South Carolina Academic Standards and Performance Indicators for Science 2014

Instructional Unit Resource

Earth Science

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As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Earth Science have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Earth Science Overview of Units

Unit 1		Unit 2		Unit 3	Unit 4	UNIT 5
EARTH SCIENCE: Astronomy		EARTH SCIENCE: Earth's Geosphere		EARTH SCIENCE: Paleobiosphere	EARTH SCIENCE: Atmosphere-Weather and Climate	EARTH SCIENCE: Hydrosphere
Standard		**Standard**		**Standard**	**Standard**	**Standard**
H.E.2		H.E.3		H.E.4	H.E.5	H.E.6
Conceptual Understanding		**Conceptual Understanding**		**Conceptual Understanding**	**Conceptual Understanding**	**Conceptual Understanding**
H.E.2.A	H.E.2.B	H.E.3A	H.E.3B	H.E.4A	H.E.5A	H.E.6A
Performance Indicators		**Performance Indicators**		**Performance Indicators**	**Performance Indicators**	
H.E.2A.1 H.E.2A.2 H.E.2A.3 H.E.2A.4 H.E.2A.5	H.E.2B.1 H.E.2B.2 H.E.2B.3 H.E.2B.4	H.E.3A.1 H.E.3A.2 H.E.3A.3 H.E.3A.4 H.E.3A.5 H.E.3A.6 H.E.3A.7 H.E.3A.8	H.E.3B.1 H.E.3B.2 H.E.3B.3 H.E.3B.4 H.E.3B.5	H.E4.A.1 H.E.4A.2 H.E.4A.3 H.E.4A.4 H.E.4A.5 H.E.4A.6 H.E.4A.7	H.E.5A.1 H.E.5A.2 H.E.5A.3 H.E.5A.4 H.E.5A.5 H.E.5A.6 H.E.5A.7 H.E.5A.8	H.E.6A.1 H.E.6A.2 H.E.6A.3 H.E.6A.4 H.E.6A.5 H.E.6A.6 H.E.6A.7 H.E.6A.8
***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**	***Science and Engineering Practices**	***Science and Engineering Practices**
S.1A.2 S.1A.7 S.1A.4 S.1A.8 S.1A.5 S.1A.6		S.1A.2 S.1A.6 S.1A.3 S.1A.7 S.1A.4 S.1A.8 S.1A.5 S.1B.1		S.1A.2 S.1A.8 S.1A.5 S.1A.6 S.1A.7	S.1A.2 S.1A.4 S.1A.6 S.1A.7	S.1A.1 S.1A.8 S.1A.2 S.1A.3 S.1A.4
***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**	***Crosscutting Concepts**	***Crosscutting Concepts**
1,2,3,4,5,7		1,2,4,6,7		1,2,3,4,5	1,2,5,6	2,3,4,5

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Unit Title
Earth Science- Astronomy
Standard
H.E.2 The student will demonstrate an understanding of the structure, properties, and history of the observable universe.

Conceptual Understanding
H.E.2A. Earth is a tiny part of a vast universe that has developed over a huge expanse of time. At the center of Earth's solar system is one local star, the Sun. It is just one of a vast number of stars in the Milky Way Galaxy, which is just one of a vast number of galaxies in the observable universe. The study of the light spectra and brightness of stars is used to identify compositional elements of stars, their movements, and their distances from Earth. Nearly all observable matter in the universe formed and continues to form within the cores of stars. The universe began with a period of extreme and rapid expansion and has been expanding ever since.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Absolute magnitude	Luminosity	Spectral type	Surface temperature
Main-sequence stars	Giants, dwarfs	Protostar	Supernova
Black hole	Neutron star	White dwarf	Cepheid star
Pulsars	Binary stars	Red shift	Blue shift
Emission spectrum	Absorption spectrum	H-R diagram	Singularity
Background radiation	Types of telescopes (reflecting, radio, refracting, catadiotropic)		

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's

H.E.2A.1 *Construct explanations* for how gravity and motion affect the formation and shapes of galaxies (including the Milky Way Galaxy).
H.E.2A.2 *Use the Hertzsprung-Russell diagram* to classify stars and explain the life cycles of stars (including the Sun).
H.E.2A.3 *Construct explanations* for how elements are formed using evidence from nuclear fusion occurring within stars and/or supernova explosions.
H.E.2A.4 *Construct and analyze scientific arguments* to support claims about the origin of the universe (including the redshift of light from distant galaxies, the measured composition of stars and non stellar gases, and the cosmic background radiation).
H.E.2A.5 *Obtain and evaluate information* to describe how the use of x-ray, gamma-ray, radio, and visual (reflecting, refracting, and catadioptric) telescopes and computer modeling have increased the understanding of the universe.

