Kindergarten

Energy from the Sun—SEP Simulation SE3: Planning and Carrying Out Investigations

This assessment focuses on making predictions, drawing conclusions from data collected during an investigation, and determining whether a solution meets a goal. The student will demonstrate mastery of the skills by:

1. Correctly predicting the amount of energy collected during July and December
2. Successfully identifying that the most energy was collected during summer and the least was collected during winter
3. Correctly concluding that the solar panel did not meet the goal of collecting the same amount of energy each season

Organisms' Impact on Environment—SEP Simulation SE7: Engaging in Argument from Evidence

The primary focus of this assessment is the student's understanding of how to construct an argument from evidence to support a claim. A student will demonstrate mastery of the concept by making observations, gathering evidence, and using evidence to support a claim.

Speed and Direction—SEP Simulation SE1: Asking Questions and Defining Problems

This assessment focuses on the student's understanding of how to identify testable questions and define problems related to speed and direction of playground equipment. Students are given three questions to select from. Their answers are highlighted in orange. A green check mark is placed next to the correct answer.

First Grade

Patterns in Space—SEP Simulation: SEP4: Analyzing and Interpreting Data

The purpose of this activity is to assess the student's use of observations to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.

Protecting the Young—SEP Simulation: SEP8: Obtaining, Evaluating, and Communicating Information

This assessment evaluates the student's ability to gather information and use it as evidence for a claim. In this situation, students decide whether each organism will need to be with its mother in order to thrive at the zoo. The key analytic is the pictures the student chooses to use as evidence for this decision. The baby bird and baby gorilla both need their mothers at the beginning of their life. Students should choose pictures that support the claim that these animals need their mothers. The flower, the tree, and the sea turtles do not need their mothers. Students should

choose pictures that show these plants growing on their own and having their needs met from sources other than their parents, and the baby sea turtles functioning on their own. The student will combine all the information to conclude that an animal is more likely to need its mother than a plant.

Behavior of Light—Simulation Practice: Light
This activity is designed to allow students to explore the concepts of reflection, refraction, and absorption of light. Students manipulate various objects to explore their effects on the behavior of light.

Animal Trait Inheritance and Variation— Simulation Practice: Traits Inherited vs Learned I
This activity is designed to give students practice identifying and differentiating between learned behaviors and inherited traits. Teachers are provided a final report of each student's performance.

Animal Trait Inheritance and Variation—Simulation Practice: Traits Inherited vs Learned II
In this activity, students review inherited traits and learned behaviors before having the opportunity to design their own organism that is best adapted to a particular biome. Teachers are provided a final report of each student's performance.

Second Grade

Effects of Wind and Water—SEP Simulation: SE6: Constructing Explanations and Designing Solutions
The purpose of this assessment is to evaluate whether the students are able to generate and/or compare multiple solutions to a problem. Students will be assessing causes of wind and water erosion in two different scenarios and deciding on solutions. Students will view each erosion scenario and choose from options to correct the problem. Students will view the effect of the different options and decide which best manages the erosion problem.

Mapping Our World—SEP Simulation: SE2: Developing and Using Models
The target of this assessment is to evaluate the student's ability to develop and use a model to represent amounts, scales, patterns, and relationships. In this situation, the students develop a model in the form of a map to represent their plan for a new public park. The key analytics are the student's placement of the symbols on their map and ability to interpret relationships between the items on the map. A student displays mastery if the map shows the following: a large playground near the fishing dock and a smaller playground north of the soccer field. Students should be able to interpret the following based on understanding that the lake takes up more space than the hills. Students should also be able to communicate that others can see their plan for the park by observing the symbols placed on the map.

What Plants Need—SEP Simulation: SE5: Using Mathematics and Computational Thinking

The main focus is to assess the student's mathematical and computational thinking. There are several key analytics in this SEP Simulation. Identifying the components of the graphs allows the students to demonstrate mastery of quantitative displays of data. Students will observe patterns of growth by reading the graphs and describing, measuring, and/or comparing quantitative attributes of different objects. They will also display data using simple graphs after testing the effects of color of light and type of liquid on plant growth. Understanding of these concepts will be shown in their open responses.

