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

<u>HS-ESS1-4</u> Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Mathematics

<u>HSA-CED.A.2</u> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

<u>HSA-CED.A.4</u> 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.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.1</u> Write arguments focused on discipline-specific content.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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

Learning ObjectivesStrategiesAssessmentReflectionsWALT Identify the aspects of science that are studied by astronomers.Setting Objectives Summarizing & Note TakingDo NowScience of Astronomy NotesLess complex reading level Shortened assignmentsUSESS1_4Different goals	(SLO) Student	Student Learning	Formative	Activities	Modifications &
WALT Identify the aspects of science that are studied by astronomers.Setting Objectives Summarizing & Note TakingDo NowScience of Astronomy NotesLess complex reading level Shortened assignmentsUSESS1.4Setting Objectives Summarizing & Note TakingDo NowScience of Astronomy NotesShortened assignmentsUSESS1.4Think-Pair-ShareScience vs PseudoscienceIEP modifications for summative and formative	Learning Objectives	Strategies	Assessment		Reflections
aspects of science that are studied by astronomers.Summarizing & Note TakingThree SummariesAstronomy NotesShortened assignmentsHS ESS1 4Think-Pair-ShareScience vs PseudoscienceIEP modifications for summative and formative	WALT Identify the	Setting Objectives	Do Now	Science of	Less complex reading level
that are studied by astronomers.Summarizing & Note TakingThree SummariesNotesDifferent goalsHS ESS1 4Think-Pair-ShareScience vs PseudoscienceIEP modifications for summative and formative	aspects of science			<u>Astronomy</u>	Shortened assignments
astronomers. Taking Think-Pair-Share Science vs IEP modifications for summative and formative	that are studied by	Summarizing & Note	Three Summaries	<u>Notes</u>	
HS ESS1 4 Think-Pair-Share Science VS IEP modifications for summative and formative	astronomers.	Taking			Different goals
HS ESS1 4 Description		, C	Think-Pair-Share	Science vs	IEP modifications for
Direct Instruction	HS-ESS1-4	Direct Instruction		<u>Pseudoscience</u>	summative and formative
HSA-SSE.A.1 Stop and Go	HSA-SSE.A.1		Stop and Go		assessment
MP.4 Alternative assignments	<u>MP.4</u>	KWL Chart			Alternative assignments
WHST.9-12.2 Illustrations	<u>WHST.9-12.2</u>	It will churt	Illustrations		Independent studies
					independent statios
Exit Tickets Mentoring of other student			Exit Tickets		Mentoring of other students
WALT to recorde the Deinferning Effort (De Nerre Lei Cofete Less complex reading level	WALT 1. was a structure to	Dainfanaina Effert/	D - N	Lat Cafata	Lass complex reading level
WALI demonstrate Reinforcing Effort/ Do Now Lab Safety	WAL1 demonstrate	Reinforcing Effort/	Do Now	Lab Safety	Less complex reading level
Iab safety and apply Providing Video Shortened assignments	lab safety and apply	Providing		<u>Video</u>	Shortened assignments
scientific methods. Recognition Self-Evaluation	scientific methods.	Recognition	Self-Evaluation	~	Different goals
Scientific				Scientific	Different goals
HS-ESS1-4 Partner Quiz Method IEP modifications for	HS-ESS1-4		Partner Quiz	Method	IEP modifications for
HSN-Q.A.1 Storyboard summative and formative	HSN-Q.A.1			Storyboard	summative and formative

