

Astronomy Curriculum

Course Title: Astronomy

Content Area: Science

Grade Level(s): 11-12

Date Revised: 7/17/2019

Date Adopted: 9/1/2019

Course Description: Astronomy is a half-year course where students will learn the contents of the entire Universe. This course introduces students to the composition and structure of the Universe. This course will provide students with a scientific study of the universe and the conditions, properties, and motions of bodies in space. The content includes historical astronomy, astronomical instruments, the celestial spheres, the solar system, the Earth as a system in space, the Earth and Moon system, and the Sun and stars.

Total Number of Units: 7

Pacing Guide

Unit 1: History of Astronomy 15 Days

The early processes that scientists used to develop ideas about how the universe works are still used to today. Early scientists followed the basic steps of the scientific method and by studying their process and ideas, students have real world examples of the methods they use in science.

Unit 2: The Moon 18 Days

Students can relate the things they observe about the sky to occurrences in the solar system.

Unit 3: The Solar System 11 Days

Our understanding of how the solar system formed is based on collecting evidence of things we can observe today. Students will use critical thinking to relate such evidence to the formation of solar system. They will also develop essential math skills by calculating ages of rock.

Unit 4: Stars 17 Days

Stars have a very complicated life cycle that depends on many factors. Students will use critical thinking to predict the outcome of a particular star based on its mass and size. Students will have to organize data to classify a star and compare to properties of our Sun.

Unit 5: Galaxies 11 Days

Students will create timelines, calculate, classify, and apply critical thinking skills by examining the large scale structure of our universe.

Unit 6: The Big Bang 9 Days

Students will generate more questions than answers in the study of the formation and fate of the universe. Students will develop questioning skills and abstract thinking

Unit 7: Exoplanets 9 Days

Students will find out more about how scientific instruments can extend our ability to make observations. They will develop classification skills and get a historical perspective of the space program and technological advances in science.

Unit 1: History of Astronomy

Time Frame: 15 Days

Essential Questions

- How did early astronomers come up with theories about the universe?
- What influences did the use of the telescope and mathematics have on early astronomy?
- What factors contribute to the strength of gravity between two objects?
- How do scientific laws and principles observed on Earth differ from that of the rest of the universe?

- What limitations may exist in the tools and technology we use while we continue to learn about space and the universe?

Standards

Standards / CPIs (cumulative Progress Indicators) taught and assessed:

Science

[HS-ESS1-4](#) Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-CED.A.4](#) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Career Ready practices

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Communicate clearly and effectively and with reason.

Model integrity, ethical leadership and effective management.

SEL Practices & Competencies:

Self-Awareness

- Analyze emotions and how they affect others.
- Accurately recognize own strengths and limitations
- Identify own needs and values

Self-Management

- Set plans and work toward goals
- Regulate emotions such as impulses, aggression, and self-destructive behavior.
- Manage personal and interpersonal stress.
- Advocate for oneself.

Social Awareness

- Identify social cues (verbal, physical) to determine how others feel.
- Predict others' feelings and reactions.
- Evaluate others' emotional reactions.
- Respect others (e.g., listen carefully and accurately).
- Understand other points of view and perspectives.
- Appreciate diversity (recognize individual and group similarities and differences).
- Identify and use the resources of family, school, and community

Relationship Skills

- Exhibit cooperative learning and working toward group goals.
- Evaluate own skills to communicate with others.
- Communicate effectively.
- Cultivate relationships with those who can be resources when help is needed.
- Resist inappropriate social pressures.

Responsible Decision Making

- Implement problem-solving skills when making decisions, when appropriate.
- Become self-reflective and self-evaluative. Make decisions based on moral, personal, and ethical standards.
- Make responsible decisions that affect the individual, school, and community.

Overall Goal

What is the universe, and what is Earth's place in it?

Pre-Assessment: Pre-Test

(SLO) Student Learning Objectives	Student Learning Strategies	<u>Formative Assessment</u>	Activities	Modifications & Reflections
WALT Identify the aspects of science that are studied by astronomers. HS-ESS1-4 HSA-SSE.A.1 MP.4 WHST.9-12.2	Setting Objectives Summarizing & Note Taking Direct Instruction KWL Chart	Do Now Three Summaries Think-Pair-Share Stop and Go Illustrations Exit Tickets	Science of Astronomy Notes Science vs Pseudoscience	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students
WALT demonstrate lab safety and apply scientific methods. HS-ESS1-4 HSN-Q.A.1	Reinforcing Effort/ Providing Recognition	Do Now Self-Evaluation Partner Quiz	Lab Safety Video Scientific Method Storyboard	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment

<p>MP.2 SL.11-12.4</p>	<p>Cues, Questions & Advance Organizers</p> <p>Nonlinguistic Representations</p> <p>Concept Mapping</p>	<p>Think-Pair-Share</p> <p>Exit Ticket</p> <p>Safety Quiz</p>		<p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other student</p>
<p>WALT Compare astronomical units of measurements and use calculations to create scale models.</p> <p>HS-ESS1-4 HSA-CED.A.2 HSN-Q.A.1</p>	<p>Cooperative Learning</p> <p>Nonlinguistic Representations</p> <p>Homework</p> <p>Provide opportunities for student practice</p> <p>Individualized Instruction</p>	<p>Do Now</p> <p>Highlighter</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>How to convert</p> <p>Using Excel to convert units</p> <p>Triangulation</p> <p>Triangulation lab</p> <p>Distances and Sizes</p> <p>Scale and Size</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT Use examples of Stonehenge, Big Horn Medicine Wheel and Caracol to explain ancient understanding of astronomy.</p> <p>HS-ESS1-4 HSA-SSE.A.1 RST.11-12.1</p>	<p>Direct Instruction</p> <p>Summarizing & Note Taking</p> <p>Identifying Similarities and Differences</p> <p>Developing high expectations for each student</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Hand it in, Pass it out</p> <p>Highlighter</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>Aztec Calendar Stone</p> <p>Guided Notes</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT organize history of astronomy into a timeline of events and astronomers.</p> <p>HS-ESS1-4 HSN-Q.A.3 RST.11-12.1</p>	<p>Setting Objectives</p> <p>Reinforcing Effort/Providing Recognition</p> <p>Concept Mapping</p> <p>KWL Chart</p>	<p>Do Now</p> <p>Hand it in, Pass it out</p> <p>Partner Quiz</p> <p>Think-Pair-Share</p> <p>Stop and Go</p> <p>Exit Tickets</p>	<p>Timeline</p> <p>Astronomers timeline</p> <p>Ancient Astronomy</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