Mapping Our World—Simulation Practice: Landforms

In this activity students identify various landforms, such as dunes, canyons, and deltas, and describe the methods by which they were formed. Teachers are provided a final report of the student's performance.

Properties of Material—Simulation Practice: Properties of Matter

In this activity, students sort and select various items based on their properties, such as flexibility, shape, state of matter, weight, hardness, and texture. Teachers are provided a final report of each student's performance.

Third Grade

Objects In Motion—SEP Simulation SE3: Planning and Carrying Out Investigations

The primary focus of this assessment is student understanding of how to manipulate variables to conduct a fair test in order to collect data. The key analytic is the number of variables changed from trial to trial. A student will demonstrate mastery of the concept by changing only one variable from trial to trial. If a student changes only one variable in each trial, they will have collected appropriate data to allow them to draw the conclusion that the "up and down motion" is the most dangerous because every time the up and down motion is set to "high," the building collapses.

Weather and Climate—SEP Simulation SE4: Analyzing and Interpreting Data

This assessment focuses on the student's understanding of how to represent and analyze data in graphical displays in order to find relationships. A student will demonstrate mastery of the concept by finding the relationship between the increase in average temperatures and the changes in the environment.

Electric and Magnetic Forces—Simulation Practice: Magnets
In this activity, students explore the various properties of objects and magnets. Students explore whether or not various objects are attracted to magnets, and how magnets behave with each other. Teachers are provided a final report of each student's performance.

Life Cycles—Simulation Practice: Insect Life Cycles
In this activity, students identify and describe the stages of metamorphosis. Teachers are provided a final report of each student's performance.

Life Cycles—Simulation Practice: Metamorphosis
In this activity, students identify the stages of metamorphosis and describe the differences between complete and incomplete metamorphosis. Teachers are provided a final report of the student's performance.

Adaptations—Simulation Practice: Adaptations
In this activity, students match various adaptations to the environments and purposes for which they are best suited. Teachers are provided a final report of each student's performance.

Fossils—Simulation Practice: What Happened Before (Fossils)
In this activity, students label fossils based on their characteristics and use reference material to identify their age. Teachers are provided a final report of each student's performance.

Weather and Climate—Simulation Practice: Weather and Climate
In this activity, students practice differentiating between weather and climate. Teachers are provided a final report of each student's performance.

Fourth Grade

Renewable and Nonrenewable Resources—SEP Simulation SE8: Obtaining, Evaluating, and Communicating Information

The primary focus of this activity is to assess the student's ability to gather and combine relevant information from multiple reliable media sources to explain a solution to a problem. The key analytic is the appropriate connection between the supporting statement given by the student and the resource the student used to support it. Students demonstrate mastery if they can give a reasonable supporting statement for their solution and cite an appropriate, reliable source to back up that statement.

Rock Patterns—SEP Simulation SE6: Constructing Explanations and Designing Solutions

In this activity students identify various landforms, such as dunes, canyons, and deltas, and describe the methods by which they were formed. Teachers are provided a final report of each student's performance.

Energy and Electric Currents—Simulation Practice: Circuits and Electricity

In this activity, students practice constructing circuits and exploring the differences between conductors and insulators. Teachers are provided a final report of each student's performance.

Changing Land—Simulation Practice: Landforms

In this activity students identify various landforms, such as dunes, canyons, and deltas, and describe the methods by which they were formed. Teachers are provided a final report of each student's performance.

Renewable and Nonrenewable Resources—Simulation Practice: Alternative Energy

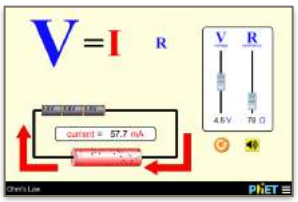
In this activity, students identify the sources of various alternative energy resources, for which part of the country they would be best suited, and their qualities. Teachers are provided a final report of each student's performance.