*Science and Engineering Practices

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

H.E.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
H.B.1A.4: Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
H.B.1A.6: Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
H.B.1A.7: Engage in Scientific Argument from Evidence Construct and analyze scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts.
H.B.1A.8: Obtain, Evaluate, and Communicate Information (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.

***Cross Cutting Concepts** (http://www.nap.edu/read/13165/chapter/8)

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

1. Patterns The National Research Council (2012) states that "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *Recognizing patterns is vital in the classification of stars using the Hertzsprung - Russell diagram. Recognizing patterns requires careful observations of similarities and differences between stars and using that information to put stars into groups. Planets and moons of the solar system have predictable patterns of movement.*

2. Cause and effect Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *The internal temperature of a star controls what the rate of nuclear fusion and the elements, if any, which are fused to form new elements.*

3. Scale, proportion, and quantity: The National Research Council (2012) states that "in considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance" (p. 84). *The Earth is a tiny part of a vast universe that was developed over a huge expanse of time. Information from a variety of sources indicates Earth is a part of an ever - expanding universe. Kepler's Laws are used to describe the elliptical motions of objects around the Sun.*

4. Systems and systems models: The National Research Council (2012) states that "Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *The Earth is a part of our solar system, which is a part of the Milky Way Galaxy, which is part of the Universe. Models should be developed to help students understand the interactions between our solar system, the Milky Way Galaxy, and our Universe.*

5. Energy and matter Flows, cycles, and conservation: The National Research Council (2012) states that " Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations. (p. 84) *Nearly all observable matter in the universe formed and continues to form within the cores of stars and the resulting energy is released into the universe.*

7. Stability and change: The National Research Council (2012) states that "For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study" (p. 84). *The structure of the universe is an example of a*

long-term change. The evolution of the universe, galaxies, and solar systems has led to predictable patterns of cause and effect which promotes stability within the system. However, the universe is ever - expanding and, while seemingly stable, is always in a state of change.

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● 7.P.2A.1 Atomic Models ● 8.P.2A.1 Motion ● 8.P.2A.5 Gravity ● 8.P 3A.3 Reflections, refraction, transmission and absorption of waves ● 8.E.4A.1 Shapes, composition, and location of galaxies; Measurement units for star identification ● 8.E.4A.2 Origin of the universe ● 8.E.4B.5 Telescopes, spectroscopes
Subsequent Knowledge
● H.C. 2A.3 Emission spectrum and absorption ● H.C. 2B Nuclear fusion ● H.P. 2D.2 Law of Universal Gravitation ● H.P. 2D.3 Gravitational interactions and patterns of motion of galaxies ● H.P. 3D Doppler Effect ● H.P. 3F Electromagnetic spectrum ● H.P. 3G Atomic Structure: Fission and Fusion; Radioactive Decay; Applications of Radioactive Decay

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

H.E.2A.1

- Galaxy Identification Ordinary citizens help identify galaxy types from photos taken from deep space telescopes. Use telescope images from Hubble telescope and have students research and report how they are actually taken and how artists are involved in the process. This resource can be found at http://hubblesite.org/gallery/behind_the_pictures/

H.E.2A.2

- Interpret the Life Cycle of the star model-This could be accomplished with the planning and design of a life cycle mural and put into the hall outside the classroom or in the classroom, or develop a storyboard. Students will write artist's statement to explain the process.

- Comparing Stars and Organisms Have students compare the life cycle of the star to the life cycle of an organism of their choosing. They must illustrate and show how the cycles are the same and different. This resource can be found at https://www.galaxyzoo.org

- Jewel Box Cluster Activity in which students measure the color and brightness of stars in the Jewel box Cluster from a color image and then determine the age of the cluster. All materials needed for this activity are on this site. This resource can be found at http://www.noao.edu/education/jewels/home.html

- Measuring Star Temperatures This resource allows students to analyze star data and calculate the temperature of a star (for differentiation). Then they could use their calculations or data you provide to predict placement of stars within the HR diagram. This resource can be found at http://spacemath.gsfc.nasa.gov/weekly/5Page55.pdf

H.E.2A.3

- Nuclear Fusion Interactive Students could complete nuclear fusion interactive as a web-quest, whole class activity, or in groups. This resource can be found at http://ippex.pppl.gov/interactive/

H.E. 2A.4

- Construct reflecting or refracting telescopes using household items; research required.

