Programs by grade

Pre-K to Kindergarten

Five Senses
Students explore the five senses and try activities to illustrate them. Pre K to 2
Subjects: Physics
Types: In class

Insect and Animal Camouflage
What is camouflage and how do organisms use it to hide? Pre K - 2
Subjects: Biology
Insects
Types: In class

Magnets
Attraction, repulsion, uses of magnets. Grades K - 3
Subjects: Physics
Types: In class

Pre-K Math
Students learn about math concepts recommended by Common Core for kindergarten readiness: Sorting, Patterns, Random Numbers, Counting, Measurement, Geometry, Graphing, and Operations. (Multiple sessions.)
Subjects: Pre-K Programs
Types: In class

Pre-K Science
Students learn about science concepts recommended by Common Core for kindergarten readiness: Weather and Seasons, Animals in Winter, Magnets, Five Senses, Healthy Choices, Sink or Float, Animal Lifestyles, Solid or Liquid. (Multiple sessions.)
Subjects: Pre-K Programs
Types: In class

Elementary School

Achi Game
Cut out geometric shapes and use them to build the game board for this variation on tic-tac-toe. Use dried beans to play the game with a partner. Grades 2 -4
Subjects: Math
Types: Out of school

Acid and Base w/ Red Cabbage Indicator
Use red cabbage leaves to make a pH indicator, and test whether household chemicals are acid or base. Grades 3 - 6
Subjects: Chemistry
Types: In class
Out of school

Acid Rain
Determine acid, base, and neutral by measuring pH; see the effects of these on Plaster of Paris. Grades 5 - 8
Subjects: Earth Science
Chemistry
Types: Mobile Lab
In class

Bat Measurement
Students use measurements to compare bats and humans. Grades 1 - 3
Subjects: Biology
Mammals
Types: In class
Beaks and Feet
How bird anatomy (types of beaks, types of feet) determines life style and food preference. Grades 3 to 6

Subjects: Biology, Birds, Ecology
Types: In class, Mobile Lab

Bouncy Buoyancy
Compare and calculate the densities of pairs of objects. Grades 4 - 7

Subjects: Physics
Types: In class, Mobile Lab

Bridge Building: Computer Model
Using computer software, students build and test bridges, and see that different designs and materials change the cost. Grades 6 - 12

Subjects: Engineering
Types: In class, Out of school

Bridge Building: Physical Model
Students build bridges from straws, tape, and cardboard, and test their strength. Grades 4 - 7

Subjects: Engineering
Types: In class, Out of school

Build a Battery using Coins
Explore the chemistry of batteries by stacking pennies and dimes with electrolyte soaked pads, and measuring the voltage produced with a multi-meter. Grades 3 - 6

Subjects: Chemistry
Types: In class, Out of school

Butterfly Life Cycles
Students explore the world of insects, and learn how caterpillars change into butterflies.

Subjects: Biology, Insects
Types: In class

Cartesian Divers
Learn how changing density causes a submarine to sink and rise. Grades 3 - 6

Subjects: Physics
Types: In class, Out of school, Mobile Lab

Cartesian Divers 2
Explore density and buoyancy by making a cartesian diver out of a plastic pipette. Grades 3 - 6

Subjects: Physics
Types: In class, Out of school

Catapults
Work in teams to learn how a catapult works, and what variables you use to control your aim. Grades 3 & 4

Subjects: Physics
Types: In class
**Chemical Change - Identify an Unknown Substance**

In this lab, students test four different white powders with four different liquids. They observe that the set of reactions the liquids have with each powder are different, and use that information to test and identify an unknown substance. Grades 5 - 7

**Subjects:** Chemistry, Forensics  
**Types:** In class, Out of school

---

**Chemical Reactions**

This lab discusses what happens during a chemical reaction, and how mass is conserved. Students observe gas formation, solid formation, color change, and temperature change during chemical reactions. Grades 5 - 7

**Subjects:** Chemistry  
**Types:** In class, Out of school

---

**Circuit on Paper**

Create a “light-up” card using metallic tape to construct an electrical circuit on paper. Grades 3 - 6