MD 2		Th: 1 D ' C1		
$\frac{MP.2}{SI 11 12 4}$	Lues, Questions &	Inink-Pair-Share		Alternative assignments
<u>5L.11-12.4</u>	Advance Organizers	Exit Ticket		Independent studies
	Nonlinguistic			Mentoring of other student
	Representations	Safety Quiz		
	Concept Mapping			
WALT Compare	Cooperative Learning	Do Now	How to	Less complex reading level
astronomical units of	Cooperative Dearning	Donow	convert	Shortened assignments
measurements and	Nonlinguistic	Highlighter		Short cricu assignments
use calculations to	Representations	T (1	Using Excel to	Different goals
create scale models.		Transfer the	<u>convert units</u>	IEP modifications for
HS-ESS1-4	Homework	concept	Triangulation	assessment
HSA-CED.A.2	Durani da su su su tamiti a	Think-Pair-Share		Alternative assignments
HSN-Q.A.1	for student practice		Triangulation	Independent studies
	for student practice	Illustrations	lab	
	Individualized	Fxit Tickets	Distances and	Mentoring of other students
	Instruction	LAR TICKEts	Sizes	
		One minute paper		
		D. M	Scale and Size	T
WALT Use examples	Direct Instruction	Do Now	<u>Aztec</u> Calandar	Less complex reading level
Horn Medicine	Summerizing & Note	Three Summaries	Stone	Shortened assignments
Wheel and Caracol to	Taking		<u></u>	Different goals
explain ancient	6	Hand it in, Pass it	Guided Notes	IEP modifications for
understanding of	Identifying	out		summative and formative assessment
astronomy.	Similarities and	Highlighter		Altornotivo ossignments
HS-ESS1-4	Differences	ingingitor		Anter native assignments
HSA-SSE.A.1	Developing high	Illustrations		Independent studies
<u>RST.11-12.1</u>	expectations for each			Mentoring of other students
	student	Exit Tickets		
				-
WALT organize	Setting Objectives	Do Now	Timeline	Less complex reading level
history of astronomy		Hand it in Pass it	Astronomers	Shortened assignments
events and	Keinforcing Effort/Providing	out	timeline	Different goals
astronomers.	Recognition			IEP modifications for
		Partner Quiz	Ancient	summative and formative
$\frac{\text{HS-ESS1-4}}{\text{HSN O A }^2}$	Concept Mapping	Think Dair Share	Astronomy	
RST.11-12.1		1 mmk-ran-Share		Alternative assignments
	KWL Chart	Stop and Go		Independent studies
				Mentoring of other students
		Exit Tickets		

WALT calculate	Direct Instruction	Do Now	Law of	Less complex reading level
eccentricity and			gravitation	Shortened assignments
gravitational forces.	Provide opportunities	Self-Evaluation	Earos of	Different goals
HS-FSS1_4	for student practice	Stop and Go	<u>FORCE OF</u> gravity lab	
<u>HSN-Q.A.1</u> HSN-Q A 3	Reciprocal Teaching	Virtual Classroom	Escape	IEP modifications for summative and formative assessment
	Learning feedback	Exit Tickets	velocity	Alternative assignments
	that is detailed and			Independent studies
	specific			Mentoring of other students
	Question-Answer Relationship Anticipation Guides			
WALT illustrate early	Setting Objectives	Do Now	Animated	Less complex reading level
models of solar	Secting Cojectives	201101	model	Shortened assignments
systems.	Cues, Questions &	Hand it in, Pass it		
	Advance Organizers	out	Geocentric	Different goals
<u>HS-ESS1-4</u> HSN-0 A 2	X1	Self-Evaluation	and Heliocentric	IEP modifications for summative and formative
MP.4	Identifying	Self L'alauton	<u>ricinocontric</u>	assessment
	Differences	Transfer the		Alternative assignments
		concept		Independent studies
	Promoting student metacognition	Think-Pair-Share		Mentoring of other students
		Illustrations		
	Developing high expectations for each student	Exit Tickets		
		One minute paper		
	Higher-level questioning			
WALT explain	Identifying	Do Now	Kepler vs	Less complex reading level
Newton's and	Similarities and		Brache	Shortened assignments
Kepler's Laws as	Differences	Four Corners	activity	Different goals
nlanetary motion	Concepting & Testing	Self-Evaluation	Filinse	
	Hypotheses		diagram	IEP modifications for summative and formative
HS-ESS1-4	Typourosob			assessment
HSN-Q.A.2	Scaffolding	Think-Pair-Share	Kepler's Law	Alternative assignments
<u>whol.9-12.2</u>	Instructions	Illustrations		Independent studies
	Provide opportunities			Mentoring of other students
	for student practice	Exit Tickets		
	*			

