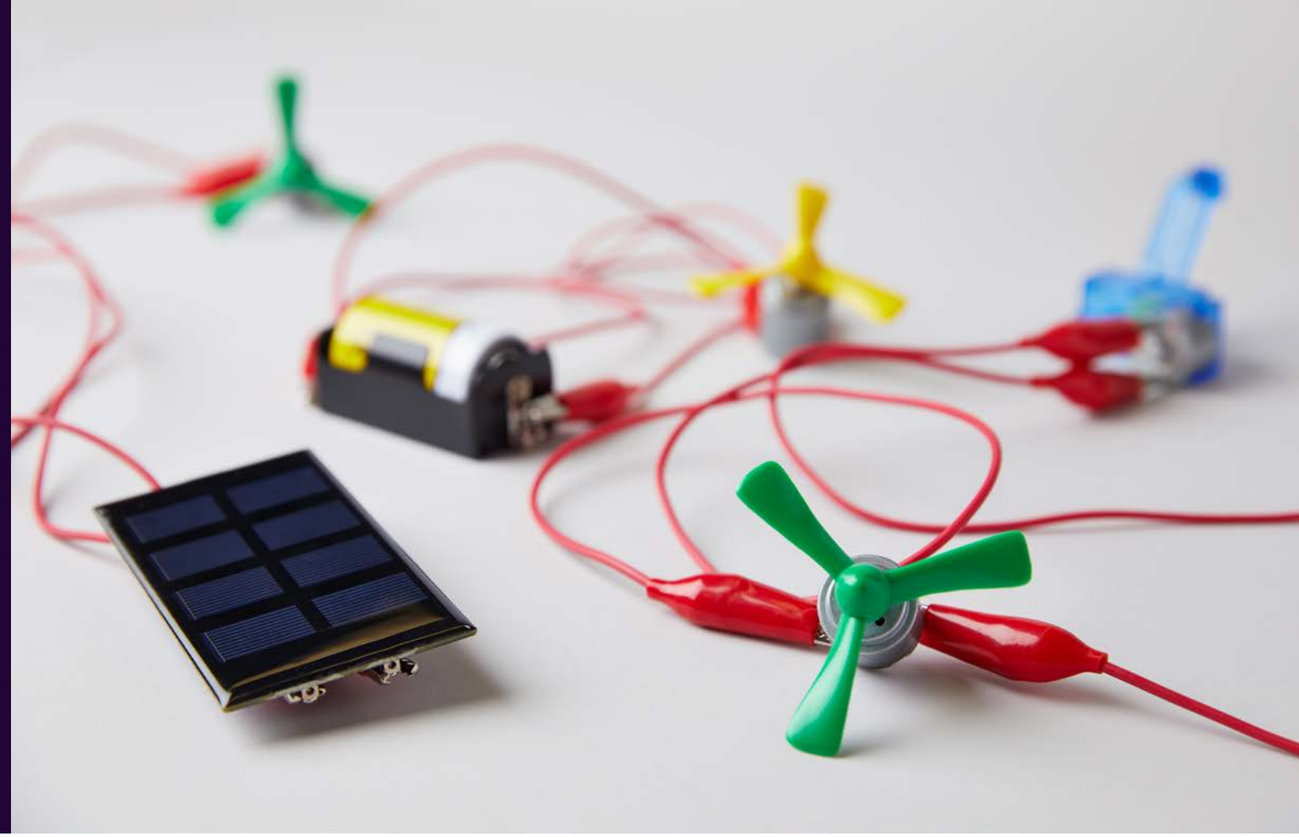


Harnessing Human Energy

Unit storyline

Energy-harvesting backpacks, rocking chairs, and knee braces are just a few of the devices that have been created to capture human energy and use it to power electrical devices. Students assume the role of student energy scientists in order to help a team of rescue workers find a way to get energy to the batteries in their equipment during rescue missions. To do so, students learn about potential and kinetic energy, energy conversions, and energy transformations.

Featured activity:
Investigating Energy Systems (Lesson 1.2)

In Lesson 1.2 of *Harnessing Human Energy*, students conduct a hands-on investigation to answer the Investigation Question: How do you know something has energy? To do this, students build three systems that use, respectively, a hand-crank generator, a battery, and a solar cell to make a fan spin and gather evidence about whether each system has energy.

