

**Telluride School District
Eighth Grade Science**

Fertile Questions:

Standard	Student Outcomes	Process Skills	Activity/Lesson/Lab	Resources	Assessment
<p>Physical Science</p>	<p>1. Identify and calculate the direction and magnitude of forces that act on an object, and explain the results in the object's change of motion</p> <p>Students can: a. Predict and evaluate the movement of an object by examining the forces applied to it b. Use mathematical expressions to describe the movement of an object c. Develop and design a scientific investigation to collect and analyze speed and acceleration data to determine the net forces acting on a moving object</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p>	<p>1. Students will construct a pendulum, predict and evaluate it's movement based on gravity, and graph its kinetic and potential energy. 2. Students will construct a rollercoaster, predict and evaluate it's movement based on gravity, and graph its kinetic and potential energy.</p>	<p>Basic physics resources, ie: Prentice Hall Earth Science Text Internet: Howstuffworks, http://phet.colorado.edu/en/simulation/energy-skate-park class demonstration using weight and string for a pendulum , and exploration by students using string and weights Lab supplies</p>	<p>Graphs of Ek and Ep for the pendulum and rollercoaster. Students will demonstrate proficiency by understanding the inverse relationship between Kinetic and Potential energy Physics clicker quiz Physics Unit Test</p>

<p>2. There are different forms of energy, and those forms of energy can be changed from one form to another – but total energy is conserved</p> <p>Students can: a. Gather, analyze, and interpret data to describe the different forms of energy and energy transfer b. Develop a research-based analysis of different forms of energy and energy transfer c. Use research-based models to describe energy transfer mechanisms, and predict amounts of energy transferred</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p>	<ol style="list-style-type: none"> 1. Students will create and analyze flow charts for energy in given situations, i.e., a car coming to a screeching halt, a cell phone, eating an apple, etc. 2. Students will come up with some way to show the Law of conservation of Energy 	<p>Everyday observations and notes on the different types of energy transformations. For example, cell phone...energy transformations will go as follows: chemical, electrical, light and sound with thermal energy between every transformation Lab supplies</p>	<p>Clicker quiz (not for a grade) Physics Unit Test</p>
<p>3. Distinguish between physical and chemical changes, noting that mass is conserved during any change</p> <p>Students can: a. Identify the distinguishing characteristics</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing</p>	<ol style="list-style-type: none"> 1. Student generated and hand made periodic tables 2. Law of conservation of Mass lab 3. Physical vs Chemical change Lab 4. Design a way to show a chemical and a physical change to the rest of the class 	<p>Periodic table Ptable.com Periodictable.com Prentice Hall Earth Science Text: We use the section on minerals identification. Each group of students is assigned one way to identify minerals and it is their job to teach it to the class. Mineral lab supplies (several boxes of minerals and identification materials.)</p>	<p>Student presentations Chemistry Unit Test Being able to demonstrate that mass is conserved using atom lab supplies when going from one state to another or one molecule/substance to another</p>

<p>between a chemical and a physical change b. Gather, analyze, and interpret data on physical and chemical changes c. Gather, analyze, and interpret data that show mass is conserved in a given chemical or physical change d. Identify evidence that suggests that matter is always conserved in physical and chemical changes e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate physical and chemical changes</p>	<p>perspectives; understand and apply knowledge of culture; seek other's ideas Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p>			
<p>4. Recognize that waves have unique characteristics and properties such as electromagnetic, sound, seismic, and water</p> <p>Students can: a. Compare and contrast different types of waves</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose;</p>	<ol style="list-style-type: none"> Students will design a lab using a laser, prisms, and mirrors to prove the laws of reflection/refraction. Students will analyze the difference between the colors of light (wavelengths) vs the idea of pigment. Students will analyze the similarities and differences between different types of waves 	<p>www.howstuffworks.com Student explorations of light and color A copy of the EM spectrum (I give it as notes) UV light Lasers CEO light table Lamp Colored bulbs, better than filters Diffraction Gratings (High School)</p>	<p>Lab Writeups Physics Unit Test Graphs/Visual representations of reflection and refraction</p>