**Subjects:** Physics  
**Types:** In class, Out of school

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**Color-Changing Slime**

Make slime that includes a thermochromic pigment, and use it to explore the concept of heat transfer. Grades 3 - 6

**Subjects:** Chemistry  
**Types:** Out of school

---

**Computer Science**

Four sections to familiarize students with computer technology: Computer Take-apart (and reassemble); Scratch Programming; Building Web Sites; Binary Numbers. Grades 4 - 8 (Multiple sessions)

**Subjects:** Technology  
**Types:** Out of school

---

**Computer Science: Making Web Sites**

Students turn their computers into servers, and build simple HTML web sites to be viewed by anyone in the class. Grades 4 to 9 (Single or multiple sessions.)

**Subjects:** Technology  
**Types:** Out of school

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**Computer Science: Programming and Coding**

Students will use Scratch programming to learn about logic, control structures, variables, and more, as they make designs and games, and solve problems. (Multiple sessions)

**Subjects:** Technology  
**Types:** Out of school

---

**Coriolis Effect**

Why do storms always rotate? Mark up a balloon with arrows to illustrate the forces that create the spiraling, rotating motion of storms.

**Subjects:** Earth Science  
**Types:** In class, Mobile Lab

---

**Daffy Density**

Estimate the density of various objects using a density gradient of liquids in a graduated cylinder. Grades 4 - 7

**Subjects:** Physics  
**Types:** In class, Mobile Lab

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**Dancing Plankton**

Learn about the use of the microscope; observe and sketch three different microscopic organisms. Grades 4 - 7

**Subjects:** Biology, Life Sciences  
**Types:** Mobile Lab
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<th>Diver Density</th>
<th>See what density is by comparing the weights and volumes of pairs of objects. Grades 4 - 7</th>
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<tr>
<td>Types:</td>
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<td>Fingerprints</td>
<td>Make a set of fingerprints and learn about characteristics that make them unique. Grades 3 - 6</td>
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<td>Food Webs</td>
<td>How energy moves through a food web from producer to consumer to decomposer. Grades 3 to 5</td>
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<td>Forensics</td>
<td>Students use various techniques to learn how crime scenes are analyzed. Grades 4 - 8 (Single or multiple sessions.)</td>
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**Friction**
Balanced and unbalanced forces: weights on a string apply force to move an object, while friction balanced with that force makes it stop. Students use different numbers of weights to compare how much friction results, and how much force is needed for motion. Grades 3 to 5.

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**Frog Life Cycles**
Students learn about how tadpoles grow into frogs.

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<th>Subjects:</th>
<th>Amphibians &amp; Reptiles</th>
<th>Biology</th>
<th>Life Sciences</th>
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**Geopanes**
Construct three dimensional shapes with toothpicks and raisins. Dip them in soap solution to explore the patterns of soap films that are formed. Grades 3 - 6

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<th>Chemistry</th>
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**Glass**
Low to high tech: Students examine obsidian arrowheads, glass compression strength, lenses, and fiber optics. Grades 3 - 8

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**Gummy Capsules**
The powder form of a polymer found in seaweed slime is reconstituted and reacted with calcium ions in solution to create “gummy” shapes. Grades 3 - 6

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**Identifying Plankton**
Same organisms as "Dancing Plankton", but includes the use of a dichotomous key. Grades 5 - 8

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**Indicating Electrolysis**
Make a pH indicator using red cabbage leaves. Use the indicator to explore what happens when electrical energy is used to split water into hydrogen and oxygen. Grades 3 - 6

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**Insect and Animal Camouflage**
What is camouflage and how do organisms use it to hide? Pre K - 2

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<th>Insects</th>
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**Intersection Game**
Construct a game based on the intersection of rows and columns in a grid. Devise a scoring system for the game. Grades 3 - 6

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**Magnets**
Attraction, repulsion, uses of magnets. Grades K - 3

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Magnets for Fun
Three surprising hands-on activities to show magnetism and electromagnetism.