Forces and Motion: Basics—PhET Simulation
Explore the forces at work when pulling against a cart, and pushing a refrigerator, crate, or person. Create an applied force and see how it makes objects move. Change friction and see how it affects the motion of objects.

Bending Light—PhET Simulation
Explore bending of light between two media with different indices of refraction. See how changing from air to water to glass changes the bending angle. Play with prisms of different shapes and make rainbows.

Wave on a String—PhET Simulation
Explore the wonderful world of waves! Even observe a string vibrate in slow motion. Wiggle the end of the string and make waves, or adjust the frequency and amplitude of an oscillator.

Ohm's Law—PhET Simulation
See how the equation form of Ohm's law relates to a simple circuit. Adjust the voltage and resistance, and see the current change according to Ohm's law.



Fifth Grade

Transfer of Energy in a Collision—SEP Simulation: SE1: Asking Questions and Defining Problems
The focus of this assessment is the student's ability to ask questions and make predictions. Students will demonstrate mastery if they are able to create appropriate and testable questions, and make reasonable predictions based on the information provided.

Earth's Systems Interactions—SEP Simulation: SE2: Developing and Using Models
The primary focus of this assessment is the student's ability to develop an accurate model from a technical/scientific description.

Gravity—SEP Simulation: SE7: Engaging in Argument from Evidence

The primary goal of this activity is to assess the student's ability to defend a proposed solution using evidence. The key analytic is the evidence the student uses to support the statements in each audit. A student displays mastery of the goal if he or she cites specific, relevant evidence to accurately support the solution. The student should choose to close down the Spinning Swings and the Teacups because they use the most energy. Students should explain that a main part of the other rides' motion is falling down. This motion is aided by gravity because gravity pulls objects down. At the ice cream factory, students should recommend the conveyor belt and the mixer sections for improvement. These sections require the most energy because gravity does not help them move. The other sections of the production line use gravity to pull objects down, meaning they require less energy to function. The lid dispenser section uses no energy because gravity pulls the lids down the chute.

Matter Changing States—SEP Simulation: SE5: Using Mathematics and Computational Thinking

The primary target of this activity is to assess the student's ability to measure, describe, and organize data so that it can be compared. Comparing the data will help students find the best solution to a problem. The key analytic is the student's ability to accurately record data in the table and use it as evidence to support a conclusion. A student demonstrates mastery if he or she can compare the results in the data table and use the information to present a reasonable solution. The students will have accurately organized and compared data if they choose combination A + E for their first recommendation, choose combination B + F as their second choice, or choose combination B + D as their third choice. It should be noted that if the student's calculations are incorrect, it is likely a contributing factor to an incorrect conclusion. If the student's calculations are correct, but the conclusions are incorrect, it is a sign that the student has difficulty interpreting data, even if correct, to draw conclusions.

Reducing Human Impact—Simulation Practice: Alternative Energy

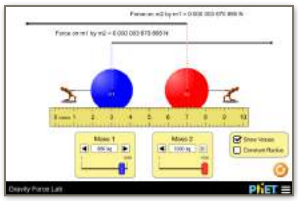
In this activity, students identify the sources of various alternative energy resources, for which part of the country they would be best suited, and their qualities. Teachers are provided a final report of each student's performance.

Earth's Rotation—Simulation Practice: Earth's Rotation

In this activity, students explore the relationship between Earth's rotation and day and night, as well as the effect of Earth's rotation on the movement of shadows.

Food Webs—Simulation Practice: Food Chains and Webs
In this activity, students begin by identifying producers, consumers, and decomposers before constructing food chains for various environments. Teachers are provided a final report of each student's performance.

Gravity Force Lab—PhET Simulation
Visualize the gravitational force that two objects exert on each other. Adjust properties of the objects to see how changing the properties affects the gravitational attraction.



