

<b>Topic: Astronomy - Applying Laws of Motion and Energy to Space</b>				
<b>Included Standards: SC.912.E.5.1 SC.912.E.5.6 SC.912.E.5.8 SC.912.E.5.10 SC.912.E.5.11 SC.912.P.10.10 SC.912.P.10.18 SC.912.P.10.19 SC.912.P.10.20 SC.912.P.12.2 SC.912.P.12.4 SC.912.P.12.7</b>				
<b>Subject: Earth Space Science</b>				
<b>Score 4.0</b>	<p>In addition to Score 3.0, in-depth inferences and applications go beyond what was taught</p> <ul style="list-style-type: none"> <li>Explain Einstein’s special theory of relativity and relate its application to historical events.</li> </ul> <p>The student exhibits no major errors or omissions regarding the Score 3.0 content</p>			
<b>Score 3.0</b>	<p><b>The student will understand how motion and energy on Earth can be applied to objects in space.</b></p> <p><b>Performs complex skills:</b></p> <ul style="list-style-type: none"> <li>Compare and contrast the different parts of the electromagnetic spectrum in terms of wavelength, frequency and energy.</li> <li>Relate the electromagnetic spectrum to phenomena and applications, including exploration of the stars/universe.</li> <li>Distinguish between objects that are blackbody radiators and those that are not</li> <li>Calculate the distance of a planet from the Sun when given the planet’s period, using Kepler’s 3rd Law of Planetary Motion</li> </ul> <p>The student exhibits no major errors or omissions regarding the Score 2.0 content</p>			
<b>Score 2.0</b>	<b>The student recognizes and recalls:</b>			
	<p><b><u>Specific Terminology</u></b></p> <ul style="list-style-type: none"> <li>Electromagnetic spectrum (television/radio waves, microwave/radar waves, infrared rays, visible light, ultraviolet rays, X rays, gamma rays)</li> <li>Kepler’s 3 Laws of Planetary Motion</li> <li>Law of Universal Gravitation</li> <li>Black body radiation</li> <li>Speed of Light</li> <li>Doppler Effect</li> <li>Continuous spectrum</li> <li>Absorption spectrum</li> <li>Emission spectrum</li> </ul>	<p><b><u>Non-Specific Terminology</u></b></p> <ul style="list-style-type: none"> <li>Wave frequency</li> <li>Wavelength</li> <li>Newton’s laws</li> <li>Radiation</li> <li>Magnetism</li> <li>Gravity</li> <li>Acceleration</li> <li>Medium</li> <li>Momentum</li> <li>Energy</li> <li>Ellipse</li> <li>Astronomical Unit</li> </ul>	<p><b><u>Affixes</u></b></p> <p>Infra- (below; beneath)  Uni- (one)  Radi- (ray)  Spec- (look at)  Scop- (look; device for seeing)  Photo- (light)  Ultra- (beyond)</p>	<p><b><u>Fundamental Skills</u></b></p> <ul style="list-style-type: none"> <li>List the waves of, in order of frequency or wavelength, the Electromagnetic Spectrum</li> <li>Recognize differences between frequency and wavelength</li> <li>Compare fundamental forces such as gravity and electromagnetism</li> <li>Define each of Kepler’s 3 Laws of Planetary Motion</li> </ul>
<b>Score 1.0</b>	With help, I understand some of 2.0 and/or 3.0			
<b>Score 0.0</b>	Even with help, I am unable to understand			

**Topic: Astronomy - Using Technology to Explore Space**

**Included Standards:** SC.912.E.5.1 SC.912.E.5.6 SC.912.E.5.8 SC.912.E.5.10 SC.912.E.5.11 SC.912.P.10.10  
 SC.912.P.10.18 SC.912.P.10.19 SC.912.P.10.20 SC.912.P.12.2 SC.912.P.12.4 SC.912.P.12.7

**Subject: Earth Space Science**

**Score 4.0** In addition to Score 3.0, in-depth inferences and applications go beyond what was taught

- Justify the continuing development of technology by relating the history of space exploration to future space exploration.

The student exhibits no major errors or omissions regarding the Score 3.0 content

**Score 3.0** **The student will understand how technology provides insight into past, present and future of what lies beyond planet Earth.**

**Performs complex skills:**

- Connect radiation and electromagnetism to use of historical and newly developed observational tools.
- Diagram the evolution of telescope technology.
- Discover the types of careers in astronomical science, education required and earning potential and the impact on Florida.
- Calculate the magnification of an optical telescope when give the objective focal length and the eyepiece focal length.