Subjects: Physics, Technology
Types: In class, Mobile Lab

Matter and Energy
Examine devices that use different forms of energy, and explain how each one changes energy from one form to another. Grades 3 to 5

Subjects: Physics
Types: In class, Mobile Lab

Measurement
For grade 3, pretend to follow a recipe to practice measuring length, volume, and weight. Materials used: ruler, beaker, and balance scale.

Subjects: Math
Types: In class, Mobile Lab

Mystery Solutions
Test various substances with vinegar, iodine, and heat; then try to identify an unknown mixture using what you have learned. Grades 5 - 9

Subjects: Chemistry
Types: In class, Mobile Lab

Mystery Substances
Examine solutions under a microscope and try to identify an unknown mixture. Grades 5 - 8

Subjects: Chemistry
Types: In class, Mobile Lab

Nano Technology
Explore how things behave differently when extremely small. (Single or multiple sessions.) Grades 2 to 8.

Subjects: Technology
Types: In class, Out of school

Ocean acidification
Using chemical reactions, this lab gives students an idea what ocean acidification means, and explores its potential effects on marine life. Grades 5 - 7

Subjects: Chemistry, Earth Science
Types: In class, Out of school

Optical Illusions
Learn about and make illusions that show us how our visual perception works. Grades 3 to 6.

Subjects: Creativity
Types: In class, Out of school

Pen Chromatography
Use paper strips and two different solvents to separate the mixtures of colors in different black markers. Identify which was used to write a “ransom note”. Grades 5 - 8

Subjects: Chemistry, Forensics
Types: In class, Out of school

Pentominoes Game
Explore what shapes can be made by combining 5 squares, with faces touching each other, in every possible combination. Cut out the shapes and use them to play a “Tetris” style game. Grades 3 - 6

Subjects: Math
Types: Out of school
Photography Camp
Campers build working pinhole cameras, take pictures with them, and develop the prints in a darkroom, just like in the "old days". Then, we will use digital cameras: taking photos, talk about composition, and load the images onto laptops and edit the photos with special effects. (Grades 4 to 7.)

Subjects: Creativity
Types: Out of school

Polymer Balls
Explore polymers using Elmer's glue and borax to create bouncy balls. Grades 3 - 6

Subjects: Chemistry
Types: Out of school

Racing Camp
Campers make and race different kinds of racers: balloon cars, CO2 cars, mousetrap-powered cars, pinewood derby racers, and more! Grades 3 to 6. (Multiple sessions)

Subjects: Engineering
Physics
Types: Out of school

Rainbow in a Test-tube
Mix different concentrations of sugar solution in the colors of the rainbow, and make use of the differences in density to form layers in a test-tube. Grades 3 - 6

Subjects: Chemistry
Types: Out of school

Rocketry and Flight
Build various flying devices: rockets, hot air balloons, tumble wing gliders. Grades 4 - 8 (Multiple sessions.)

Subjects: Engineering
Technology
Types: Out of school

Saliva Testing
Test mock crime scene evidence for the presence of saliva using starch-agar plates and iodine solution. Grades 5 - 8

Subjects: Chemistry
Forensics
Types: In class
Out of school

Science Show
Different shows on topics like: general physics, science and music. A different show each year. Air pressure, gravity, electricity, etc. Audience participation! (For large audiences: 100+)

Subjects: Various
Types: Large audience

Seeds and Seed Dispersal
Students explore different ways plants disperse their seeds and the mechanisms that ensure viable germination in the spring. Grades 2 to 4

Subjects: Plants
Biology
Types: In class

Simple Machines
Examine a number of common devices to recognize the simple machines that they are made of. Grades 3 to 5.