Force and Motion

Unit storyline

In this unit, students engage in authentic work as they take on the roles of student physicists working for the fictional Universal Space Agency (USA). They are called upon to assist in the investigation of one recent mishap. Students apply their developing knowledge of force and motion to explain why a space pod failed to dock at the space station as planned. This mystery serves as the anchor phenomenon for the unit. As they investigate, students will learn about the relationship between force, change in velocity, mass, and the equal and opposite forces exerted during collisions.

Featured activity:

Exploring Mass, Force, and Velocity (Lesson 2.1)

Students use physical materials to plan and conduct an investigation about how exerting the same force affects objects of different mass. For example, students use a launcher to exert the same force on a golf ball and table tennis ball, and time how long it takes each ball to travel one meter.

INTEGRATED-SPECIFIC MODEL | GRADE 8

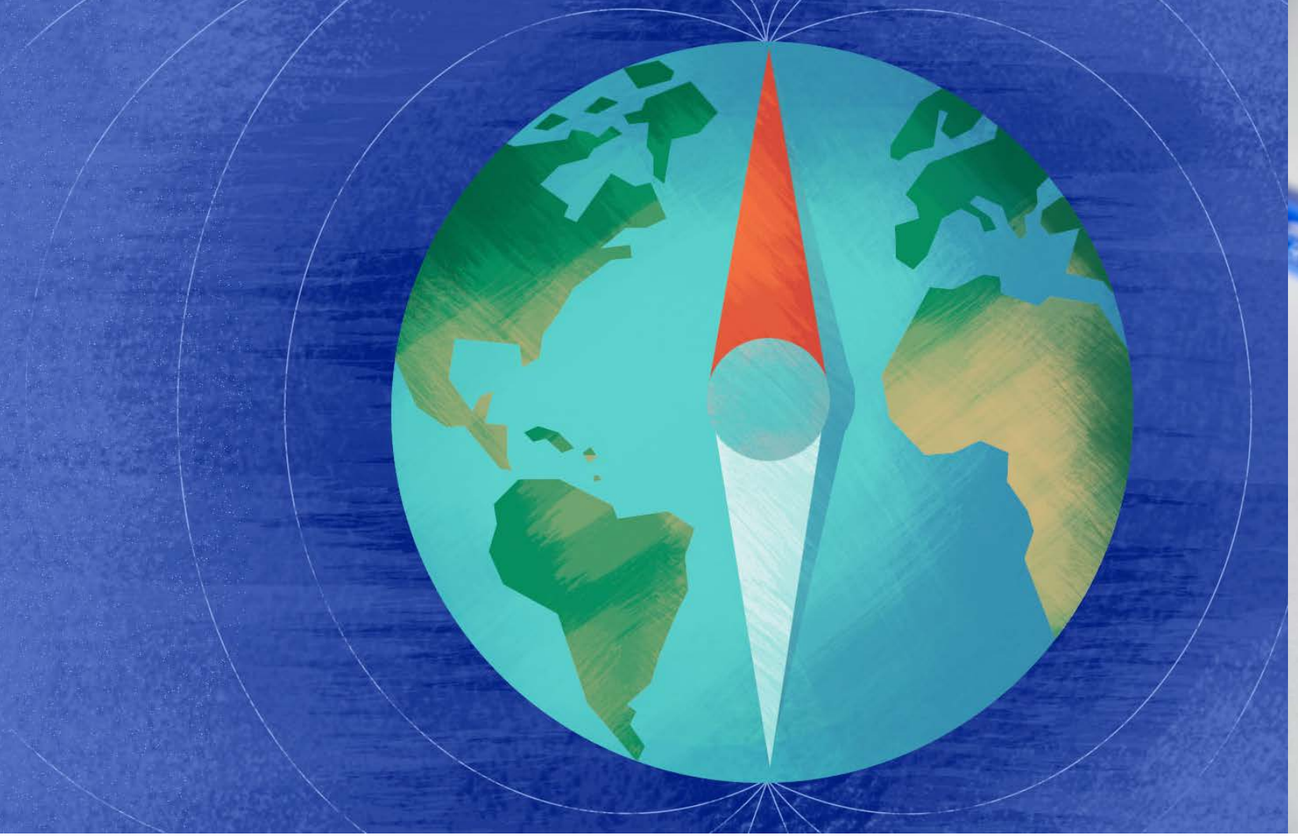
Force and Motion: Engineering Internship

