Impact Science

6th Grade EARTH SCIENCE Storylines

 impactscience.co

Instructional Segment:	I. Weather Climate Climate Change	II. Earth Systems Natural Resources	III. Earth's Place in the Universe Geologic Time Scale Human Impact
Storyline:	Energy from the Sun drives weather, climate, and climate change, as sunlight interacts with the Earth and its water, soil, and atmosphere.	We live on an Earth that is dynamic; changes are sometimes sudden and catastrophic and need to be planned for, but other times so slow that they are barely noticeable during our lifetime. On the other hand our use of natural resources is changing the Earth in ways that will be hard to reverse or mitigate.	Our place in the universe and our place on Earth's timeline are both pretty special; we should be mindful of our human impact as we live our lives.
Life Sciences (LS)	To model the water cycle, students make and observe a terrarium. They consider the role of living things and humans in the water cycle. In Climate, they use their knowledge of climates and climate zones to design an ecotourism resort. Climate Change explores the effects of climate change on living things, as well as the role of living things in climate change — the role of trees as carbon sinks for example, and cows as greenhouse gas producers.	Students consider living things in the context of geological events – such as which volcanoes are more destructive, based on their proximity to humans and other living things. In addition, students consider fossil evidence for Pangaea, the body of evidence for which spans many disciplines. Students research our extraction, production, and use of natural resources and the effects on living things, including people. The Natural Resources anchor phenomenon is the plastics pollution problem and how to solve it, since plastics do not decompose via biological processes and this is having a negative impact on living things.	The anchor phenomenon for Geologic Time Scale is, why did the dinosaurs go extinct? Students use fossil evidence to understand what we know about Earth's past. In Earth's Place in the Universe students read about astronomy in ancient cultures around the world, bring in humanities and social studies. Finally in Human Impact students consider how humans are affecting ecosystems.
Earth and Space Sciences (ESS)	Students pose questions about what causes different kinds of weather and climate, then model these meteorological phenomena. They research extreme weather events, and also study the increasing frequency of these types of weather phenomena. Then they are able to consider climate change, evidence for it, and causes and effects.	Students consider everything from rock formation to the layers of the Earth to plate tectonics in the context of the Earth as a system. Erosion, weathering, rock types and the rock cycle, volcanoes, earthquakes, and plate tectonics are all interconnected, as students will note on their way to solving the mystery of how the Grand Canyon might have formed. The Natural Resources unit has a heavy emphasis on geology, mining, and why resources are distributed as they are based on past plate motions.	In Earth's Place in the Universe, students study and explain phenomena such as the seasons, eclipses, and phases of the moon. Earlier in the year in Climate they thought about seasons, but now they are able to explain the underlying reason. To make sense of the Earth's layers and the fossil evidence, they use what they learned in the previous segment in the Earth Systems unit. Human Impact revisits water resources and climate change, themes from the first Instructional Segment.
Physical Sciences (PS)	Students did some preliminary exploration and designed their own investigations with ice and dry ice in the Intro unit. They use what they learned about energy and matter to model weather phenomena, and to understand the mechanisms behind climate and climate change. To understand air pressure and air masses, students study the properties of air. Weather instruments also work on physical science principles, measuring such things as temperature and air pressure.	Students think about the forces that shape rocks and geological formations. Students simulate the physical processes by which different types of rocks form — simple layering for sedimentary rock, heat and pressure for metamorphic rock, and crystal formation during cooling for igneous rock. In the Natural Resources unit, students carry out the reactions to make a type of bioplastic in order to better understand the plastics problem and the reliance on petroleum for large-scale plastics production.	Earth's Place in the Universe sets the scene by looking at our place in the cosmos. Students use solar system data and to look for trends in size, density, gravity, etc. They model alignments of different bodies to explain phenomena, and even pace out the scale of the solar system. In Geologic Time Scale students look at meteorite impacts and consider how large the impact would have needed to be in order to wipe out the dinosaurs.
Engineering, Technology, and Applications of Science (ETS)	Engineering design opportunities are varied, from tinkering with weather instruments, to designing an ecotourism resort which draws on students' understanding of climate as well as their own interests and the environment. In Climate Change, students design a program to reduce carbon footprint and collect data to gauge how well it is working and make improvements – showing that engineers design and improve programs and processes as well as devices and technologies.	Having learned that earthquakes are more likely to occur in certain places, students design model buildings for earthquakes, taking into account the uses of the building, its ability to withstand loads and shaking, as well as the location and soil type. Students research the sourcing and mining of everyday materials and the consequences of this extraction in the Natural Resources unit. They also analyze the product life cycle of plastics to devise and articulate possible solutions to the plastics pollution problem.	To cap off Earth's Place in the Universe students design a physical model or a multimedia presentation that explains one of the phenomena they have studied, essentially designing a museum exhibit. In Geologic Time Scale they learn about different fossil dating techniques. In Human Impact, students recommend a solution to address negative human impacts and present it to decision makers.