Subjects: Physics
Technology
Types: In class
Mobile Lab

Solar System (for older grades)
An audio-visual presentation exploring the planets - not your run-of-the-mill PowerPoint. Grades 4 to 6

Subjects: Physics
Types: In class
Solids and Liquids
Observe how two different liquids interact with each other, and explain density. Grades 2 to 3

Subjects: Earth Science
          Physics

Types: In class

Space Camp
Campers build and launch rockets, watch "Apollo 13", do Scratch programming to make space games, and more! Grades 3 to 7. (Multiple sessions)

Subjects: Technology

Types: Out of school

Squishy Circuits
Use conducting and insulating dough to build electrical circuits. Grades 3 - 6

Subjects: Chemistry
          Physics

Types: Out of school

Static Electricity
Observe some effects of static electricity. Grades 4 - 7

Subjects: Physics

Types: In class
       Mobile Lab

Stem-Makes-Music Camp
Campers build and play musical instruments (marimba, "canjo", and percussion from recyclables), and compose musical pieces together, and then perform them on Friday for their families. Grades 4 to 7. (Multiple sessions)

Subjects: Creativity

Types: Out of school

Stop-Motion Animation
Students make movies frame by frame, with toys, objects, even people! Each student gets a copy of the DVD with all the movies the students have made. Grades 4 - 8 (Multiple sessions)

Subjects: Creativity

Types: Out of school

Waste Water Treatment
Re-create the five steps that a water filtration plant uses to clean water for drinking. Grades 4 - 7

Subjects: Earth Science

Types: In class
       Mobile Lab

Water Cycle: Incredible Journey
See the water cycle in action from the viewpoint of a water droplet. Vocabulary includes: evaporation, condensation, precipitation, percolation, runoff. Grades 3 to 5

Subjects: Earth Science

Types: Mobile Lab

Middle School

Acid and Base w/ Red Cabbage Indicator
Use red cabbage leaves to make a pH indicator, and test whether household chemicals are acid or base. Grades 3 - 6

Subjects: Chemistry

Types: In class
       Out of school

Acid Rain
Determine acid, base, and neutral by measuring pH; see the effects of these on Plaster of Paris. Grades 5 - 8

Subjects: Earth Science
          Chemistry

Types: Mobile Lab
       In class
### Acid Rain: Chemicals in the Air
Simple pH testing with red cabbage indicator; simulate acid rain with indicator by blowing CO2 into it, increasing its acidity. Grades 6 to 8.

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### Beaks and Feet
How bird anatomy (types of beaks, types of feet) determines life style and food preference. Grades 3 to 6

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### Bridge Building: Computer Model
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### Bridge Building: Physical Model
Students build bridges from straws, tape, and cardboard, and test their strength. Grades 4 - 7

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### Cartesian Divers
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### Cartesian Divers 2
Explore density and buoyancy by making a cartesian diver out of a plastic pipette. Grades 3 - 6

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### Catapults
Work in teams to learn how a catapult works, and what variables you use to control your aim. Grades 3 & 4

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### Chemical Change - Identify an Unknown Substance
In this lab, students test four different white powders with four different liquids. They observe that the set of reactions the liquids have with each powder are different, and use that information to test and identify an unknown substance. Grades 5 - 7

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This lab discusses what happens during a chemical reaction, and how mass is conserved. Students observe gas formation, solid formation, color change, and temperature change during chemical reactions. Grades 5 - 7

Subjects: Chemistry
Types: In class
Out of school

Circuit on Paper
Create a “light-up” card using metallic tape to construct an electrical circuit on paper. Grades 3 - 6

Subjects: Physics
Types: In class
Out of school

Cleaning Oil Spills
This lab gives students an opportunity to explore four methods for cleaning oil spills, using a model ocean in a cup. Grades 6 - 8

Subjects: Earth Science
Ecology
Types: In class
Out of school

Color-Changing Slime
Make slime that includes a thermochromic pigment, and use it to explore the concept of heat transfer. Grades 3 - 6

Subjects: Chemistry
Types: Out of school

Computer Science
Four sections to familiarize students with computer technology: Computer Take-apart (and reassemble); Scratch Programming; Building Web Sites; Binary Numbers. Grades 4 - 8 (Multiple sessions)

Subjects: Technology
Types: Out of school

Computer Science: Making Web Sites
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Students will use Scratch programming to learn about logic, control structures, variables, and more, as they make designs and games, and solve problems. (Multiple sessions)

Subjects: Technology
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Coriolis Effect
Why do storms always rotate? Mark up a balloon with arrows to illustrate the forces that create the spiraling, rotating motion of storms.