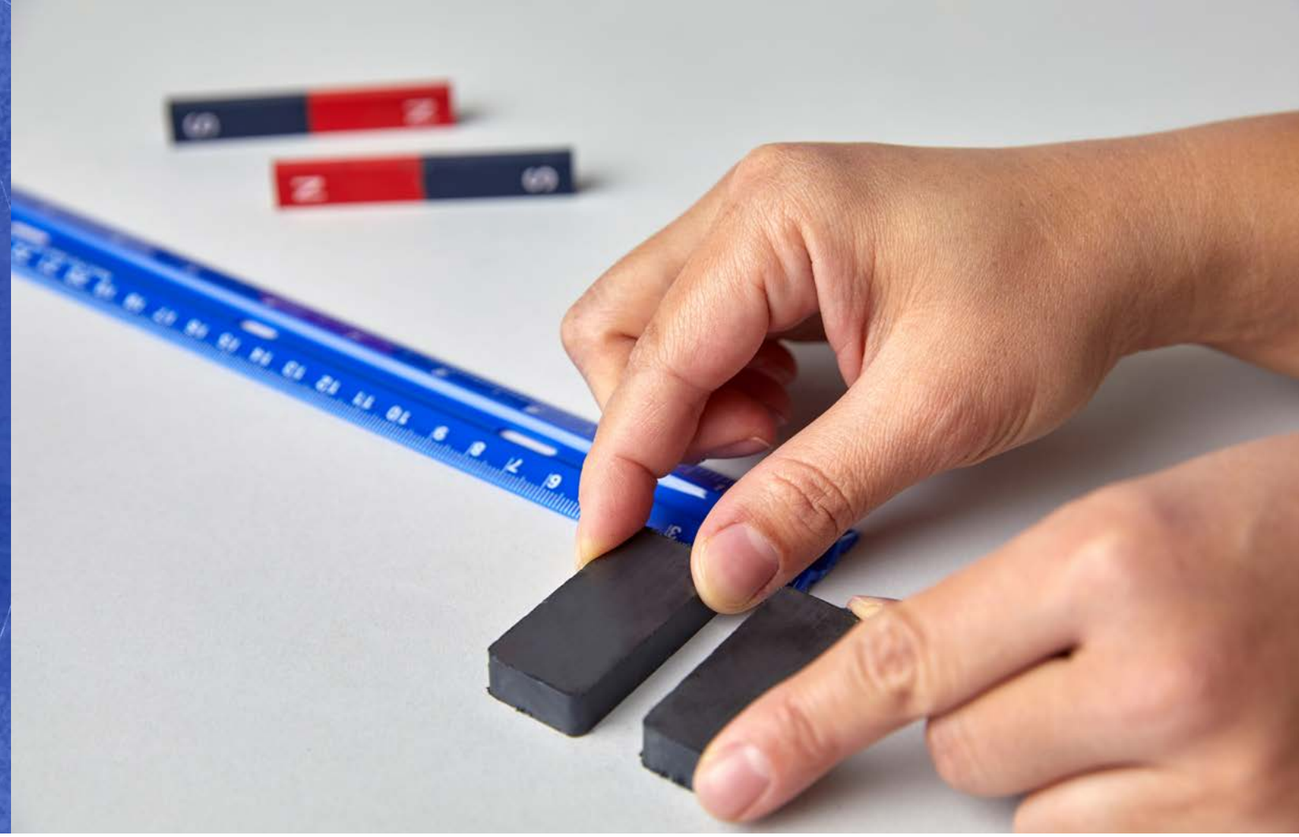
Unit storyline

In this unit, students work as mechanical engineering interns at Futura Engineering to design a supply pod that will deliver humanitarian aid packages to people in disaster-stricken locations. Specifically, they learn about engineering practices and deepen their understanding about collision forces. They explore how to manipulate mass and falling speed in the design process, using the SupplyDrop Design Tool to run iterative tests and collect data. They then focus on data analysis, noting the structure and function of different design features, in order to design a pod that survives the impact of colliding with the ground.

Featured activity:
Egg Drop Challenge (Day 2)

In this lesson, students deepen their research of collisions and impact forces by modeling the supply pods with a hands-on activity, the Egg Drop Challenge. Students design and build structures to surround and protect an egg. They weigh their structures and consider the effect of the mass on the impact it will experience. The Egg Drop Challenge spans two days, allowing time for student reflection and iteration.