	<p>b. Describe for various waves the amplitude, frequency, wavelength, and speed</p> <p>c. Describe the relationship between pitch and frequency in sound</p> <p>d. Develop and design a scientific investigation regarding absorption, reflection, and refraction of light</p>	<p>infer to predict and draw conclusions; problem solve; understand and use logic</p>	<p>(sound, light, EM spectrum, etc)</p>		
<p>Earth Systems Science</p>	<p>1. Weather is a result of complex interactions of Earth's atmosphere, land and water, that are driven by energy from the sun, and can be predicted and described through complex models</p> <p>Students can:</p> <p>a. Differentiate between basic and severe weather conditions, and develop an appropriate action plan for personal safety and the safety of others</p>	<p>Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing perspectives; understand and apply knowledge of culture; seek other's ideas</p> <p>Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p>	<p>1. Students will study the water cycle, including water moving from about ground to below ground. (percolation)</p> <p>2. Students will develop models to explain local weather phenomena. For example, in the morning the weather heats the East side of Gold hill, thus creating an upward wind on that side due to radiation from the sun heating the ground, which heats the air above the ground due to conduction, and that air will rise due to convection. In the evening, the same</p>	<p>Thermometers, Barometers Prentice Hall Earth Science Text Notes on Convection, conduction, and radiation (howstuffworks and text are good resources) Other Lab Supplies World Map Internet (Weather Underground or NOAA are great sites. Weather underground has the history of the weather of each city which is better)</p>	<p>Weather Unit Test Weather Map Projects Weather clicker quiz</p>

<p>b. Observe and gather data for various weather conditions and compare to historical data for that date and location</p> <p>c. Use models to develop and communicate a weather prediction</p>		<p>process happens to the West side of Gold hill, which is why we only see gliders on that side of the mountain in the later hours of the day.</p>		
<p>2. Earth has a variety of climates defined by average temperature, precipitation, humidity, air pressure, and wind that have changed over time in a particular location</p> <p>Students can:</p> <p>a. Develop, communicate and justify an evidence-based scientific explanation to account for Earth's different climates</p> <p>b. Research and evaluate direct and indirect evidence to explain how climates vary from one location to another on Earth</p> <p>c. Examine, evaluate, and</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process</p> <p>Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing perspectives; understand and apply knowledge of culture; seek other's ideas</p> <p>Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p> <p>Information Literacy: Students will: Evaluate information critically</p>	<p>1. Students will create a weather map of a chosen location and track the corresponding weather and predict the future weather based on Longitude/Latitude, elevation, and geographic location</p> <p>2. Students will draw a specific location and explain the local weather, based on radiation, conduction, and convection.</p> <p>3. Students will use knowledge of weather systems (globally and locally) to predict weather.</p>	<p>Thermometers, Barometers Prentice Hall Earth Science Text Notes on Convection, conduction, and radiation Other Lab Supplies World Map Internet (Weather Underground)</p>	<p>Weather Unit Test Weather Map Projects Weather clicker quiz</p>

<p>question information from a variety of sources and media to investigate how climates vary from one location to another on Earth</p>	<p>and competently; accessing appropriate tools to synthesize information distinguish fact/fiction/opinion/ point of view</p>			
<p>3. The solar system is comprised of various objects that orbit the Sun and are classified based on their characteristics</p> <p>Students can:</p> <p>a. Construct a scale model of the solar system, and use it to explain the motion of objects in the system such a planets, Sun, Moons, asteroids, comets, and dwarf planets</p> <p>b. Describe methods and equipment used to explore the solar system and beyond</p> <p>c. Design an investigation that involves direct observation of objects in the sky, and analyze and explain results</p> <p>d. Research, critique, and communicate scientific theories</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process</p> <p>Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing perspectives; understand and apply knowledge of culture; seek other’s ideas</p> <p>Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p> <p>Information Literacy: Students will: Evaluate information critically and competently; accessing appropriate tools to synthesize information distinguish</p>	<p>1. Students will make a model of relative distances and sizes of planetary bodies in our solar system and draw them accordingly. In addition, students will color each planet according to its actual color, and the composition of that planet.</p> <p>2. Students will use geometry sketchpad to develop a model of the solar system with correct relative distances of the planets to the sun. They will put the planets in motion around the sun in the center and attempt to get them moving with correct speeds.</p> <p>3. Students will research methods and equipment used to explore the solar system</p> <p>4. Students will read and summarize an article comparing theories on how our</p>	<p>Measuring tape Large paper Internet for relative distances (any website that lists the distances to the planets in Astronomical Units (AU’s) will work) Colored pencils Earth Science textbook for composition of planets Geometry sketchpad Article about newly discovered planet found in the habitable zone. Found at : http://www.washingtonpost.com/wp-dyn/content/article/2010/09/29/AR2010092907492.html</p>	<p>Planet project rubric Observations of Geometry sketchpad document Article summary Astronomy clicker quiz Astronomy unit test</p>