Impact Science

7th Grade LIFE SCIENCE Storylines

 impactscience.co

Instructional Segment:	I. Cells Body Systems Traits & Survival	II. Resp. & Photosynthesis Ecology Evolution
Storyline:	Living things need certain things to survive and reproduce; human impacts are negatively affecting survival and reproduction for many species.	Setting up a habitat on Mars is much more complicated than one might think. Earth's ecosystems are actually quite delicate and complex, and their balance depends on many factors, including how various organisms have evolved over many generations.
Life Sciences (LS)	The Cells and Body Systems units are closely interrelated and can be taught in either order, small to large, or large to small. This instructional segment culminates with Traits and Survival, in which students consider cause-and-effect relationships, and how different traits contribute to the chances of survival and successful reproduction. Students research an endangered species of their choosing. Based on evidence from their research, students construct a scientific explanation for how genetic and environmental factors affect their endangered species.	The focus of these units is ecology, and the life science processes that ecosystems depend on. In Respiration & Photosynthesis students analyze what living things need, in order to determine what is needed for a Mars mission. Through several examples and case studies, students come to appreciate the delicate balance in ecosystems and the important role of predators. In Evolution students look at structural similarities in organisms as well as similarities in several animal embryos. Ecology and Evolution build on what students learned in Traits & Survival in the first segment, extending survival and reproduction to populations, and then populations evolving over time.
Earth and Space Sciences (ESS)	As students research their endangered species, it becomes evident that human impacts such as climate change are responsible for many species becoming endangered. This ties back to the storyline of the first instructional segment from 6th grade, which culminated in climate change and its effects.	The Evolution unit relies on what students learned about Earth's past in the Geologic Time Scale unit in 6th grade. The anchor phenomenon for the Respiration & Photosynthesis unit is designing a Mars habitat; students ask questions and do research comparing Mars and Earth in terms of soil, atmosphere, etc. in order to figure out what would be needed to support life on Mars.
Physical Sciences (PS)	In their study of body systems, students compare mechanical joints to joints in the human body. They draw each mechanical joint and then compare to human joints, noting similarities and differences in terms of structure and function. In preparation for studying cells, students investigate with hand lenses, measuring and calculating how much one hand lens magnifies compared with two hand lenses used in combination.	Students learn about respiration and photosynthesis, the two complementary chemical processes that are the foundation of all life and ecosystems. To understand ecosystems — and to plan a successful habitat on Mars — students analyze the flow of energy and cycling of matter in the ecosystem.
Engineering, Technology, and Applications of Science (ETS)	Students design a magnifying device in order to view things more closely. They read about the history of the microscope, tying in connections among engineering, technology, and society. At the end of the Body Systems unit, they design a system for organ donation.	Students designs a Mars habitat in the Respiration & Photosynthesis unit and ecosystem restoration solutions in the Ecology unit. Evolution culminates in a research project on the topic of genetic engineering technologies and their ethical dilemmas.