<p>WALT calculate eccentricity and gravitational forces.</p> <p>HS-ESS1-4 HSN-Q.A.1 HSN-Q.A.3</p>	<p>Direct Instruction</p> <p>Provide opportunities for student practice</p> <p>Reciprocal Teaching</p> <p>Learning feedback that is detailed and specific</p> <p>Question-Answer Relationship</p> <p>Anticipation Guides</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Stop and Go</p> <p>Virtual Classroom</p> <p>Exit Tickets</p>	<p>Law of gravitation</p> <p>Force of gravity lab</p> <p>Escape velocity</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT illustrate early models of solar systems.</p> <p>HS-ESS1-4 HSN-Q.A.2 MP.4</p>	<p>Setting Objectives</p> <p>Cues, Questions & Advance Organizers</p> <p>Identifying Similarities and Differences</p> <p>Promoting student metacognition</p> <p>Developing high expectations for each student</p> <p>Higher-level questioning</p>	<p>Do Now</p> <p>Hand it in, Pass it out</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>Animated model</p> <p>Geocentric and Heliocentric</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT explain Newton's and Kepler's Laws as they relate to planetary motion.</p> <p>HS-ESS1-4 HSN-Q.A.2 WHST.9-12.2</p>	<p>Identifying Similarities and Differences</p> <p>Generating & Testing Hypotheses</p> <p>Scaffolding Instructions</p> <p>Provide opportunities for student practice</p>	<p>Do Now</p> <p>Four Corners</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>Kepler vs Brache activity</p> <p>Ellipse diagram</p> <p>Kepler's Law</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	Developing high expectations for each student			
--	---	--	--	--

21 st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
		<u>Animated model</u>	<u>Geocentric and Heliocentric</u>	<u>Kepler vs Brache activity</u>	
Summative Assessments:					
<u>Test</u>					
Key Terms					
Aphelion	Astronomy	Astronomical unit (A.U.)	Copernican revolution	Eccentricity	Ellipse
Epicycle	Escape velocity	Force	Geocentric	Gravity	Heliocentric
Inertia	Light-year	Law of universal gravitation	Orbital period	Orbital velocity	Perihelion
Retrograde	Scientific law	Scientific notation	Scientific theory	Semi-major axis	

Unit 2: The Moon
Time Frame: 18 Days

Essential Questions

- How do objects appear to move in the sky?
- What causes the Earth to experience seasons?
- How did early civilizations benefit from constellations?
- Why does the moon appear to change shape overtime?
- How is it that Earth only sees one side of the Moon?
- How do Zodiac constellations relate to the orbit of the Earth?
- How is it that Earth experiences tidal change?
- What causes a lunar and solar eclipses?

Standards

Standards / CPIs (cumulative Progress Indicators) taught and assessed:

Science

[HS-ESS1-4](#) Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-CED.A.4](#) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

[Career Ready practices](#)

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Communicate clearly and effectively and with reason.

Employ valid and reliable research strategies.

Work productively in teams while using cultural global competence.

SEL Practices & Competencies:

[Self-Awareness](#)

- Label and recognize own and others' emotions.
- Analyze emotions and how they affect others.
- Possess self-efficacy and self-esteem

[Self-Management](#)

- Overcome obstacles and create strategies for more long-term goals.
- Monitor progress toward personal and academic short- and long-term goals.
- Seek help when needed. Display grit, determination, or perseverance.

[Social Awareness](#)

- Predict others' feelings and reactions.
- Evaluate others' emotional reactions.
- Appreciate diversity.

[Relationship Skills](#)

- Evaluate own skills to communicate with others.
- Communicate effectively.
- Cultivate relationships with those who can be resources when help is needed.

[Responsible Decision Making](#)

- Discuss strategies used to resist peer pressure.
- Identify problems when making decisions, and generate alternatives.
- Implement problem-solving skills when making decisions, when appropriate.

Overall Goal (What is the big idea?)

What is the universe, and what is Earth's place in it?

How do Earth's surface processes and human activities affect each other?

