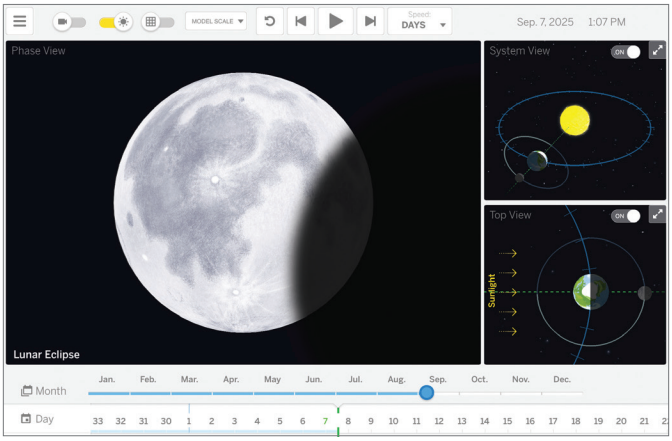
Introduction

Developed exclusively for Amplify Science, digital simulations, or "sims," are interactive, virtual worlds that allow students to discover and construct understanding of science concepts and phenomena. Sims provide students with opportunities to explore scientific phenomena that might otherwise be challenging to investigate in a classroom because they are too small, large, slow, distant, dangerous, or difficult to manipulate directly. Much like real scientists do, students in Amplify Science use technology to explore and investigate phenomena, observe and identify relationships, model processes, make predictions, gather evidence, and apply their understanding of science concepts.

Middle School

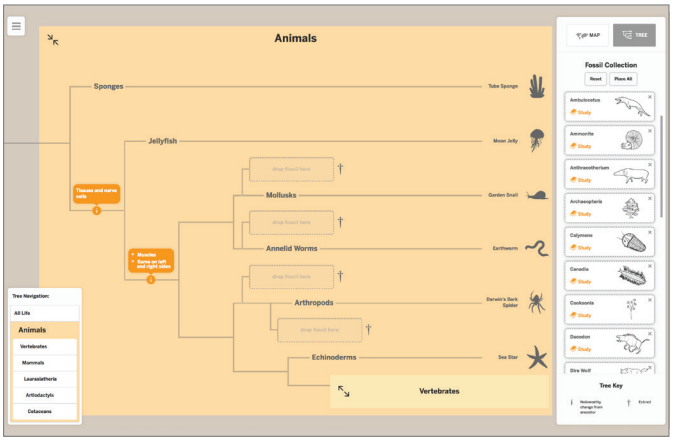
Earth, Moon, and Sun

The Earth, Moon, and Sun sim is an interactive model of the Earth, Moon, and sun system. It has two modes: Two View mode and Three View mode. In Two View mode, students can explore the causes of Moon phases by changing the position of the Moon in its orbit around Earth. In Three View mode, in addition to exploring Moon phases, students can discover the causes of lunar eclipses by manipulating a full three-dimensional model of the Earth, Moon, and sun system.



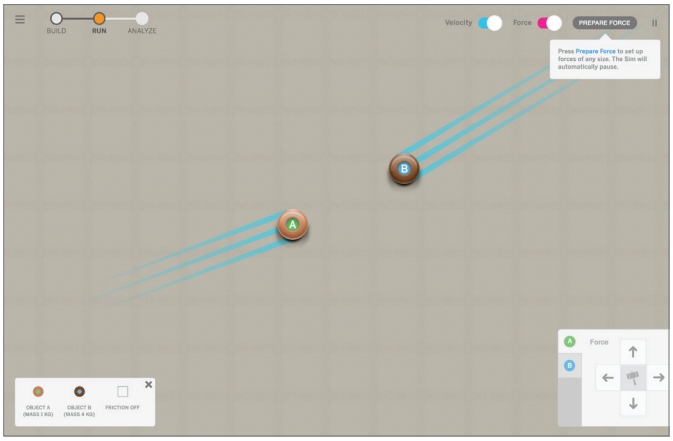
Evolutionary History

The Evolutionary History sim is an interactive model that allows students to explore a simplified, student-friendly version of the evolutionary “tree of life.” The sim features 55 real species, including 23 living species and 22 extinct species represented in the fossil record. The sim allows students to consider the changes that have taken place throughout the history of life, starting with the first single-celled organisms and ending with the complex and diverse array of species that we see today.