- Making waves with the electromagnetic spectrum There are various resources that allow students to explore various types of electromagnetic waves. This resource can be found at http://www.pbslearningmedia.org/resource/phy03.sci.phys.energy.lp_emspect/making-waves-with-the-electromagnetic-spectrum/

- Decode star spectra This interactive website can be found at http://www.pbs.org/wgbh/nova/space/decoding-cosmic-spectra.html

Resources

- Zoouniverse.org is a great reference site for anything universe related. This resource can be found at

http://www.zooteach.org/subject/sciences

- This is a lesson about the life cycle of stars. There are five sections. Each one is about a specific topic or a specific stage in the life cycle of a star. This resource can be found at http://aspire.cosmic-ray.org/Labs/StarLife/

- Gallery of the entire collection of Hubble images http://hubblesite.org/gallery/album/show/

- This is an activity using the Doppler affect and light from stars to figure how fast stars are moving towards or away from Earth. This activity requires a computer and internet connections. Could be done as a demonstration using projection. This resource can be found at http://www.pbs.org/wgbh/nova/physics/doppler-effect.html

- Activity is a group demonstration for what happens in the core of a star when it runs out of fuel. This resource can be found at https://nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=339

- Interactive lesson to help students understand star spectra. This resource can be found at http://www.pbs.org/wgbh/nova/space/decoding-cosmic-spectra.html

- A collection of reference material, interactives, and games. This resource can be found at spaceplace@NASA.gov

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- Graphic organizers. http://www.studenthandouts.com/graphicorganizers.htm

- Use various items to represent parts of the star life cycle and role play the process in groups for the class.

- Students take pictures of objects they feel have the same shape as a galaxy and explain for the class. They should be able to explain how the galaxy got its shape versus the object they took a picture of.

- Complete the Jewel Box Cluster activity in resources section above. Observe students working to determine their level of confidence with the information.
- Exit slips https://datadeb.files.wordpress.com/2010/11/exit-slips-wahlstrom1.pdf
- Write a letter or post card between Tycho and Kepler in the manner the students think they may have spoken to each other and their research as it was discovered (research required).
- Develop and use models when appropriate. For instance students use a drawing rather than words to show understanding of a concept and then explain why they made the drawing.

Unit Title
Earth Science- Astronomy
Standard
H.E.2 The student will demonstrate an understanding of the structure, properties, and history of the observable universe.

Conceptual Understanding
H.E.2B. The solar system consists of the Sun and a collection of objects of varying sizes and conditions – including planets and their moons – that have predictable patterns of movement. These patterns can be explained by gravitational forces and conservation laws, and in turn explains many large-scale phenomena observed on Earth. Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the Sun. The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**
Astronomical unit (AU) Rotation Revolution Law of ellipses

Law of equal areas	Law of harmonies	Centripetal force	Retrograde motion
Elliptical motion	Maria	Rays	Highlands
Planetesimals	Fission theory	Capture theory	Condensation theory
Ejected ring theory	Colliding planetesimals theory	Parallax	Newton's universal law of gravitation

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's

H.E.2B.1 *Analyze and interpret data* to compare the properties of Earth and other planets (including composition, density, surface expression of tectonics, climate, and conditions necessary for life).

H.E.2B.2 *Obtain, evaluate, and communicate* information about the properties and features of the moon to support claims that it is unique among other moons in the solar system in its effects on the planet it orbits.

H.E.2B.3 *Use mathematical and computational thinking* to explain the motion of an orbiting object in the solar system.

H.E.2B.4 *Construct explanations* for how the solar system was formed.

***Science and Engineering Practices**

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H.B.1A.4: Analyze and Interpret Data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.

H.B.1A.5: Use mathematics and computational thinking to (1) use and manipulate appropriate metric units, (2) collect and analyze data, (3) express relationships between variables for models and investigations, or (4) use grade-level appropriate statistics to analyze data.

H.B.1A.6: Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

H.B.1A.8: Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.