Pre-Assessment: Pre-Test

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
<p>WALT relate Earth's rotation to the movement of celestial objects across our skies during a 24 hour period.</p> <p>HS-ESS1-4 HSA-CED.A.2 HSN-Q.A.2</p>	<p>Summarizing & Note Taking</p> <p>Direct Instruction</p> <p>Individualized Instruction</p> <p>Reciprocal Teaching</p> <p>Developing high expectations for each student</p> <p>Higher-level questioning</p> <p>KWL Chart</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Partner Quiz</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p> <p>Metacognition sheet</p>	<p>Rotation & Revolution of the Earth</p> <p>Position of Earth in Milky Way</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT use constellations to find compass direction and time of the year.</p> <p>HS-ESS1-4 WHST.9-12.1 HSN-Q.A.1</p>	<p>Cues, Questions & Advance Organizers</p> <p>Summarizing & Note Taking</p> <p>Scaffolding instructions</p> <p>Provide opportunities for student practice</p> <p>Developing high expectations for each student</p> <p>Learning feedback that is detailed and specific</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>Zodiac Reference</p> <p>Sky map</p> <p>Seasonal constellations</p> <p>Articles</p> <p>Navigation with constellations</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT identify the effects of Earth's tilt on the distribution of heat on Earth.</p> <p>HS-ESS1-4 HSA-SSE.A.1</p>	<p>Summarizing & Note Taking</p> <p>Generating & Testing Hypotheses</p>	<p>Do Now</p> <p>Four Corners</p> <p>Hand it in, Pass it out</p>	<p>Seasons</p> <p>Reason for seasons</p> <p>Tilt and climate</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and</p>

RST.11-12.8	<p>Inquiry-Based Teaching</p> <p>Teacher clarity</p> <p>Learning feedback that is detailed and</p> <p>Question-Answer Relationship</p>	<p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Jigsaw</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p>		<p>formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT explain why we only see one side of the Moon from Earth</p> <p>HS-ESS1-4</p> <p>RST.11-12.1</p> <p>WHST.9-12.1</p>	<p>Cooperative Learning</p> <p>Nonlinguistic Representations</p> <p>Identifying Similarities and Differences</p> <p>Generating & Testing Hypotheses</p> <p>Homework</p> <p>Concept Mapping</p> <p>Response Notebooks</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>Eccentric Earth</p> <p>Synchronous rotation of the moon</p> <p>Model moon motion</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT identify Moon phases and explain why they occur</p> <p>HS-ESS1-4</p> <p>SL.11-12.4</p> <p>WHST.9-12.2</p>	<p>Cooperative Learning</p> <p>Identifying Similarities and Differences</p> <p>Instructional Planning</p> <p>Provide opportunities for student practice</p> <p>Inquiry-Based Teaching</p> <p>Teacher clarity</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>Phase calendar</p> <p>Oreo moon phases</p> <p>Understanding the Moon phases</p> <p>Exploring the phases of the Moon</p> <p>Phases video</p> <p>Multiple hands on phases</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	Learning feedback that is detailed and specific			
WALT describe conditions necessary for eclipses. HS-ESS1-4 RST.11-12.1 SL.11-12.4	Summarizing & Note Taking Generating & Testing Hypotheses Homework Provide opportunities for student practice Concept Mapping Promoting student metacognition KWL Chart	Do Now Four Corners Three Summaries Hand it in, Pass it out Self-Evaluation Partner Quiz Think-Pair-Share Jigsaw Illustrations Exit Tickets	Eclipses Phases and eclipses lab Modeling eclipses Eclipse lollipop lab	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students
WALT relate the gravitational forces of the Moon and Sun and their relative positions as they affect tidal changes. HS-ESS1-4 HSA-CED.A.4 MP.2 MP.4	Cooperative Learning Nonlinguistic Representations Generating & Testing Hypotheses Homework Providing clear and effective learning feedback Setting goals or objectives	Do Now Three Summaries Transfer the concept Virtual Classroom Exit Tickets	Tides Tides data graph Tidal forces Gravity and Tides Lab	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students

21 st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
Oreo moon phases	Eclipses	Tides data graph	Gravity and Tides Lab		

		Phase calendar			
Summative Assessments:					
Practice test					
Key Terms					
Antarctic Circle	Gibbous	Axis	Azimuth	Autumnal Equinox	Lunar Eclipse
Lunar Phase	Celestial sphere	Circumpolar constellations	Constellation	Crescent	Ecliptic
Full moon	TideArtic Circle	Synchronous rotation	Tidal bulge	Neap tide	New moon
Orbital plane	Penumbra	Precession	Seasons	Sidereal year	Solar Eclipse
Spring tide	Summer Solstice	Tropic of Cancer	Tropic of Capricorn	Tropical year	Umbral
Vernal Equinox	Waning	Waxing	Winter Solstice		

Unit 3: The Solar System

Time Frame: 11 Days

Essential Questions

- To what extent do the interactions of objects in our Solar System cause observable phenomena?
- Why is it important to use models to understand and explain the interactions of objects in the universe?
- What objects make up our Solar System?
- What makes objects in the Solar System similar?
- How do we classify objects in the Solar System?
- How can observers from Earth determine basic properties of each planet?
- What events caused our Solar System to form?

Standards

Standards / CPIs (cumulative Progress Indicators) taught and assessed:

Science

[HS-ESS1-1](#) Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.

[HS-ESS1-6](#) Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-CED.A.4](#) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling. (HS-ESS1-4) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

[Career Ready practices](#)

Attend to personal health and financial well-being.

Demonstrate creativity and innovation.

Model integrity, ethical leadership and effective management.

Work productively in teams while using cultural global competence.

[SEL Practices & Competencies:](#)

[Self-Awareness](#)

- Identify what triggers own emotions.
- Analyze emotions and how they affect others.
- Possess self-efficacy and self-esteem

[Self-Management](#)

- Set plans and work toward goals
- Manage personal and interpersonal stress.
- Attention control (maintain optimal work performance).

- Seek help when needed. Display grit, determination, or perseverance.

Social Awareness

- Identify social cues (verbal, physical) to determine how others feel.
- Predict others’ feelings and reactions.
- Appreciate diversity (recognize individual and group similarities and differences).

Relationship Skills

- Exhibit cooperative learning and working toward group goals.
- Communicate effectively.
- Cultivate relationships with those who can be resources when help is needed.
- Provide help to those who need it.