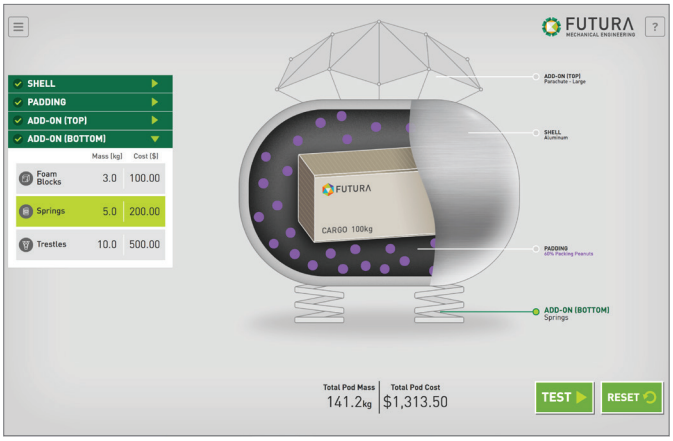
Force and Motion

The Force and Motion sim is an interactive model where students can visualize the motion of objects and investigate how an object's motion changes based on forces exerted on the object. Students can observe the effects of collisions between objects, observe friction's effect on objects, and directly exert forces on objects. By using this sim, students can gather data about the relationships among force, mass, and change in velocity, as well as the relationships among mass, velocity, and kinetic energy.



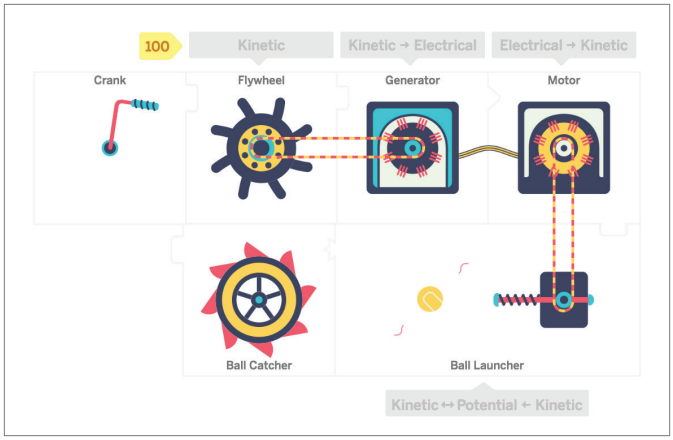
Force and Motion: Engineering Internship

The SupplyDrop Design Tool is a digital model that allows students to test various designs of supply pods for delivering emergency supplies to people in need. The tool offers students the ability to add and adjust features on their design. When a student runs a test, their supply pod is "dropped" and their choices are tested. Various numerical outputs are provided to give the student information on how the design performed. Students use the design tool multiple times throughout the unit in order to perform iterative tests on their supply pod design.



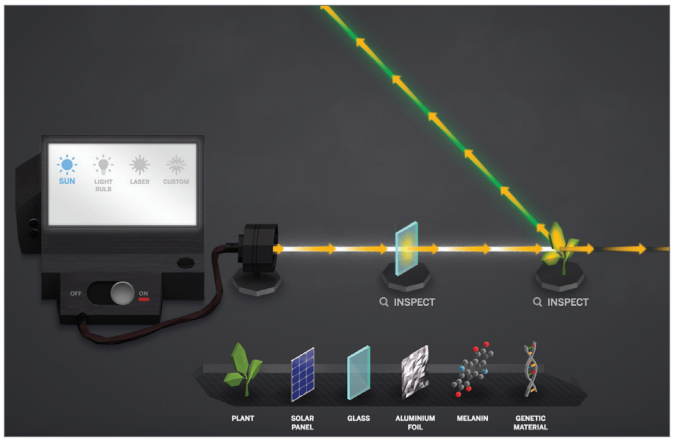
Harnessing Human Energy

The Harnessing Human Energy sim allows students to set up, modify, and compare different energy system configurations in order to explore different energy sources and investigate how energy changes as it moves through a system.