Middle School Life Science

Bodies and Systems—SEP Simulation: SE1: Asking Questions and Defining Problems
The primary focus of this assessment is student understanding of independent and dependent variables and their relationships. A student will demonstrate mastery of the concept by creating questions about the relationships between the variables. In addition to this, students need to create an answer key for all the questions they created.

What Are Cells—SEP Simulation: SE3: Planning and Carrying Out Investigations
The focus of this assessment is the student's ability to successfully complete an investigation where data is gathered in pursuit of a particular goal. Students will demonstrate mastery if they are able to complete the investigation and accurately interpret the results of the investigation.

Genes and Gene Mutations—SEP Simulation: SE8: Obtaining, Evaluating, and Communicating Information
The primary focus of this assessment is for the student to communicate how gene mutations can cause alterations in the expression of traits. Students will be able to observe how some types of data collection occurs in gene sequencing, and then utilize the results of this type of sequencing to observe differences in gene sequences among individuals that are related. Finally, they are asked to make a written explanation for these gene differences and mutation occurrences.

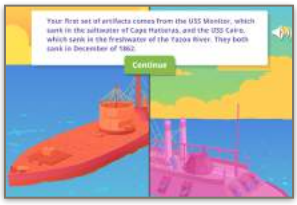
Middle School Physical Science

Thermal Energy Transfer—SEP Simulation: SE7: Engaging in Argument from Evidence

The goal of this activity is to assess the student's ability to make a written argument that supports or refutes the advertised performance of a device, process, or system. Student arguments should be based on empirical evidence of the technology's ability to meet relevant criteria and constraints.

Characteristics of Chemical Reactions—SEP Simulation: SE4: Analyzing and Interpreting Data

The primary focus of this assessment is analyzing data and applying reasoning to evaluate the data to evaluate the appropriateness or inappropriateness of conclusions.



Introduction to Properties of Waves—SEP Simulation: SE5: Using Mathematics and Computational Thinking

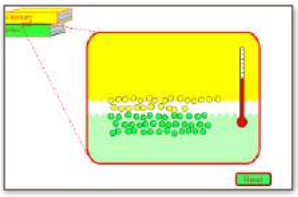
The goal of this activity is to not only expose students to the basic measurements and terms associated with waves, but also allow them to represent what they know through mathematical representations, specifically diagrams of sound waves. Students will seek to produce waves with the same period and amplitude but in the opposite phase of the supplied sound wave. Students will be able to manipulate their representations until they reach the correct answer.

Kinetic Energy—Simulation Practice: Calculating Speed

An interactive simulation in which students classify robots by calculating their speed.

Friction—PhET Simulation

Learn how friction causes a material to heat up and melt. What happens on an atomic level when you rub two objects together?

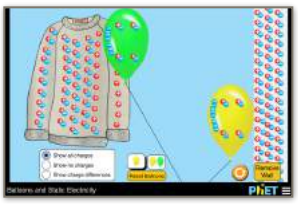


Forces and Motion: Basics—PhET Simulation

Explore the forces at work when pulling against a cart, and pushing a refrigerator, crate, or person. Create an applied force and see how it makes objects move. Change friction and see how it affects the motion of objects.

Reactants, Products, and Leftovers—PhET Simulation
Create your own sandwich and then see how many sandwiches you can make with different amounts of ingredients. Do the same with chemical reactions. See how many products you can make with different amounts of reactants. Play a game to test your understanding of reactants, products and leftovers. Can you get a perfect score on each level?

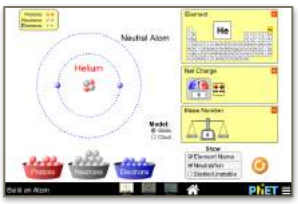
Balloons and Static Electricity—PhET Simulation
Why does a balloon stick to your sweater? Explore the charges in the sweater, balloons, and the wall as you investigate!



Energy Skate Park: Basics—PhET Simulation
Learn about conservation of energy with a skater gal! Explore different tracks and view the kinetic energy, potential energy and friction as she moves. Build your own tracks, ramps, and jumps for the skater.