***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)**

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2. Cause and effect Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *The internal temperature of a star controls what the rate of nuclear fusion and the elements, if any, which are fused to form new elements.*

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out of, and within systems helps one understand the systems' possibilities and limitations. (p. 84) *Nearly all observable matter in the universe formed and continues to form within the cores of stars and the resulting energy is released into the universe.*

7. Stability and change: The National Research Council (2012) states that "For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study" (p. 84). *The structure of the universe is an example of a long-term change. The evolution of the universe, galaxies, and solar systems has led to predictable patterns of cause and effect which promotes stability within the system. However, the universe is ever - expanding and, while seemingly stable, is always in a state of change.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● 6.E.2 Climate ● 7.P.2B.1 Density ● 7.P.2A.2 Periodic Table ● 8.E.4B.1 Characteristics and movements of objects in the solar system ● 8.E.4B.2 Gravity and motion of objects and tides
Subsequent Knowledge
● 8.E.5A.4 Plate tectonics ● H.P. 2D.2 Law of Universal Gravitation ● H.P. 2D.3 Gravitational interactions and patterns of motion of galaxies

Possible Instructional Strategies/Lessons **Strategies and lessons that will enable students to master the standard and/or indicator.**
H.E.2B.1 ● Students could develop and use models to create the solar system in the hall. They would make it to scale and complete necessary calculations. The planets would also be to scale. They would create these planets and include an artist's statement with all standard based characteristics. This could be done in groups or individually. ● Complete a graphic organizer containing all of the standard based characteristics of the planets in the solar system (research required).

- Students can listen to eleven different scientists describe their favorite planet. The students then choose their favorite and must explain why using standards based characteristics. http://www.pbs.org/wgbh/nova/space/favorite-planet.html

H.E.2B.2

- Host a debate or open forum concerning the moon formation theories and how the moon affects the earth. Each team will have to convince a panel of guests that their theory is the most probable. After discussion or debate concerning moon formation theories, have students read the article found in resources that describes a new study concerning moon formation and discuss its relationship to the information presented during the debate. http://www.space.com/15035-moon-formation-theory-challenged.html

- Improv Game The moon pretends to host a party each guest that comes (one at a time) tells the moon why they are so special and the moon will retort with something no other moon can do. The other moons at the party mingle and exchange information about each other. The teacher will provide a sheet of their design to have students write facts about the different moons as they mingle.

H.E.2B.3

- Students could complete kepler's laws interactive http://oneminuteastronomer.com/8626/keplers-laws/

- Students could create a new planet in our solar system. They must use Kepler's laws to determine what its movements would be based on the placement of the new planet from the sun. This new planet could be displayed and explained in mural form with an artistic statement. As part of this the student would need to explain how the new planet formed using the latest information concerning solar system formation (flash required). http://astro.unl.edu/naap/pos/animations/kepler.swf

- Whole class design- Students can role play the planet movements based on kepler's laws including the rate of travel. The students would rotate and revolve in the simulation. The students could design how this will be accomplished

H.E.2B.4

- Watch the video origins of the solar system http://www.pbs.org/wgbh/nova/space/origins-solar-system.html. Then use the transcript http://www.pbs.org/wgbh/nova/space/origins-solar-system.html provided on the webpage to jigsaw to various groups. Have the groups find the salient point in each section and write them on the board. Whole class discussion will ensue to determine why the groups

considered these points the most important.

Resources

- Exploring the Moon Educator Guide: This site has a series of activities and lessons related to the moon. Of particular note are Differentiation, Distance to the Moon, and Impact Craters. This resource can be found at https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Exploring.the.Moon.html

- Tour the Solar System: Allows students to take an interactive tour of the solar system. This resource can be found at http://www.pbs.org/wgbh/nova/space/tour-solar-system.html

- Moon - "light" Atlas: Is an interactive map of the moon and has great images of all the various moon formations. This resource can be found at http://www.astrosurf.com/cidadao/moonlight.htm

- Solar System Scope: is a moving, three dimensional model of the solar system. This resource can be found at http://www.solarsystemscope.com/

- Moon Formation Theory Challenged by New Study: Article discussing a new moon formation theory. This resource can be found at http://www.space.com/15035-moon-formation-theory-challenged.html

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- List three things a fellow student does not understand about the topic and trade with the classmate. Try to help each other solve the issues and then discuss with class.

- Two roses and a thorn- Have the students write down 2 things they understood about the lesson and one thing they did not.

- Postcards from a planet.

- Venn diagram comparing inner and outer solar system.

- Describe a planet in our solar system without naming it and have the students draw a visualization of it and identify it.
- Twitter vote their favorite planet and why in a 160 letters or less (on paper if not able to use twitter) and each student should make a hashtag.
- Students will respond to a teacher question on padlet (if technology is available) or on exit slips etc.
- Peer reviews. http://www.senseaboutscience.org/pages/peer-review.html
- Learning response logs. https://wvde.state.wv.us/teach21/LearningResponseLogs.html
- Set up a google forms response question that asks them to respond to questions you pose.

References

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