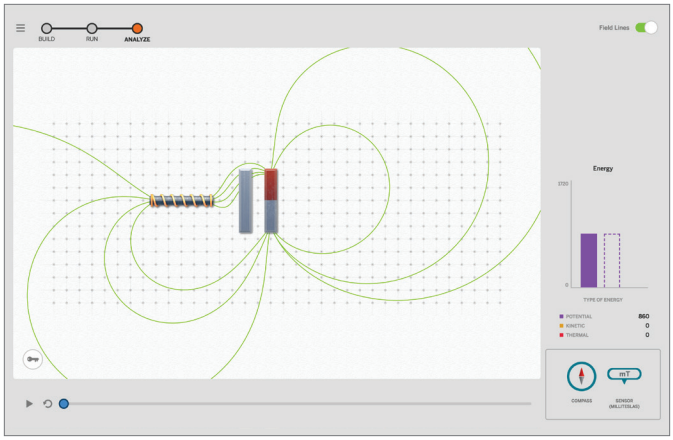


Light Waves

The Light Waves sim allows students to view the results of interactions between light and materials. Students choose between different light sources that emit a variety of types of light, and see representations of the path that light takes and the energy carried by the light. Students can place different materials in the path of the light and observe the light reflecting off, transmitting through, or being absorbed by a material. They also observe the changes to the materials that result when light is absorbed. Students can manipulate the wavelength and amplitude of a light waveform, and then observe the resulting changes to the type of light and its interaction with materials.

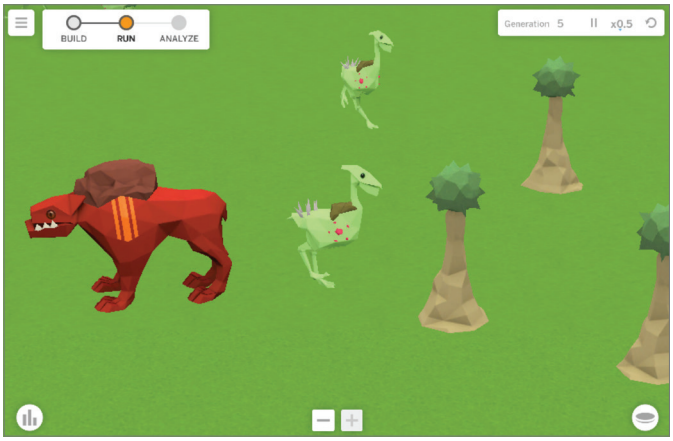


Magnetic Fields



The Magnetic Fields sim is an interactive model with two modes: Permanent Magnets and Electromagnets. In Permanent Magnets mode, students can investigate properties of bar magnets. In Electromagnets mode, students can investigate properties of both bar magnets and electromagnets. Each mode allows students to investigate the attractive and repulsive forces between magnetic objects, the magnetic field lines around these objects, and the strength of the magnetic fields around these objects. Students can also make observations about the conversion of potential energy to kinetic energy (and thermal energy) due to magnetic force.

Natural Selection



The Natural Selection sim is a dynamic, interactive, virtual world based on the rules of natural selection, a process that is difficult to observe directly because it takes place gradually, over long periods of time. By enabling students to set up populations with different trait distributions, manipulate environmental conditions, and investigate populations over time, the sim allows the complex process of natural selection to come alive for students.

Students can modify abiotic factors in the environment and adjust the presence and initial trait distributions of plant, herbivore, and predator populations. Students can then run the sim to quickly observe the results of their tests and analyze and interpret histograms to figure out how trait distributions change over time.

Natural Selection: Engineering Internship Selection

The MalariaMed Design Tool is a digital model that allows students to build and test antimalarial drug treatment designs that fight malaria parasite populations. Students use MalariaMed to research the effects of particular drug treatment regimens on a parasite population, and to iteratively design and test different antimalarial drug treatment plans. Students can use a variety of drug combinations in each design to observe the cause and effect of their design decisions. Students' ultimate goal is to design an optimal malaria treatment that can keep drug resistance low and minimize patient side effects, all for a low cost, while still reducing the number of malaria parasites in the population.