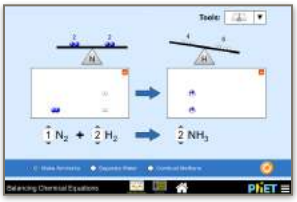
Charges and Fields—PhET Simulation
Arrange positive and negative charges in space and view the resulting electric field and electrostatic potential. Plot equipotential lines and discover their relationship to the electric field. Create models of dipoles, capacitors, and more!

Build an Atom—PhET Simulation
Build an atom out of protons, neutrons, and electrons, and see how the element, charge, and mass change. Then play a game to test your ideas!



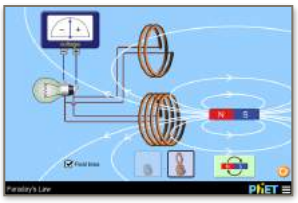
Wave on a String—PhET Simulation
Explore the wonderful world of waves! Even observe a string vibrate in slow motion. Wiggle the end of the string and make waves, or adjust the frequency and amplitude of an oscillator.

Balancing Chemical Equations—PhET Simulation
How do you know if a chemical equation is balanced? What can you change to balance an equation? Play a game to test your ideas!

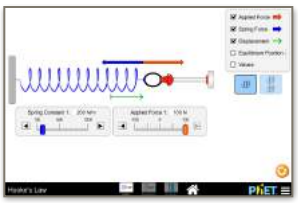


Bending Light—PhET Simulation
Explore bending of light between two media with different indices of refraction. See how changing from air to water to glass changes the bending angle. Play with prisms of different shapes and make rainbows.

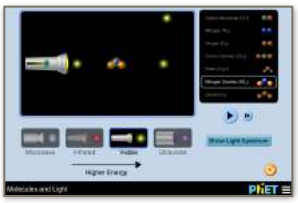
Faraday's Law—PhET Simulation
Investigate Faraday's law and how a changing magnetic flux can produce a flow of electricity!



Hooke's Law—PhET Simulation
Stretch and compress springs to explore the relationships between force, spring constant, displacement, and potential energy! Investigate what happens when two springs are connected in series and parallel.



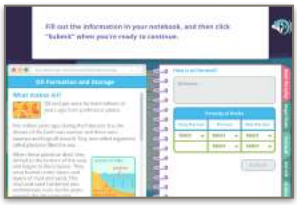
Molecules and Light—PhET Simulation
Do you ever wonder how a greenhouse gas affects the climate, or why the ozone layer is important. Use the sim to explore how light interacts with molecules in our atmosphere.



Middle School Earth and Space Science

Solar System—SEP Simulation: SE2: Developing And Using Models
The primary focus of this assessment is the student's understanding of how to construct a model to represent a natural phenomenon. Students will have the opportunity to construct a model. They will then demonstrate their knowledge of the construction of models and their limitations by answering the open-ended questions provided. In part two, the student will use a model to predict and explain how natural phenomena (in this case an eclipse) occur.

Geological History of the Earth—SEP Simulation: SE6: Constructing Explanations and Designing Solutions
The primary goal of this activity is to assess the student's ability to support a claim using appropriate evidence. The key analytics are the answers selected by the



student and the evidence cited to justify them. A student displays mastery of the goal if he or she cites specific, relevant evidence to accurately support the claims.

High School Life Science

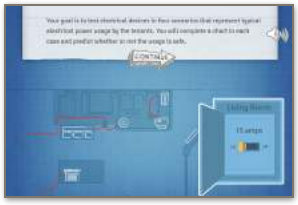
Evidence of Common Ancestry—SEP Simulation: SE8: Obtaining, Evaluating, and Communicating Information

The focus of this assessment is the student's ability to interpret observations and communicate information graphically and textually. Students demonstrate mastery of this skill when they are able to successfully complete the cladogram, and reach well-reasoned, text-based conclusions.