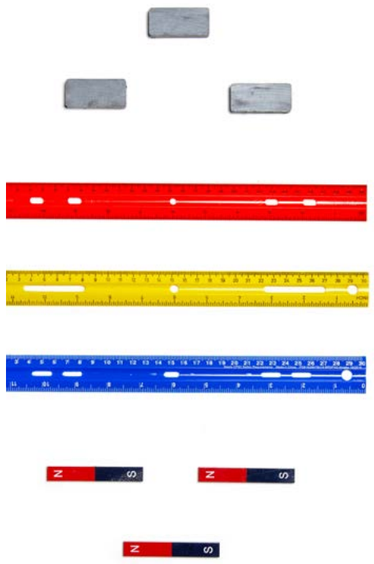




Magnetic Fields

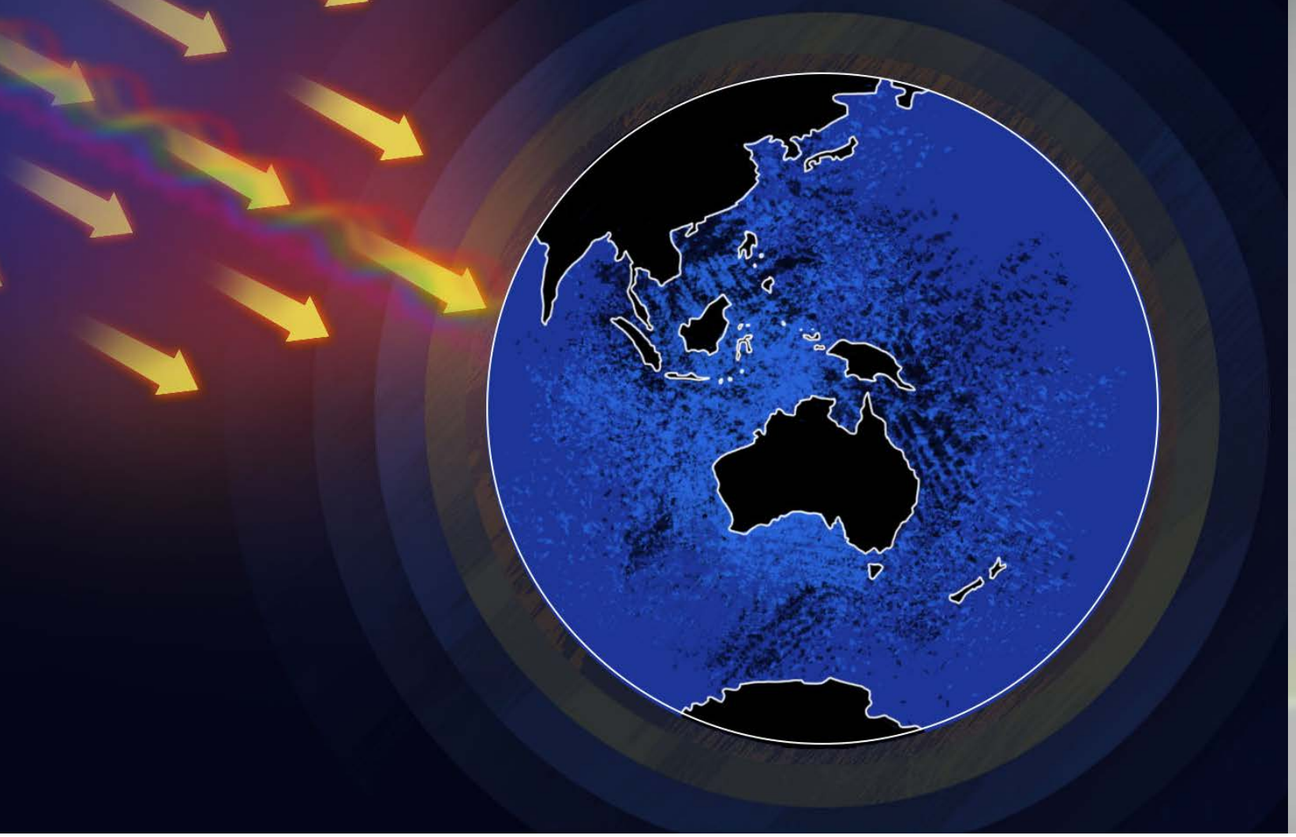
Unit storyline

In the roles of physicists working for the Universal Space Agency, a fictional agency that resembles NASA, students investigate the unexpected results from one test launch of a magnetic spacecraft. While scientists at the USA were testing the launch system, they found that the spacecraft in their third test traveled much faster than expected, and it's this unexpected outcome that serves as the anchor phenomenon for student investigations in the unit. Was there an error in magnet alignment? Was there an unexpected energy increase in the launcher system, or was there more magnetic force? Motivated to understand what affects the movement of magnets, students use the Magnetic Fields simulation, hands-on activities, and evidence from science articles to learn about magnetic force.