Impact Science

8th Grade PHYSICAL SCIENCE Storylines

 impactscience.co

Instructional Segment:	I. Thermal Energy	II. Properties of Matter Elements & Compounds Physical & Chemical Changes	III. Motion & Forces Kinetic & Potential Energy	IV. Electricity & Magnetism Waves
Storyline:	Thermal energy transfer happens all around us, starting with energy from the Sun; understanding different types of thermal energy transfer can help us with everything from insulating our houses to refrigerating and cooking food.	All the materials around us, with all their unique properties, are made of the same hundred or so elements; the way these are combined (or not combined) changes during chemical reactions, resulting in materials with new properties.	Understanding forces and energy can help us bring astronauts safely back to earth and design equipment to prevent sports injuries.	Electricity and magnetism are closely related, and can be used for a variety of practical applications, such as electric motors, home electrical systems, and various ways to generate sound and light.
Life Sciences (LS)	To complement their solar cooker redesign, students read about how solar cookers benefit people, and how the high temperatures kill bacteria that cause illness.	The anchor phenomenon "What killed Blinky the fish?" relates properties of common household compounds to the context of safe water for fish. Students study acids and bases in the context of foods and medicines. Tasked with designing hot/cold packs, they generate questions and do related research; for example, they might research frostbite, or how hot/cold packs can be used to relieve symptoms in people with different conditions.	The anchor phenomenon for the Kinetic & Potential Energy unit is, how do we prevent concussions? Students review functions of the different parts of the brain and the possible consequences of damaging each one, which they learned in 6th grade in the Body Systems unit. They design a helmet that can be worn during soccer or another sport to protect both the brain and brain stem.	Related to the study of magnetism, students analyze the importance of the Earth's magnetic field to protecting life on the planet. They read about animals that have magnetoreception and research how it works and why it's important. Students' study of electromagnetic waves touches on how sight works, as well as medical uses of x-rays and other technologies.
Earth and Space Sciences (ESS)	Student compare radiation from the Sun to radiation in a microwave oven. They ponder how we get thermal energy from the Sun — certainly not as "heat", since there is only cold empty space between us and Sun. It is actually sunlight that radiates out from the Sun and is absorbed by various materials — in our bodies, our homes, or a solar cooker.	Students research elements and where they are found on Earth. They look at data about the prevalence of elements both in the Earth and in the human body.	The anchor phenomenon for Motion and Forces is, how do we get astronauts safely to the International Space Station (ISS) and back? Students do research on the ISS. They design a space capsule that could bring astronauts safely back to Earth, then test it using specific criteria.	For Electricity & Magnetism, the anchor phenomenon is the Earth's magnetic field. Students use compasses and model how they think the magnetic field works and what causes it. They return to this question at the end of the unit and construct an explanation based on physical and geological evidence. Reviewing what they learned in 6th grade about the layers of the Earth and the properties of each one, they carefully consider which one could be responsible for the Earth's magnetic field, based on evidence.
Physical Sciences (PS)	Students study thermal energy and kinetic energy concepts in the context of redesigning their solar cookers. As they learn about radiation, conduction, convection, and what we mean by "heat" and "cold" they apply these concepts to the solar cooker.	Students explore properties of common everyday materials, experiment with physical and chemical changes, and perform electrolysis on water to separate it into its component elements. They notice trends in the properties of elements in the periodic table and relate these to atomic models of those elements.	Students study motion and forces; they observe motion and gather data in order to come to their own conclusions about force and mass before reading the original text of Newton's laws. Students then study kinetic and potential energy (both gravitational and elastic potential energy) and use these to design a helmet that will prevent concussions.	Students experiment and model with magnets, then study static electricity and electric current. They gather data on the properties of magnets, as well as components of an electric circuit. They also make an electromagnetic nail and an electric motor (these can be demos at the teacher's option) to study the interplay of electricity and magnetism. In the Waves unit, students analyze and model both sound waves and light waves, and analyze the similarities and differences.
Engineering, Technology, and Applications of Science (ETS)	Engineering design is interwoven throughout the unit. Students start by observing a solar cooker that only works moderately well and modeling how it uses sunlight to heat food. As they learn about thermal energy concepts, they think about how to apply them to improving the cooker -- in terms of shape, materials, and other design features.	Students design a density toy, a crystal growing kit complete with instructions and packaging, and a hot or cold pack along with an accessory that uses it. They also read about how different technologies – such as bicycles – use different materials for different components based on the desired properties.	While studying motion and forces, students design and test a model space capsule that will bring an astronaut safely back to Earth, and test it by dropping it and studying the damage using specific criteria. To apply kinetic and potential energy, students design and construct a helmet to prevent concussions during soccer or another sport.	In Waves, students model analog and digital transmission and compare the two technologies. In the Waves unit, they build their own speaker, which uses electricity and magnetism, bridging the two units. Multiple other design opportunities include wiring a toy house, and designing a sound and light display that is either artistic or practical.