Responsible Decision Making

- Identify decisions one makes at school.
- Reflect on how current choices affect one’s future.
- Identify problems when making decisions, and generate alternatives.
- Implement problem-solving skills when making decisions, when appropriate.

Overall Goal (What is the big idea?)
“What is the universe, and what is Earth’s place in it?”
How and why is Earth constantly changing?

Pre-Assessment: KWL Chart

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
WALT classify objects in the solar system based on description or position. HS-ESS1-1 RST.11-12.1 SL.11-12.4	Identifying Similarities and Differences Direct Instruction Individualized Instruction Concept Mapping Providing clear and effective learning feedback Consistent, ‘low-threat’ assessment Question-Answer Relationship	Do Now Self-Evaluation Highlighter Transfer the concept Virtual Classroom Illustrations Exit Tickets One minute paper	Our Solar System Journey to scale Planets to scale Non Planets Meteors	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students

	KWL Chart			
<p>WALT compare and contrast inner and outer planets.</p> <p>HS-ESS1-6 RST.11-12.8 WHST.9-12.1</p>	<p>Nonlinguistic Representations</p> <p>Identifying Similarities and Differences</p> <p>Homework</p> <p>Provide opportunities for student practice</p> <p>Individualized Instruction</p> <p>Reciprocal Teaching</p> <p>Promoting student metacognition</p> <p>Developing high expectations for each student</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>	<p>Inner Vs Outer planets</p> <p>Planet Data</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT Place steps in the formation of the solar system in chronological order and describe each step.</p> <p>HS-ESS1-6 HSA-CED.A.4 HSN-Q.A.2</p>	<p>Nonlinguistic Representations</p> <p>Summarizing & Note Taking</p> <p>Instructional Planning Using the Nine Categories of Strategies</p> <p>Scaffolding instructions</p> <p>Concept Mapping</p> <p>Teacher clarity</p> <p>Higher-level questioning</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Jigsaw</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p>	<p>Formation Timeline</p> <p>Solar System Math</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	Response Notebooks			
<p>WALT apply the physics concept of angular momentum to account for rotation and revolution.</p> <p>HS-ESS1-6 HSA-SSE.A.1 MP.2 MP.4</p>	<p>Setting Objectives</p> <p>Identifying Similarities and Differences</p> <p>Provide opportunities for student practice</p> <p>Inquiry-Based Teaching</p> <p>Reciprocal Teaching</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>Uranus Tilt</p> <p>Orbit and rotation</p> <p>Is Pluto a Planet?</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT calculate the age of the solar system using radiometric data collected from meteorites on Earth.</p> <p>HS-ESS1-6 HSA-CED.A.2 HSN-Q.A.1 HSN-Q.A.3</p>	<p>Reinforcing Effort</p> <p>Cues, Questions & Advance Organizers</p> <p>Generating & Testing Hypotheses</p> <p>Individualized Instruction</p> <p>Concept Mapping</p> <p>Teacher clarity</p> <p>Higher-level questioning</p> <p>Learning feedback that is detailed and specific</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Stop and Go</p> <p>Exit Tickets</p>	<p>Carbon Dating Rocks</p> <p>Meteorite date data</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT present evidence that supports the current theory of how the solar system formed.</p> <p>HS-ESS1-6 RST.11-12.1</p>	<p>Setting Objectives</p> <p>Summarizing & Note Taking</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p>	<p>The Role of Density</p> <p>Planet Formation</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p>

WHST.9-12.2	Generating & Testing Hypotheses Homework Provide opportunities for student practice Setting goals or objectives	Illustrations Exit Tickets One minute paper		IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students
-----------------------------	--	---	--	---

21st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
Planet Formation		Formation Timeline		Planets to scale	Carbon Dating Rocks
Summative Assessments: (include rubrics & exemplars) Sample Test Questions					
Key Terms					
Accretion	Angular momentum	Asteroid	Asteroid belt	Coma	Comet
Dwarf planet	Half-life	Condensation nuclei	Ion tail	Jovian	Kuiper belt
Meteor	Meteor shower	Meteorite	Meteoroid	Oort cloud	Orbital plane
Planet	Planetesimal	Orbital inclination	Protoplanet	Protosun	Ring
Satellite	Terrestrial	Radioactive decay			

Unit 4: Stars

Time Frame: 17 Days

Essential Questions

- Why does the Sun have such a strong gravitational pull and massive amounts of energy?
- How does solar activity affect the Earth?
- How are stars classified?
- How can stars have a life-cycle?
- Why are massive stars essential for the formation of black holes and heavy elements?

Standards

Standards / CPIs (cumulative Progress Indicators) taught and assessed:

Science

[HS-ESS1-3](#) Communicate scientific ideas about the way stars, over their life cycle, produce elements.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-CED.A.4](#) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

[Career Ready practices](#)

Act as a responsible and contributing citizen and employee.

Communicate clearly and effectively and with reason.
 Employ valid and reliable research strategies.
 Plan education and career paths aligned to personal goals.

SEL Practices & Competencies:

Self-Awareness

- Identify what triggers own emotions.
- Identify own needs and values
- Possess self-efficacy and self-esteem

Self-Management

- Set plans and work toward goals
- Monitor progress toward personal and academic short- and long-term goals.
- Attention control (maintain optimal work performance).
- Use feedback constructively.
- Advocate for oneself.

Social Awareness

- Predict others' feelings and reactions.
- Evaluate others' emotional reactions.
- Appreciate diversity (recognize individual and group similarities and differences).