Subjects: Earth Science
Types: In class
Mobile Lab

Dancing Plankton
Learn about the use of the microscope; observe and sketch three different microscopic organisms. Grades 4 - 7

Subjects: Biology
Life Sciences
Types: Mobile Lab

Diver Density
See what density is by comparing the weights and volumes of pairs of objects. Grades 4 - 7

Subjects: Earth Science
Physics
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Mobile Lab
# DNA Fingerprinting
Explore the DNA fingerprinting process by using paper “strands” of DNA to create DNA fingerprints. Grades 5 - 8

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# Electric Circuits: Series and Parallel
Build a number of circuits, including series and parallel. Grades 4 - 7

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# Electric Motor
Build a working electric motor with common materials: paper clips, magnets, and wire. Grades 5 - 8

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# Electromagnetism
See the effect of a magnet on a compass; build an electromagnetic rail “car”. Grades 4 - 6

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# Electroscope
Explore static electricity with balloons and build a simple electroscope to detect electrical charge. Grades 3 - 6

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# Engineering
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# Evidence: Hair
Using microscopes, students analyze hair samples and solve a simple crime scenario. Grades 5 - 12

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forensics</td>
<td>Out of school</td>
</tr>
</tbody>
</table>

# Fingerprints
Make a set of fingerprints and learn about characteristics that make them unique. Grades 3 - 6

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# Forensic Entomology
Using fly colony development to estimate time of death of a corpse. Grades 6 to 12.

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# Forensics
Students use various techniques to learn how crime scenes are analyzed. Grades 4 - 8 (Single or multiple sessions.)

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# Geopanes
Construct three dimensional shapes with toothpicks and raisins. Dip them in soap solution to explore the patterns of soap films that are formed. Grades 3 - 6

<table>
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<tr>
<th>Subjects</th>
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<tbody>
<tr>
<td>Chemistry</td>
<td>Out of school</td>
</tr>
<tr>
<td>Title</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Glass</td>
<td>Low to high tech: Students examine obsidian arrowheads, glass compression strength, lenses, and fiber optics.</td>
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</tr>
<tr>
<td>Gummy Capsules</td>
<td>The powder form of a polymer found in seaweed slime is reconstituted and reacted with calcium ions in solution to create “gummy” shapes.</td>
</tr>
<tr>
<td>Identifying Plankton</td>
<td>Same organisms as &quot;Dancing Plankton&quot;, but includes the use of a dichotomous key.</td>
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<tr>
<td>Indicating Electrolysis</td>
<td>Make a pH indicator using red cabbage leaves. Use the indicator to explore what happens when electrical energy is used to split water into hydrogen and oxygen.</td>
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<tr>
<td>Intersection Game</td>
<td>Construct a game based on the intersection of rows and columns in a grid. Devise a scoring system for the game.</td>
</tr>
<tr>
<td>Lattitude and Longitude</td>
<td>Learn about how to find locations on a map of the Earth. Reenforce the concepts by using lattitude and longitude to encode and decode messages with others in the group.</td>
</tr>
<tr>
<td>Mystery Solutions</td>
<td>Test various substances with vinegar, iodine, and heat; then try to identify an unknown mixture using what you have learned.</td>
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<tr>
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<tr>
<td>Mystery Substances</td>
<td>Examine solutions under a microscope and try to identify an unknown mixture.</td>
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<tr>
<td>Nano Technology</td>
<td>Explore how things behave differently when extremely small. (Single or multiple sessions.)</td>
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<tr>
<td>Ocean acidification</td>
<td>Using chemical reactions, this lab gives students an idea what ocean acidification means, and explores its potential effects on marine life.</td>
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</table>
Optical Illusions
Learn about and make illusions that show us how our visual perception works. Grades 3 to 6.