High School Physical Science

Electric Currents and Magnetic Fields—SEP Simulation: SE5: Using Mathematics and Computational Thinking

The primary focus of this assessment is the student's understanding of how to use mathematics and computational thinking to solve a problem. The student will use Ohm's Law to determine the number of amps (current) a group of devices will use in a typical electric circuit, and from the calculations, predict the probability of the circuit breaker turning off. The student will also apply knowledge of electricity and electric circuits. If the student correctly calculates the current in each of the four trials, the student should be able to make correct predictions. Finally, the student should provide a short written summary of a presentation he or she will present to the apartment tenants' meeting supporting or not supporting the apartment's management's decision to disallow use of portable electric heaters.



Energy Transfer in Thermal Processes—SEP Simulation: SE3: Planning and Carrying Out Investigations

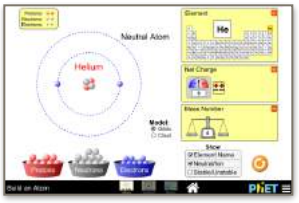
The focus of this assessment is the student's ability to systematically manipulate variables to carry out a useful and proper investigation. Duplicate combinations of direction and tilt may indicate that the student does not understand the concept of purposefully manipulating variables.

Formation of Elements—SEP Simulation: SE4: Analyzing and Interpreting Data

The primary focus of this assessment is on comparing and analyzing sets of data. The student will demonstrate mastery of the concept by dragging the appropriate elements onto the combined spectrums from each lab.

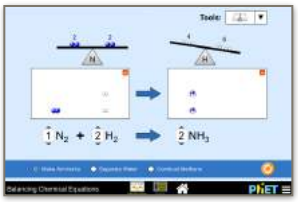
Build an Atom—PhET Simulation

Build an atom out of protons, neutrons, and electrons, and see how the element, charge, and mass change. Then play a game to test your ideas!

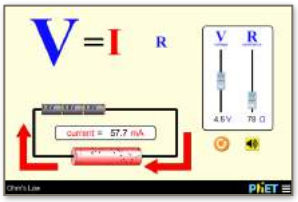


Energy Skate Park: Basics—PhET Simulation
Learn about conservation of energy with a skater gal! Explore different tracks and view the kinetic energy, potential energy and friction as she moves. Build your own tracks, ramps, and jumps for the skater.

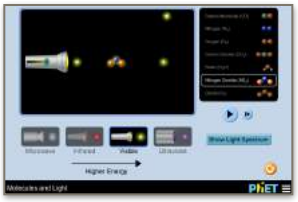
Balancing Chemical Equations—PhET Simulation
How do you know if a chemical equation is balanced? What can you change to balance an equation? Play a game to test your ideas!



Ohm's Law—PhET Simulation
See how the equation form of Ohm's law relates to a simple circuit. Adjust the voltage and resistance, and see the current change according to Ohm's law.

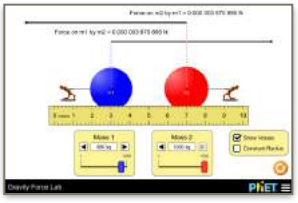


Molecules and Light—PhET Simulation
Do you ever wonder how a greenhouse gas affects the climate, or why the ozone layer is important. Use the sim to explore how light interacts with molecules in our atmosphere.



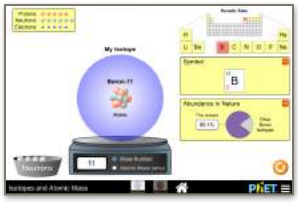
Wave on a String—PhET Simulation
Explore the wonderful world of waves! Even observe a string vibrate in slow motion. Wiggle the end of the string and make waves, or adjust the frequency and amplitude of an oscillator.

Gravity Force Lab—PhET Simulation
Visualize the gravitational force that two objects exert on each other. Adjust properties of the objects to see how changing the properties affects the gravitational attraction.