Featured activity:
Exploring Force and Potential Energy (Lesson 3.1)

In Lesson 3.1 of *Magnetic Fields*, students use magnets to test variables and gather data about magnetic force in a hands-on activity. This is an opportunity for students to plan an investigation using what they have learned about isolating variables. Students will create one experiment in which they isolate magnet strength and another in which they isolate the distance between magnets. They will then determine whether those variables affect the amount of potential energy that a system of magnets stores in the magnetic field.



Light Waves

Unit storyline

Taking on the roles of student spectroscopists working for the fictional Australian Health Alliance, students investigate why Australia's cancer rate is so high, analyzing real data that scientists might consider. This problem serves as the anchor phenomenon that students focus on throughout the unit. Students use the *Light Waves* simulation, conduct hands-on activities, read articles, and watch videos to gather evidence about how light interacts with materials. The sim allows students to observe how light carries energy and how this energy causes materials to change when it is absorbed. Students can simulate manipulating the wavelength of light, observing that different types of light have different wavelengths and that different types of light can change a material in different ways.

Featured activity:
How Different Light Sources Change Materials

Students conduct a hands-on investigation, shining an incandescent flashlight and an ultraviolet flashlight on different materials, and then observing different changes. Partners discuss the evidence and determine that different light sources can emit different types of light.