The student exhibits no major errors or omissions regarding the Score 2.0 content

**Score 2.0** The student recognizes and recalls:

<u>Specific Terminology</u>	<u>Non-Specific Terminology</u>	<u>Affixes</u>	<u>Fundamental Skills</u>
<ul style="list-style-type: none"> <li>Astrophysicist</li> <li>Radio Telescope</li> <li>Chromatic Aberration</li> <li>Focus</li> <li>Refracting Telescope</li> <li>Reflecting Telescope</li> <li>Objective</li> </ul>	<ul style="list-style-type: none"> <li>Amplifier</li> <li>Antenna</li> <li>Resolution</li> <li>Magnification</li> <li>Light-gathering</li> <li>Observatory</li> <li>Optical telescope</li> </ul>	<ul style="list-style-type: none"> <li>Chrom- (color)</li> <li>Opt- (eye)</li> <li>Ab- (away from)</li> <li>Flect- (bend)</li> <li>Fract- (break)</li> <li>Astro- (star)</li> <li>Cosmo- (world)</li> </ul>	<ul style="list-style-type: none"> <li>List the properties of optical telescopes</li> <li>Compare and contrast reflecting and refracting telescopes and radio telescopes</li> <li>Multiplication</li> </ul>

**Score 1.0** With help, I understand some of 2.0 and/or 3.0

**Score 0.0** Even with help, I am unable to understand

**Topic: Astronomy - The Universe**

**Included Standards: SC.912.E.5.1 SC.912.E.5.2 SC.912.E.5.5 SC.912.E.5.7**

**Subject: Earth Space Science**

**Score 4.0** In addition to Score 3.0, in-depth inferences and applications go beyond what was taught

- Calculate the odds of life in the universe.

The student exhibits no major errors or omissions regarding the Score 3.0 content

**Score 3.0** **The student will understand the organization and distribution of matter in the universe and the forces that determine them.**

**Performs complex skills:**

- Explain the formation of planetary systems based on our knowledge of our Solar System.
- Determine Earth’s galactic “address” from smallest to largest.
- Demonstrate the evidence of Universe expansion
- Cite evidence used to develop and verify the Big Bang Theory
- Explain the importance of the verification of Higgs Boson at the Large Hadron Collider

The student exhibits no major errors or omissions regarding the Score 2.0 content

**Score 2.0** **The student recognizes and recalls:**

**Specific Terminology**

- Big Bang Theory
- Red Shift
- Galaxy
- Milky Way
- Planetary system
- Higgs boson
- Large Hadron Collider
- Doppler shift
- Universe expansion

**Non-Specific Terminology**

- Theory
- Inference

**Affixes**

**Fundamental Skills**

- Recognize that when objects move away from each other, the distance expands
- Recognize that the Universe consists of many galaxies, including the Milky Way
- Recognize that scientific inferences are drawn from scientific observations that can lead to the development of theories

**Score 1.0** With help, I understand some of 2.0 and/or 3.0

**Score 0.0** Even with help, I am unable to understand

<b>Topic: Astronomy - Life of a Star</b>					
<b>Included Standards: SC.912.E.5.3 SC.912.E.5.4 SC.912.P.8.1, SC.912.P.8.4 SC.912.P.10.10 SC.912.P.10.11, SC.912.P.10.16</b>					
<b>Subject: Earth Space Science</b>					
<b>Score 4.0</b>	<p>In addition to Score 3.0, in-depth inferences and applications go beyond what was taught</p> <ul style="list-style-type: none"> <li>Demonstrate the calculations that determine when our Solar System's Sun will become a Black Dwarf</li> </ul> <p>The student exhibits no major errors or omissions regarding the Score 3.0 content</p>				
<b>Score 3.0</b>	<p><b>The student will understand the evolution of stars, including the Sun, and how they impact planets within their systems.</b></p> <p><b>Performs complex skills:</b></p> <ul style="list-style-type: none"> <li>Describe and predict how the initial mass of a star determines its evolution</li> <li>Relate the color of a star to its temperature and evolutionary state</li> <li>Explain the atomic processes (fusion) that happen within all stars</li> <li>Compare the nuclear forces (weak and strong), in terms of magnitude and range of each</li> <li>Explain how solar activity (solar flares and sunspots) affect Earth</li> </ul> <p>The student exhibits no major errors or omissions regarding the Score 2.0 content</p>				
<b>Score 2.0</b>	<b>The student recognizes and recalls:</b>				
	<p><b><u>Specific Terminology</u></b></p> <ul style="list-style-type: none"> <li>Apparent magnitude</li> <li>Absolute magnitude</li> <li>H-R Diagram</li> <li>Nebula</li> <li>Protostar</li> <li>Nuclear Force</li> <li>Main-sequence star</li> <li>Nuclear Force</li> <li>Red Giant</li> <li>Planetary nebula</li> <li>White dwarf</li> <li>Black dwarf</li> <li>Neutron star</li> </ul>	<ul style="list-style-type: none"> <li>* Black Hole</li> <li>* Solar Flare</li> <li>* Sunspot</li> <li>* Fusion</li> <li>* Weak</li> <li>* Strong</li> </ul>	<p><b><u>Non-Specific Terminology</u></b></p> <ul style="list-style-type: none"> <li>Brightness</li> <li>Star</li> <li>Sun</li> <li>Atomic</li> <li>Plasma</li> </ul>	<p><b><u>Affixes</u></b></p> <p>Mag- Proto-</p>	<p><b><u>Fundamental Skills</u></b></p> <ul style="list-style-type: none"> <li>Recognize the phases of the life cycle of a star</li> <li>Recognize states of matter, including plasma</li> <li>Compare the effects of revolution and rotation on the Earth</li> <li>Describe solar and lunar eclipses</li> </ul>
<b>Score 1.0</b>	With help, I understand some of 2.0 and/or 3.0				
<b>Score 0.0</b>	Even with help, I am unable to understand				