Relationship Skills

- Demonstrate capacity to make friends.
- Manage and express emotions in relationships, respecting diverse viewpoints.
- Communicate effectively.
- Demonstrate leadership skills when necessary, being assertive and persuasive.

Responsible Decision Making

- Reflect on how current choices affect one's future.
- Identify problems when making decisions, and generate alternatives.
- Implement problem-solving skills when making decisions, when appropriate.

Overall Goal (What is the big idea?)

What is the universe, and what is Earth's place in it?

How and why is Earth constantly changing?

Pre-Assessment: Pre-Test

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
-----------------------------------	-----------------------------	----------------------	------------	-----------------------------

<p>WALT understand the Sun’s structure and affect on Earth.</p> <p>HS-ESS1-3 MP.2 RST.11-12.1 SL.11-12.4</p>	<p>Setting Objectives</p> <p>Generating & Testing Hypotheses</p> <p>Direct Instruction</p> <p>Provide opportunities for student practice</p> <p>Providing clear and effective learning feedback</p> <p>KWL Chart</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Exit Tickets</p>	<p>Features of the Sun</p> <p>Earth's Magnetic Field</p> <p>Magnetic Spheres</p> <p>Solar Structure</p> <p>Spectra</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT identify types of stars and how they are classified using the H-R diagram.</p> <p>HS-ESS1-3 HSA-SSE.A.1 WHST.9-12.1</p>	<p>Cooperative Learning</p> <p>Summarizing & Note Taking</p> <p>Homework</p> <p>Scaffolding instructions</p> <p>Promoting student metacognition</p> <p>Setting goals or objectives</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Exit Tickets</p>	<p>H-R Diagram</p> <p>H-R Spectrum</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT determine the formation of stars from dust particles into a nebula.</p> <p>HS-ESS1-3 HSN-O.A.1 MP.4</p>	<p>Cues, Questions & Advance Organizers</p> <p>Nonlinguistic Representations</p> <p>Provide opportunities for student practice</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Exit Tickets</p>	<p>Star Evolution Chart</p> <p>Stars resources</p> <p>Stellar formation cards</p> <p>Properties of Stars</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p>

	<p>Developing high expectations for each student</p> <p>Setting goals or objectives</p> <p>Comparison Matrix</p>			<p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT evaluate the life cycle of stars and how individual star's life cycle depends on its mass and fuel supply.</p> <p>HS-ESS1-3 HSA-CED.A.2 HSA-CED.A.4 WHST.9-12.2</p>	<p>Summarizing & Note Taking</p> <p>Homework</p> <p>Scaffolding instructions</p> <p>Individualized Instruction</p> <p>Concept Mapping</p> <p>Developing high expectations for each student</p> <p>Response Notebooks</p>	<p>Do Now</p> <p>Partner Quiz</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>	<p>Star Life</p> <p>Mass Dependence</p> <p>Star Clusters</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT understand stellar explosions and the formation of neutron stars and black holes.</p> <p>HS-ESS1-3 HSN-Q.A.3 RST.11-12.1</p>	<p>Setting Objective</p> <p>Identifying Similarities and Differences</p> <p>Generating & Testing Hypotheses</p> <p>Reciprocal Teaching</p> <p>Promoting student metacognition</p> <p>Teacher clarity</p> <p>Consistent, 'low-threat' assessment</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Partner Quiz</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Jigsaw</p> <p>Exit Tickets</p>	<p>Supernova</p> <p>Supernova Model</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	Learning feedback that is detailed and specific			
--	---	--	--	--

21 st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
	Earth's Magnetic Field	Spectra	Mass Dependence	Stellar formation cards	
		Stars resources			
Summative Assessments: Review Sample Quiz					
Key Terms					
Absolute magnitude	Apparent magnitude	Luminosity class	Magnetic field	Radiation zone	Red giant
Aurora	Binaries	Black dwarf	Black hole	Chromosphere	Convective zone
Corona	Fission	Fusion	Luminosity	Main sequence	Nebula
Neutron star	Nova	Hertzprung-Russell (H-R) diagram	Parallax	Parsec	Solar flare
Prominence	Protostar	Photosphere	Pulsar	Solar cycle	Solar wind
Spectrum	Spicules	Sunspot	Sunspot cycle	Supernova	Variable star
White dwarf					

Unit 5: Galaxies	
Time Frame: 11 Days	
Essential Questions	
<ul style="list-style-type: none"> • How is large-scale structures of the Universe defined? • Which type of objects are described when studying the large-scale structure of the Universe? • How are most large-scale structures detected? 	
Standards	
Standards / CPIs (cumulative Progress Indicators) taught and assessed:	
Science	
HS-ESS1-2 Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	
Mathematics	
HSA-SSE.A.1 Interpret expressions that represent a quantity in terms of its context.	

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Career Ready practices

Apply appropriate academic and technical skills.

Consider the environmental, social and economic impacts of decisions.

Utilize critical thinking to make sense of problems and persevere in solving them.

Use technology to enhance productivity.

SEL Practices & Competencies:

Self-Awareness

- Analyze emotions and how they affect others.
- Accurately recognize own strengths and limitations
- Possess self-efficacy and self-esteem

Self-Management

- Overcome obstacles and create strategies for more long-term goals.
- Regulate emotions such as impulses, aggression, and self-destructive behavior.
- Use feedback constructively.
- Exhibit positive motivation, hope, and optimism.

Social Awareness

- Evaluate others' emotional reactions.
- Respect others (e.g., listen carefully and accurately).
- Understand other points of view and perspectives.

Relationship Skills

- Exhibit cooperative learning and working toward group goals.
- Manage and express emotions in relationships, respecting diverse viewpoints.
- Communicate effectively.

