

# THE LEAGUE OF YOUNG INVENTORS

## IN SCHOOL PROGRAMS

The League of Young Inventors is a growing nonprofit with a mission to make interdisciplinary, hands-on STEAM learning accessible to all kids. The League curriculum directly aligns with and compliments a variety of grade-level units and standards across Science and Social Studies. It also follows the engineering design process: from understanding a problem, to designing and prototyping solutions, to testing and revising. Each of our lessons has been fully field-tested in after-school and in-school environments.

The cost of our residencies include:

- Teaching: by our highly trained and qualified education and science professionals
- All build materials: these are extensive and each child will have something they can present or take home at the end of the residency
- Extension resources: for teachers to keep and use for deeper exploration of topics and ideas covered
- Assessment materials: these scaffold and guide students' process of testing and evaluating their prototypes

Each residency is customized to students' appropriate age and/or skill level. Schools may choose to have residencies culminate in a formal presentation, an informal sharing OR an exhibit of student work.

### IN SCHOOL PROGRAM STRUCTURE

**Residencies:** serve four to six classrooms during a school day.

**After-school residencies:** 1.5 hours of instructional time during after-school hours for 10 weeks.

**Cycles:** Residencies are generally conducted over a **10 week period**. Programming is provided on a cycle basis and observes all school closures

<b>Cycle 1:</b> <b>October–December</b>	<b>Cycle 2:</b> <b>January–March</b>	<b>Cycle 3:</b> <b>April–June</b>
<ul style="list-style-type: none"> <li>● Invent it. Build it (Grades 3,4,5)</li> <li>● Early Native American Homes (Grade 4)</li> <li>● Physics of Play (Grades 1,2)</li> </ul>	<ul style="list-style-type: none"> <li>● Bridges &amp; Skyscrapers (Grades 2,3)</li> <li>● Simple Machines (Grades 3,4,5)</li> <li>● Cities of the Future (Grades 3,4,5)</li> </ul>	<ul style="list-style-type: none"> <li>● Invent it. Build it (Grades 3,4,5)</li> <li>● Neighborhoods (Grade 1)</li> <li>● Bridges &amp; Skyscrapers (Grades 2,3)</li> </ul>
<b>After School:</b> Card Arcades & Pop-Ups	<b>After School:</b> Inventing Green	<b>After School:</b> Space Odyssey

### PROGRAM DETAILS

### **Invent it! Build it!** (Grades 3,4,5)

#### **10 Sessions**

In this program, students work together on a series of challenges designed to demonstrate how invention can be used to improve the lives of people and animals. Each challenge is centered around the design process, a series of steps used by inventors and engineers to arrive at innovative solutions aimed at addressing real world problems. Projects include earth-friendly sneakers, reusable tableware, powerful wind turbines, and water filtration systems. This directly links with the NGSS engineering process.

### **Early Native American Homes** (Grade 4)

#### **10 sessions**

In this unit, students construct models of the traditional homes of the Plains Tribes (tipis), the Lenape (wigwams), and the Haudenosaunee (longhouses) to gain a deeper understanding of the specific set of engineering principles at play in each design. In each lesson, students are prompted to consider how the natural environment and unique lifestyle of each indigenous group impacted the choices they made when designing and building their homes. The unit culminates with a design challenge that tasks students with designing and prototyping a sustainable home that could be used to house a group of junior astronauts on an expedition to another planet. This unit directly aligns with the Grade 4 Social Studies unit on Native Americans: First Inhabitants of New York State.

### **The Physics of Play** (Grade 1, 2)

#### **10 Sessions**

In this unit, students get to build and experiment with different toy designs to learn about gravity, momentum, kinetic energy, and other basic physics principles. Projects include balance sculptures, spinning tops, marble runs, and toy cars. This directly links with the NGSS engineering process.

### **Bridges & Skyscrapers** (Grade 2, 3)

#### **10 Sessions**

In this unit, students build and test models of the "BATS" bridges (beam, arch, truss, and suspension) to gain a deeper understanding of how each bridge type stands strong under the forces of tension and compression. A design challenge asks students to apply their knowledge by designing and prototyping a bridge given a set of landscape parameters and community needs. Next, students will explore how our cities are under increasing pressure to house more people, so one way of doing this is by building upwards! Students will prototype different skyscraper designs to understand how they hold up against the forces of wind, gravity and earthquakes. This unit directly aligns with 2nd Grade Social Studies units on New York City Over Time and 3rd Grade Social Studies units on Introduction to World Communities.

### **Not So Simple Machines** (Grades 3,4,5)

#### **10 Sessions**

Why do bicycles have gears? How do pulleys make loads lighter? In this program, students explore the history and science behind the six simple machines that make everyday work easier – the inclined plane, wedge, screw, lever, wheel & axle, and pulley. Projects include marble runs, Archimedes screws, tongs, catapults, cranes, and more. After mastering these foundational technologies, students will work in teams to create an original Rube Goldberg design that incorporates all six machines. This directly links with the NGSS engineering process across all grades and directly aligns with the 3rd Grade Science unit on Interacting Forces and 4th Grade Science units on Transfer of Energy and Information and Energy, Motion, and Collisions.

### **Cities of the Future** (Grade 3, 4, 5)

#### **10 Sessions**

This unit prompts students to consider some of the greatest challenges facing urban centers of the present and future, including overpopulation, rising sea levels, pollution, extreme weather, and traffic congestion. Students conceptualize and engineer their own solutions; designing earthquake-resistant towers, green roofs, floating homes, and self-driving transportation infrastructure. In the unit's culminating final challenge, students are asked to identify a problem in their own community and work together to prototype a solution. This unit directly aligns with the 3rd Grade Science unit on Introduction to World Communities and 5th Grade Social Studies units on Comparative Case Study of Western Hemisphere Cultures, and The Western Hemisphere Today .

### **Neighborhoods** (Grades 1)

#### **10 Sessions**

In this unit, students will learn about the key natural and man-made features common to communities. They will study similarities and differences and work with representations—such as maps, models, and more. At the end of each lesson, students add their latest creations to an evolving classroom 3D model neighborhood, to be completed at the conclusion of the unit. This unit directly aligns with 1st Grade Social Studies units on the Community and Community Economics.

### **After School (12 Weeks)**

#### **Card-cade & Pop Arts (Cardboard & Paper Engineering)** (Grade 3, 4, 5)

Each week students are introduced to a new set of simple mechanics, building techniques, and power sources. Once mastered, they will be challenged to use this knowledge along with their creativity to design and build a variety of cardboard arcade games and pop-books showcasing an original story!

#### **Inventing Green** (Grade 3, 4, 5)

Students work together to find sustainable solutions to problems faced by communities across the globe. Projects include earth-friendly sneakers, reusable tableware, powerful wind turbines, and water filtration systems.

#### **Space Odyssey** (Grade 3, 4, 5)

Students are given fun, hands-on ways to think like NASA engineers. Using everyday materials, they design and build air-powered rockets, an airbag-landing system, a variety of robot arms, rubber band rovers and more.