Subjects: Creativity
Types: In class
Out of school

Pen Chromatography
Use paper strips and two different solvents to separate the mixtures of colors in different black markers. Identify which was used to write a "ransom note". Grades 5 - 8

Subjects: Chemistry
Forensics
Types: In class
Out of school

Pentominoes Game
Explore what shapes can be made by combining 5 squares, with faces touching each other, in every possible combination. Cut out the shapes and use them to play a “Tetris” style game. Grades 3 - 6

Subjects: Math
Types: Out of school

Photography Camp
Campers build working pinhole cameras, take pictures with them, and develop the prints in a darkroom, just like in the "old days". Then, we will use digital cameras: taking photos, talk about composition, and load the images onto laptops and edit the photos with special effects. (Grades 4 to 7.)

Subjects: Creativity
Types: Out of school

Planet Orbital Periods
Students use PowerPoint to construct a model that shows the relative speeds of the planets as they orbit the Sun. Grades 5 to 7

Subjects: Earth Science
Physics
Types: In class
Mobile Lab

Polymer Balls
Explore polymers using Elmer’s glue and borax to create bouncy balls. Grades 3 - 6

Subjects: Chemistry
Types: Out of school

Rainbow in a Test-tube
Mix different concentrations of sugar solution in the colors of the rainbow, and make use of the differences in density to form layers in a test-tube. Grades 3 - 6

Subjects: Chemistry
Types: Out of school

Rocketry and Flight
Build various flying devices: rockets, hot air balloons, tumble wing gliders. Grades 4 - 8 (Multiple sessions.)

Subjects: Engineering
Technology
Types: Out of school

Saliva Testing
Test mock crime scene evidence for the presence of saliva using starch-agar plates and iodine solution. Grades 5 - 8

Subjects: Chemistry
Forensics
Types: In class
Out of school

Science Show
Different shows on topics like: general physics, science and music. A different show each year. Air pressure, gravity, electricity, etc. Audience participation! (For large audiences: 100+)

Subjects: Various
Types: Large audience
Seasons and the Earth’s Orbit
Hands-on activities and a PowerPoint animation to explore why the Earth has seasons.

Subjects: Earth Science
Types: In class

Solar System (for older grades)
An audio-visual presentation exploring the planets - not your run-of-the-mill PowerPoint. Grades 4 to 6

Subjects: Physics
Types: In class

Sound Science
Using oscilloscope software and common objects, students will examine sound waves concepts: wavelength, amplitude, and frequency. Grades 7 - 8

Subjects: Physics
Technology
Types: In class

Space Camp
Campers build and launch rockets, watch "Apollo 13", do Scratch programming to make space games, and more! Grades 3 to 7. (Multiple sessions)

Subjects: Technology
Types: Out of school

Squishy Circuits
Use conducting and insulating dough to build electrical circuits. Grades 3 - 6

Subjects: Chemistry
Physics
Types: Out of school

Static Electricity
Observe some effects of static electricity. Grades 4 - 7

Subjects: Physics
Types: In class
Mobile Lab

Stem-Makes-Music Camp
Campers build and play musical instruments (marimba, "canjo", and percussion from recyclables), and compose musical pieces together, and then perform them on Friday for their families. Grades 4 to 7. (Multiple sessions)

Subjects: Creativity
Types: Out of school

Stop-Motion Animation
Students make movies frame by frame, with toys, objects, even people! Each student gets a copy of the DVD with all the movies the students have made. Grades 4 - 8 (Multiple sessions)

Subjects: Creativity
Types: Out of school

Waste Water Treatment
Re-create the five steps that a water filtration plant uses to clean water for drinking. Grades 4 - 7

Subjects: Earth Science
Types: In class
Mobile Lab

High School

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Using microscopes, students analyze hair samples and solve a simple crime scenario. Grades 5 - 12

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Types: Out of school
Forensic Entomology
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