Responsible Decision Making

- Identify decisions one makes at school.
- Reflect on how current choices affect one's future.

- Identify problems when making decisions, and generate alternatives.

Overall Goal (What is the big idea?)

What is the universe, and what is Earth's place in it?

How and why is Earth constantly changing?

Pre-Assessment: KWL Chart

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
<p>WALT describe our home galaxy, the Milky Way, in terms of properties, size, and location.</p> <p>HS-ESS1-2 HSN-Q.A.1 MP.4</p>	<p>Setting Objectives</p> <p>Cooperative Learning</p> <p>Summarizing & Note Taking</p> <p>Direct Instruction</p> <p>Concept Mapping</p> <p>Promoting student metacognition</p> <p>Setting goals or objectives</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>Earth in the Milky Way</p> <p>Galaxy Size</p> <p>Formation of the Milky Way</p> <p>Milky Way Timeline</p> <p>Milky Way Map</p> <p>Milky Way Model</p> <p>Milky Way Quiz</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT classify galaxies by shape and describe how they form.</p> <p>HS-ESS1-2</p>	<p>Cooperative Learning</p> <p>Nonlinguistic Representations</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p>	<p>Galaxy Classification</p> <p>Model the three types of galaxies</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p>

<p>HSA-SSE.A.1 RST.11-12.8</p>	<p>Identifying Similarities and Differences</p> <p>Homework</p> <p>Scaffolding instructions</p> <p>Providing clear and effective learning feedback</p> <p>KWL Chart</p>	<p>Jigsaw</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>		<p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT define clusters and superclusters.</p> <p>HS-ESS1-2 HSN-Q.A.2 WHST.9-12.2</p>	<p>Cues, Questions & Advance Organizers</p> <p>Summarizing & Note Taking</p> <p>Provide opportunities for student practice</p> <p>Concept Mapping</p> <p>Providing clear and effective learning feedback</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Transfer the concept Think-Pair-Share</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>	<p>The Nearest Supercluster</p> <p>Deep Field Views</p> <p>The Doppler Effect</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT explain the role of black holes and how they form.</p> <p>HS-ESS1-2 MP.2 WHST.9-12.1</p>	<p>Nonlinguistic Representations</p> <p>Summarizing & Note Taking</p> <p>Promoting student metacognition</p> <p>Setting goals or objectives</p> <p>Consistent, 'low-threat' assessment</p>	<p>Do Now</p> <p>Self-Evaluation</p> <p>Highlighter</p> <p>Jigsaw</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>Black Holes</p> <p>Locating Black Holes</p> <p>Black Hole Guide</p> <p>Black Hole Article</p> <p>Structure of a Black Hole</p> <p>Model Black Hole</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	Higher-level questioning			
WALT describe the properties of quasars and explain their role in galactic evolution. HS-ESS1-2 RST.11-12.1 SL.11-12.4	Identifying Similarities and Differences Scaffolding instructions Concept Mapping Reciprocal Teaching Teacher clarity Learning feedback that is detailed and specific KWL Chart	Do Now Three Summaries Self-Evaluation Transfer the concept Think-Pair-Share Exit Tickets One minute paper	Quasar Video Bright or Far Quasar Quiz	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students

21 st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
The Doppler Effect		Quasar Video	Locating Black Holes		Black Hole Article
			Milky Way Model		
Summative Assessments: Unit Test					
Key Terms					
Binary	Black body	Barred-spiral galaxy	Black hole	Dust lanes	Elliptical galaxy
Galactic bulge	Galactic center	Galactic cannibalism	Galactic disk	Galactic halo	Galactic nucleus
Galaxy cluster	Globular clusters	Irregular galaxy	Quasar	Radio galaxy	Seyfert galaxy
Supercluster	The Local Group				

Unit 6: Big Bang

Time Frame: 9 Days

Essential Questions

- How and when did the universe form?
- How was all the matter in the universe formed?
- How do scientists support the Big Bang Theory?
- How are large-scale structures in the universe disturbed?
- What is dark matter and dark energy?
- How do you describe the shape of the universe?
- What is the fate of the universe?

Standards

Standards / CPIs (cumulative Progress Indicators) taught and assessed:

Science

[HS-ESS1-2](#) Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-CED.A.4](#) Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.1](#) Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

Career Ready practices

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Demonstrate creativity and innovation.

Employ valid and reliable research strategies.

Use technology to enhance productivity.

Work productively in teams while using cultural global competence.

SEL Practices & Competencies:

Self-Awareness

- Analyze emotions and how they affect others.
- Accurately recognize own strengths and limitations
- Identify own needs and values

Self-Management

- Regulate emotions such as impulses, aggression, and self-destructive behavior.
- Manage personal and interpersonal stress.
- Attention control (maintain optimal work performance).
- Advocate for oneself.

Social Awareness

- Evaluate others' emotional reactions.
- Respect others (e.g., listen carefully and accurately).
- Understand other points of view and perspectives.

Relationship Skills

- Evaluate own skills to communicate with others.
- Manage and express emotions in relationships, respecting diverse viewpoints.
- Communicate effectively.
- Demonstrate leadership skills when necessary, being assertive and persuasive.

Responsible Decision Making

- Reflect on how current choices affect one's future.
- Identify problems when making decisions, and generate alternatives.
- Negotiate fairly

Overall Goal (What is the big idea?)

What is the universe, and what is Earth's place in it?

How and why is Earth constantly changing?