<p>that explain how the solar system was formed e. Use computer data sets and simulations to explore objects in the solar system f. Recognize that mathematical models are used to predict orbital paths and events</p>	<p>fact/fiction/opinion/ point of view</p>	<p>solar system formed. 5. Students will use geometry sketchpad to show relative orbital motions of planets, asteroids, and comets.</p>		
<p>4. The relative positions and motions of Earth, Moon, and Sun can be used to explain observable effects such as seasons, eclipses, and Moon phases</p> <p>Students can: a. Develop, communicate, and justify an evidence-based explanation using relative positions of Earth, Moon, and Sun to explain the following natural phenomenon: 1. Tides 2. Eclipses of the Sun and Moon 3. Different shapes of the Moon as viewed from Earth</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing perspectives; understand and apply knowledge of culture; seek other’s ideas Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic Information Literacy: Students will: Evaluate</p>	<p>1. Students will begin by doing a hands-on observation using a lamp and a ball. The parts of the scientific model are the lamp representing the sun, the ball representing the moon, and their heads representing the earth. They are shown the positions of each for a lunar and solar eclipse, and each phase of the moon. 2. Students make a graph of the high and low tides compared to the phases of the moon. They will then use these graphs to explain how the position of the moon causes tides on earth. 3. Students will use a ball and their pencil to represent the earth and show how the earth revolves around the sun</p>	<p>Lamp and ball, size/color of ball doesn’t matter, although white ping pong balls do a better job due to the observers ability to view the shadow Tide and moon phase data from the internet. Google Phases of the moon and tides</p>	<p>Informal assessment of introduction Astronomy clickers Astronomy Unit Test</p>

	<p>b. Analyze and interpret data to explain why we have seasons</p> <p>c. Use models to explain the relative motions of Earth, Moon, and Sun over time</p>	<p>information critically and competently; accessing appropriate tools to synthesize information distinguish fact/fiction/opinion/ point of view</p>	<p>(lamp) and why the northern hemisphere is in the opposite season as the southern hemisphere.</p>		
<p>Life Science</p>	<p>1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency</p> <p>Students can:</p> <p>a. Develop, communicate, and justify an evidence-based scientific example of how humans can alter ecosystems</p> <p>b. Analyze and interpret data about human impact on local ecosystems</p> <p>. Recognize and infer bias in print and digital resources while researching an environmental issue</p> <p>d. Use technology resources such as online encyclopedias, online databases, and credible websites to locate,</p>	<p>Invention: Students will synthesize information from multiple sources and apply new ways to solve problems for their cognitive process</p> <p>Collaboration: Students will participate in peer review; respectfully discourse; mediate opposing perspectives; understand and apply knowledge of culture; seek other’s ideas</p> <p>Critical Thinking and Reasoning: Students will: argue a point; justify reasoning; evaluate for purpose; infer to predict and draw conclusions; problem solve; understand and use logic</p> <p>Information Literacy: Students will: Evaluate information critically and competently; accessing appropriate</p>	<p>Students will be doing a research paper that will take 4 weeks to complete. They will begin by researching possible topics on day 1. Their topic must be related to human’s responsibility to their ecosystem and biosphere as a whole. For the first 2 weeks, most of the time will be dedicated towards gathering information and sources. There will be 5 fact cards due each day, with 40 due at the end of the 2 weeks. The students will then write a thesis and organize their fact cards in outline format. They will then make an outline for their paper. They will then begin writing the intro paragraph, 3 body paragraphs, and the conclusion. The students will peer</p>	<p>Internet, any websites the students want to use as sources must be a legit site. Wiki is not a legit site. If they cannot find the author, I do not let them use the site.</p> <p>Microsoft word notecards</p>	<p>3 grades will be given for the research paper.</p> <p>SS- works cited LA- conventions and idea development Science- Develop, communicate, and justify an evidence-based scientific example of how humans can alter their ecosystems</p>

	organize, analyze, evaluate, and synthesize information about human impact on local ecosystems e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate an environmental issue		tools to synthesize information distinguish fact/fiction/opinion/ point of view		review and then write a final draft.		
--	---	--	---	--	--------------------------------------	--	--

	<p>2. Organisms reproduce and transmit genetic information (genes) to offspring, which influences individuals' traits in the next generation</p> <p>Students can:</p> <ul style="list-style-type: none">a. Develop, communicate, and justify an evidence-based scientific explanation for how genetic information is passed to the next generationb. Use direct and indirect observations, evidence, and data to support claims about genetic reproduction and traits of individualsc. Gather, analyze, and interpret data on transmitting genetic informationd. Use models and diagrams to predict the phenotype and genotype of offspring based on the genotype of the parentse. Use computer simulations to model and predict	<p>7th Grade will cover this standard</p>			
--	--	---	--	--	--

	phenotype and genotype of offspring based on the genotype of the parents				
--	--	--	--	--	--