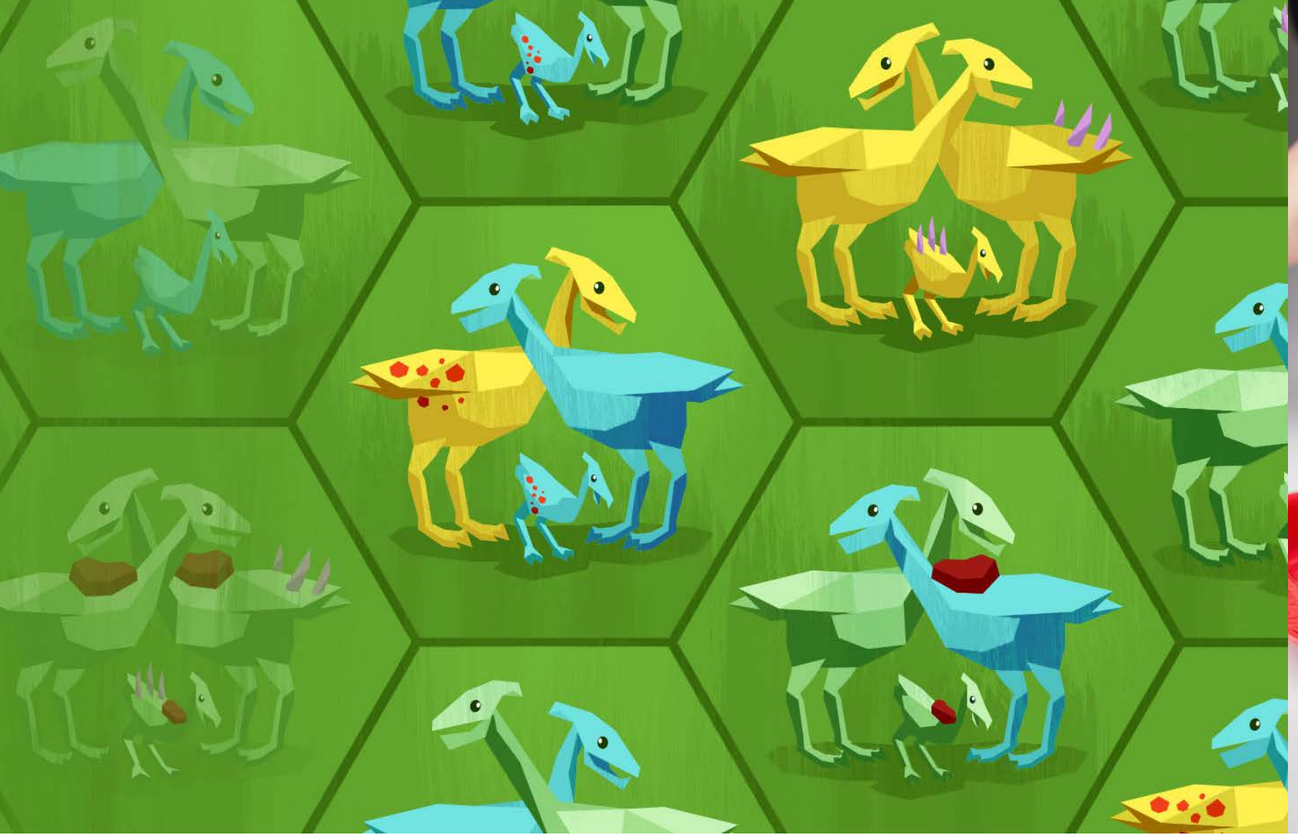
Earth, Moon, and Sun

Unit storyline

The *Earth, Moon, and Sun* unit begins as students take on the roles of student astronomers, tasked with advising an astrophotographer who needs to take photographs of the Moon for a fictional magazine called *About Space*. The astrophotographer can only take pictures of specific features on the Moon at certain times, and this serves as the anchor phenomenon for the unit. In order to provide advice about when to take photographs of the Moon as well as how to take photographs of a lunar eclipse, students will need to investigate where the Moon's light comes from, what causes the characteristic changes in the appearance of the Moon that we observe, and what conditions are required to view phenomena, such as particular moon phases and lunar eclipses. As students conduct these investigations, they will use a hands-on Moon Sphere Model, the digital *Earth, Moon, and Sun* simulation, and the *Earth, Moon, and Sun* Modeling Tool to gather and represent information about the movement of and light patterns on the Moon.

Featured activity:
Gathering Evidence from a Model (Lesson 2.2)

In Lesson 2.2, students use the Moon Sphere Model to gather evidence about why the Moon looks different to us from night to night. A light bulb is set up in the center of the classroom. Each student holds a sphere, and observes the appearance of the lighted part of the sphere as they orbit the sphere around themselves.



Natural Selection

Unit storyline

According to local legend around Oregon State Park, three unfortunate campers were found dead at their campsite and investigators found only one clue — a rough-skinned newt inside the coffee pot that the campers used to make their morning coffee. Student biologists investigate what caused the rough-skinned newts of Oregon State Park to become so poisonous. They uncover the mechanisms of natural selection, investigating variation in populations, survival and reproduction, and mutation.

FLEX

Featured activity:
Clawbeast Model

Each student plays the role of an individual in a population of fictional organisms called clawbeasts. One trait that varies in clawbeasts is the number of claws, and claws are used for getting food. With a recent natural disaster, this population no longer has a variety of food choices — there's only one type of plant available now, so students are able to step in and examine how the distribution of traits changes over multiple generations. They investigate claw traits in relation to this new food, based on individuals that either survive and reproduce (adaptive traits) or individuals that die and do not reproduce (non-adaptive traits). Students then think about and investigate what happens when the food source changes yet again.

Some materials depicted are independently sourced by teachers and not included with the Amplify Science kits.

Natural Selection: Engineering Internship

Unit storyline

The Natural Selection Engineering Internship asks students to design a treatment that does not cause an increase in the malaria parasite population while considering three criteria: One, minimizing drug resistance in the malaria parasite population; two, minimizing patient side effects; and three, keeping costs low. Students use the MalariaMed Design Tool to collect and analyze data, complete iterative tests, and learn about optimizing designs. By the end of this unit, students can describe engineering practices and compose a written proposal that supports their optimal design for making a safe and effective malaria treatment, one that also manages trade-offs between the project criteria.

Featured activity:
Modeling Population Shifts (Day 2)

In this lesson, students engage in a hands-on activity that simulates mutations in a malaria parasite population when an antimalarial drug is introduced to the environment. The three colors of cubes represent malaria parasites with different levels of drug resistance: green cubes represent individuals with no resistance, blue cubes indicate some resistance, and purple cubes indicate high resistance.

Evolutionary History

Unit storyline

Students act as student paleontologists to discover the evolutionary history of a mystery fossil. Is this species more closely related to wolves or whales, and how did all three species change over time? Students learn how to interpret similarities and differences among fossils, they investigate how natural selection can lead to one population becoming two different species, and also investigate evolution over vast periods of time.

FLEX

Featured activity:
Owl Pellets

Students examine the bones in an owl pellet as an analogy for the ways in which paleontologists examine fossil bones. Students dissect an owl pellet and separate the bones found in the owl pellet. They compare the bones they find to the bones of different organisms, focusing on making careful observations to identify what organism the bone may have come from and what type of bone it might be. Students then organize their bones into a skeleton, again focusing on making careful and precise observations as they decide where to place each bone.

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