Pre-Assessment: Pre-Test, KWL Chart

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
<p>WALT understand the formation of the universe and the Big Bang theory.</p> <p>HS-ESS1-2 HSN-Q.A.2 HSN-Q.A.3 RST.11-12.8</p>	<p>Setting Objectives</p> <p>Summarizing & Note Taking</p> <p>Direct Instruction</p> <p>Concept Mapping</p> <p>Providing clear and effective learning feedback</p> <p>Higher-level questioning</p> <p>KWL Chart</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p>	<p>Other Theories</p> <p>Cosmic Calendar</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT model the shape of the universe.</p> <p>HS-ESS1-2 HSA-CED.A.2 HSA-CED.A.4</p>	<p>Reinforcing Effort/Providing Recognition</p> <p>Nonlinguistic Representations</p> <p>Generating & Testing Hypotheses</p> <p>Homework</p> <p>Scaffolding instructions</p> <p>Individualized Instruction</p> <p>Providing clear and effective learning feedback</p> <p>Setting goals or objectives</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Transfer the concept</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>There is no Middle</p> <p>Big Bang</p> <p>Shape of the Universe</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT provide evidence of Big Bang and expansion.</p>	<p>Nonlinguistic Representations</p>	<p>Do Now</p> <p>Hand it in, Pass it out</p>	<p>Big Band Evidence</p> <p>CMB Video</p>	<p>Less complex reading level</p>

<p>HS-ESS1-2 HSA-SSE.A.1 RST.11-12.1 SL.11-12.4</p>	<p>Homework</p> <p>Developing high expectations for each student</p> <p>Providing clear and effective learning feedback</p> <p>Higher-level questioning</p> <p>Anticipation Guides</p>	<p>Self-Evaluation</p> <p>Highlighter</p> <p>Jigsaw</p> <p>Virtual Classroom</p> <p>Exit Tickets</p>	<p>Dark Energy</p>	<p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT describe the formation of original matter, the first elements, and sequence of events leading up to today.</p> <p>HS-ESS1-2 HSN-Q.A.1 MP.4 WHST.9-12.2</p>	<p>Summarizing & Note Taking</p> <p>Scaffolding instructions</p> <p>Direct Instruction</p> <p>Concept Mapping</p> <p>Developing high expectations for each student</p> <p>Setting goals or objectives</p> <p>Consistent, ‘low-threat’ assessment</p> <p>Higher-level questioning</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Partner Quiz</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Letter through time</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>	<p>Nucleosynthesis</p> <p>Cosmic Connections</p> <p>Spongy Universe</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT predict the fate of the universe.</p> <p>HS-ESS1-2 MP.2 WHST.9-12.1</p>	<p>Cooperative Learning</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Partner Quiz</p>	<p>Fate of the Universe</p> <p>Writing Task Fate of Universe</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p>

	<p>Identifying Similarities and Differences</p> <p>8. Generating & Testing Hypotheses</p> <p>Provide opportunities for student practice</p> <p>Inquiry-Based Teaching</p> <p>Developing high expectations for each student</p> <p>Teacher clarity</p> <p>Question-Answer Relationship</p> <p>Anticipation Guides</p>	<p>Jigsaw</p> <p>Illustrations</p> <p>Exit Tickets</p> <p>Roll the die</p>		<p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
--	--	--	--	--

21st Century Theme Targeted – Global Awareness
21st Century Skills Targeted

Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
Cosmic Calendar	Dark Energy		Fate of the Universe		Other Theories
Summative Assessments: Unit Test					
Key Terms					
Antimatter	Antiquark	Big Bang theory	Blue shift	Closed universe	Cosmology
Critical density	Dark matter	Cosmic background radiation	Cosmological principle	Exotic particles	Flat universe
Grand Unification	Hubble's law	Cosmic microwave background	Fundamental force	Gravitational singularity	Inflation
Inflationary epoch	Interstellar matter	Isotropic	Nucleosynthesis	Open universe	Planck
Plasma	Quark	Primordial synthesis	Universal recession	Redshift	Vacuum

Unit 7: Exoplanets
Time Frame: 9 Days
Essential Questions
<ul style="list-style-type: none"> ● How did the invention of the telescope influence science? ● How do telescopes work? ● What space based methods can we use to observe the universe? ● How has the space program influenced our lives on Earth? ● Why is astronomy such a dynamic science?
Standards
Standards / CPIs (cumulative Progress Indicators) taught and assessed: Science HS-ESS1-1 Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.

[HS-ESS1-3](#) Communicate scientific ideas about the way stars, over their life cycle, produce elements.

Mathematics

[HSA-CED.A.2](#) Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

[HSA-SSE.A.1](#) Interpret expressions that represent a quantity in terms of its context.

[HSN-Q.A.2](#) Define appropriate quantities for the purpose of descriptive modeling.

[HSN-Q.A.3](#) Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

[MP.2](#) Reason abstractly and quantitatively.

[MP.4](#) Model with mathematics.

ELA/Literacy

[RST.11-12.1](#) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[RST.11-12.8](#) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[WHST.9-12.1](#) Write arguments focused on discipline-specific content.

[WHST.9-12.2](#) Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

[SL.11-12.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

[Career Ready practices](#)

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Communicate clearly and effectively and with reason.

Use technology to enhance productivity.

Work productively in teams while using cultural global competence.

[SEL Practices & Competencies:](#)

[Self-Awareness](#)

- Identify what triggers own emotions.
- Analyze emotions and how they affect others.
- Accurately recognize own strengths and limitations

[Self-Management](#)

- Set plans and work toward goals
- Seek help when needed. Display grit, determination, or perseverance.
- Advocate for oneself.

[Social Awareness](#)

- Predict others' feelings and reactions.
- Understand other points of view and perspectives.
- Appreciate diversity (recognize individual and group similarities and differences).
- Identify and use the resources of family, school, and community

[Relationship Skills](#)

- Communicate effectively.
- Cultivate relationships with those who can be resources when help is needed.
- Provide help to those who need it.
- Resist inappropriate social pressures.

