to provide clean energy. By building and testing easy-to-assemble solar cars, students begin to understand gear ratios and speed of rotation. After racing their solar cars, they use the collected race data to graph distance versus time and to calculate slope. Before leaving solar energy, they are challenged to create a four-wheel-drive solar car. Moving on to wind energy, students learn the basics such as measuring and graphing wind speed, varying blade pitch, and measuring voltage on a wind generator demonstrator. Then, students build and operate their own small wind generators.

39847

3 WEEKS

HIGH-FLYING ROCKETS

Fun and excitement go hand in hand with learning STEM concepts through these rocketry activities. Starting with water rockets, students dive into the science of rocketry with fuel-pressure testing and analysis, fuel-volume testing, and apogee while launching water-propelled rockets. Then, students move to the rockets with real power – solid-fuel rockets that can reach hundreds of feet into the sky! While building and launching these thrilling rockets, students also learn about average velocity, potential and kinetic energy, and how to design for stability.

39849

3 WEEKS

MEASUREMENT & PREDICTION

Measurement and prediction are the foundational elements of STEM research. In this unit, students explore these elements while participating in lively experiments. First, they build a tissue paper parachute and determine the load capacity, velocity, and acceleration of the parachute. In a fun – and potentially messy – challenge, students design their own parachutes to safely transport an egg to the floor. Then, students stretch their learning potential by completing several model bungee jump experiments while exploring Hooke's law, properties of materials, and the use of scatter graphs for predicting outcomes.

39844

3 WEEKS

MEDIEVAL MACHINES

Medieval war machines that once inspired fear now inspire awe and interest in students. After learning about the history of medieval siege machines, students build and experiment with two such mechanisms. Students build and use a catapult to learn about relating speed with projectile mass, testing elasticity, and designing to make the catapult a mobile mechanism and to launch a projectile the greatest distance. Then, the class moves on to the catapult's cousin, the trebuchet. With this siege machine using counterweights, students explore how projectile mass affects a launch and how to calculate potential energy. Then, they are challenged to use their knowledge to adjust projectile and counterweight masses in order to hit a target.

39845

3 WEEKS

MODEL AIRPLANES

Personal dreams of flight eventually brought forth the science and technology to achieve what most called impossible – manned flight. In this unit, students start by building balsa gliders and learning how size affects flight, how to calculate glider ratios, and how to build a glider to stay airborne as long as possible. Moving on to powered flight, students learn about elastic potential energy and kinetic energy before building and flying a rubber band-powered model plane. They test and modify their airplanes to increase flight time and then try to engineer a model plane that will stay in the air as long as possible.

39853

3 WEEKS

UNCONVENTIONAL FLIGHT

Unconventional Flight covers flight outside of airplanes and rockets – such as hot-air balloons and kites. As students design, build, and fly their own tetrahedron kites, they apply geometry and engineering, investigate the relationship between size and lift, and calculate area and volume. In the second part of the unit, students build and launch hot-air balloons. In the process, they approximate surface area and analyze the flight of their balloons. As a final project, students compete in an engineering challenge to determine who can design, build, and fly a hot-air balloon to achieve the highest altitude.

39851