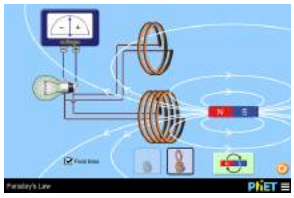


Molecule Shapes—PhET Simulation
Explore molecule shapes by building molecules in 3D! How does molecule shape change with different numbers of bonds and electron pairs? Find out by adding single, double or triple bonds and lone pairs to the central atom. Then, compare the model to real molecules!

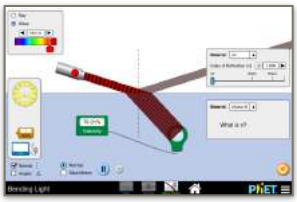
Isotopes and Atomic Mass—PhET Simulation
Are all atoms of an element the same? How can you tell one isotope from another? Use the sim to learn about isotopes and how abundance relates to the average atomic mass of an element.



Faraday's Law—PhET Simulation
Investigate Faraday's law and how a changing magnetic flux can produce a flow of electricity!

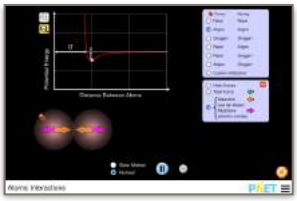


Bending Light—PhET Simulation
Explore bending of light between two media with different indices of refraction. See how changing from air to water to glass changes the bending angle. Play with prisms of different shapes and make rainbows.



Charges and Fields—PhET Simulation
Arrange positive and negative charges in space and view the resulting electric field and electrostatic potential. Plot equipotential lines and discover their relationship to the electric field. Create models of dipoles, capacitors, and more!

Atomic Interactions—PhET Simulation
Explore the interactions between various combinations of two atoms. Observe the the total force acting on the atoms or the individual attractive and repulsive forces. Customize the attraction to see how changing the atomic diameter and interaction strength affects the interaction.



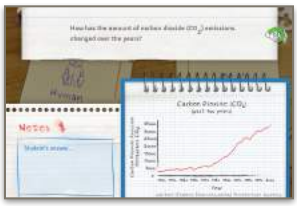
High School Earth and Space Science

Kepler's Laws—SEP Simulation: SE1: Asking Questions and Defining Problems

The primary focus of this assessment is asking questions and generating hypotheses. The student will demonstrate mastery by responding to and generating questions that seek more information and clarify understanding.

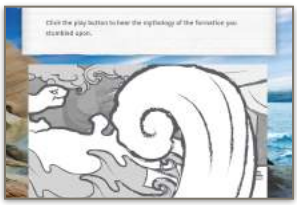
Changing Climate—SEP Simulation: SE2: Developing and Using Models

The primary focus of this assignment is to allow students to look at different models/ graphs for changes in the climate over the past 100 years. The focus is not on students' understanding of climate change in explicit terms; rather, the goal is for students to interpret the data shown in these models in order to look for similarities and draw conclusions from the data seen in the graphs.



Earth's Formation—SEP Simulation: SE7: Engaging in Argument from Evidence

The focus of this assessment is the student's ability to evaluate the merits of arguments, and respond thoughtfully to challenges to their ideas. Students will demonstrate mastery if they are able to articulate and justify their reasoning behind their judgments and respond thoughtfully to challenges to their arguments.



Earth's Early History—SEP Simulation: SE6: Constructing Explanations and Designing Solutions

Emphasis is on using available evidence within the solar system to reconstruct the early history of Earth, which is believed to have formed along with the rest of the solar system about 4.5 billion years ago. Examples of evidence include the estimated ages of ancient materials (obtained by radiometric dating of meteorites, moon rocks, and Earth's oldest minerals). The student's goal in this assessment is to apply scientific reasoning, theory, and/or models to link evidence to the claims in order to assess the extent to which the reasoning and data support the explanation or conclusion.

The Stars—Simulation Practice: Electromagnetic Spectrum

An interactive simulation in which students use the electromagnetic spectrum to analyze the characteristics of stars.