[Responsible Decision Making](#)

- Discuss strategies used to resist peer pressure.
- Reflect on how current choices affect one's future.
- Implement problem-solving skills when making decisions, when appropriate.

Overall Goal (What is the big idea?)

What is the universe, and what is Earth's place in it?

How and why is Earth constantly changing?

How do Earth's surface processes and human activities affect each other?

Pre-Assessment: Pre-test

(SLO) Student Learning Objectives	Student Learning Strategies	Formative Assessment	Activities	Modifications & Reflections
<p>WALT understand electromagnetic spectrum and types of radiation.</p> <p>HS-ESS1-3 HSA-CED.A.2 WHST.9-12.2</p>	<p>Setting Objectives</p> <p>Cues, Questions & Advance Organizers</p> <p>Identifying Similarities and Differences</p> <p>Scaffolding instructions</p> <p>Individualized Instruction</p> <p>Concept Mapping</p> <p>Consistent, 'low-threat' assessment</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Transfer the concept</p> <p>Jigsaw</p> <p>Illustrations</p> <p>Exit Tickets</p>	<p>EM Spectrum</p> <p>EM Spectrum Diagram</p> <p>Color Through a Prism</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

	KWL Chart			
<p>WALT compare types of telescopes.</p> <p>HS-ESS1-1 HSN-Q.A.3 WHST.9-12.1</p>	<p>Nonlinguistic Representations</p> <p>Generating & Testing Hypotheses</p> <p>Direct Instruction</p> <p>Provide opportunities for student practice</p> <p>Providing clear and effective learning feedback</p> <p>Teacher clarity</p> <p>Setting goals or objectives</p>	<p>Do Now</p> <p>Partner Quiz</p> <p>Highlighter</p> <p>Transfer the concept</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p> <p>One minute paper</p>	<p>Optical Telescope</p> <p>Timeline Activity</p> <p>Simple Reflecting</p> <p>Build a Telescope</p> <p>What else can they see</p> <p>Comparing Telescopes</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT discover science based observations and explorations.</p> <p>HS-ESS1-3 HSA-SSE.A.1 WHST.9-12.2</p>	<p>Cooperative Learning</p> <p>Summarizing & Note Taking</p> <p>Instructional Planning Using the Nine Categories of Strategies</p> <p>Homework</p> <p>Individualized Instruction</p> <p>Promoting student metacognition</p> <p>Developing high expectations for each student</p> <p>Comparison Matrix</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p> <p>Jigsaw</p> <p>Exit Tickets</p> <p>Metacognition sheet</p>	<p>Hubble Space Telescope</p> <p>Overcoming the Atmosphere</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>

<p>WALT understand the history of the space program.</p> <p>HS-ESS1-1 HSN-Q.A.2 WHST.9-12.1</p>	<p>Nonlinguistic Representations</p> <p>Identifying Patterns</p> <p>Scaffolding instructions</p> <p>Reciprocal Teaching</p> <p>Providing clear and effective learning feedback</p> <p>Setting goals</p> <p>Higher-level questioning</p> <p>Anticipation Guides</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Partner Quiz</p> <p>Think-Pair-Share</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p>	<p>Space events</p> <p>Space Timeline</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT predict technological advances.</p> <p>HS-ESS1-1 MP.4 SL.11-12.4</p>	<p>Setting Objectives</p> <p>Generating & Testing Hypotheses</p> <p>Homework</p> <p>Direct Instruction</p> <p>Provide opportunities for student practice</p> <p>Reciprocal Teaching</p> <p>Promoting student metacognition</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Highlighter</p> <p>Transfer the concept</p> <p>Think-Pair-Share</p> <p>Virtual Classroom</p> <p>Illustrations</p> <p>Letter through time</p> <p>Exit Tickets</p>	<p>Impacts of Space Travel</p> <p>Types of Satellites</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and formative assessment</p> <p>Alternative assignments</p> <p>Independent studies</p> <p>Mentoring of other students</p>
<p>WALT explore current events.</p> <p>HS-ESS1-1 RST.11-12.1 RST.11-12.8 SL.11-12.4</p>	<p>Reinforcing Effort/Providing Recognition</p> <p>Summarizing & Note Taking</p>	<p>Do Now</p> <p>Three Summaries</p> <p>Self-Evaluation</p> <p>Think-Pair-Share</p>	<p>Astronomy News</p> <p>Sky and Telescope</p> <p>Universe Today</p> <p>Space.com</p>	<p>Less complex reading level</p> <p>Shortened assignments</p> <p>Different goals</p> <p>IEP modifications for summative and</p>

	Homework Inquiry-Based Teaching Reciprocal Teaching Consistent, 'low-threat' assessment	Illustrations Exit Tickets Metacognition sheet		formative assessment Alternative assignments Independent studies Mentoring of other students
--	--	--	--	---

21 st Century Theme Targeted – Global Awareness					
21st Century Skills Targeted					
Creativity & Innovation	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
Build a Telescope			Overcoming the Atmosphere	Lunar Crash Mission	Impacts of Space Travel
Summative Assessments: Unit Test					
Key Terms					
Adaptive optics	Aperture	Convex lens	Electromagnetic spectrum	Focal length	Focus
High-energy telescope	Hubble Space Telescope	Infrared telescope	Interferometer	Light pollution	Optical telescope
Radar	Radio telescope	Reflecting telescope	Refracting telescope	Remote sensing	Resolving power
Space probe	Space shuttle	Space spinoff	Space station		