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	Communicati on & Collaboration	Life & Careers		
		Animated model	<u>Geocentric and</u> <u>Heliocentric</u>	<u>Kepler vs</u> <u>Brache</u> activity			
Summative A	Summative Assessments:						
		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

<u>HS-ESS1-4</u> Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Mathematics

<u>HSA-CED.A.2</u> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

<u>HSA-CED.A.4</u> 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.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.2</u> Define appropriate quantities for the purpose of descriptive modeling.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections
WALT relate Earth's	Summarizing & Note	Do Now	Rotation &	Less complex
rotation to the	Taking		Revolution of the	reading level
movement of		Three Summaries	Earth	Shortened
celestial objects	Direct Instruction			assignments
across our skies		Self-Evaluation	Position of Earth in	Different goals
during a 24 hour	Individualized		<u>Milky Way</u>	IFD
period.	Instruction	Partner Quiz		for summative and
				formative
HS-ESS1-4	Reciprocal Teaching	Illustrations		assessment
HSA-CED.A.2	Recipioeur reaching			Alternative
HSN-Q.A.2	Developing high	Exit Tickets		assignments
	Developing high			Independent
	expectations for each	One minute paper		studies
	student			Mentoring of other
	TT: -11	Metacognition sheet		students
	Higher-level			
	questioning			
	KWL Chart			
WALT use	Cues, Questions &	Do Now	Zodiac Reference	Less complex reading level
constellations to find	Advance Organizers		C1	
compass direction		Self-Evaluation	<u>Sky map</u>	Shortened
and time of the year.	Summarizing & Note	Turnefer (hereiner)	C	assignments
	Taking	I ransfer the concept	<u>Seasonal</u>	Different goals
<u>H5-E551-4</u> WHST 0 12 1		Think Dair Shara	constellations	IEP modifications
$\frac{W1151.9-12.1}{HSNOA1}$	<u>Scaffolding</u>		Articles	for summative and
<u>11511-Q.A.1</u>	<u>instructions</u>	Illustrations	Articles	assessment
		mustrations	Navigation with	
	Provide opportunities	Exit Tickets	constellations	Alternative
	for student practice	One minute paper	constentations	assignments
		one minute puper		Independent
	Developing high			studies
	expectations for each			Mentoring of other
	student			students
	Learning feedback			
	that is detailed and			
	specific			
WALT identify the	Summarizing & Note	Do Now	Seasons	Less complex
effects of Earth's tilt	Taking	Four Corners		reading level
on the distribution of			Reason for seasons	Shortened
heat on Earth.	Generating & Testing	Hand it in, Pass it out		assignments
	Hypotheses		Tilt and climate	Different goals
HS-ESS1-4				IFP modifications
HSA-SSE.A.1				for summative and

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

	Learning feedback that is detailed and specific			
WALT describe	Summarizing & Note	Do Now	<u>Eclipses</u>	Less complex
conditions necessary	Taking	Four Corners	^	reading level
for eclipses.	-	Three Summaries	Phases and eclipses	Shortened
-	Generating & Testing	Hand it in, Pass it out	lab	assignments
HS-ESS1-4	Hypotheses	Self-Evaluation		Different goals
<u>RST.11-12.1</u>	11) pouloood	Partner Quiz	Modeling eclipses	
SL.11-12.4	Homework			IEP modifications
	TIOINCWOIK	Think-Pair-Share	Eclipse lollipop lab	formative
		Jigsaw		assessment
	Provide opportunities	-		Alternative
	for student practice			assignments
		Illustrations		T 1
	Concept Mapping			studies
		Exit Tickets		
	Promoting student			Mentoring of other
	metacognition			stutents
	KWL Chart			
WALT relate the	Cooperative Learning	Do Now	Tides	Less complex reading level
of the Moon and Sun and their relative	Nonlinguistic Representations	Three Summaries	<u>Tides data graph</u>	Shortened assignments
positions as they		Transfer the concept	<u>Tidal forces</u>	Different goals
affect tidal changes. <u>HS-ESS1-4</u> <u>HSA-CED.A.4</u> <u>MP.2</u> <u>MP.4</u>	Generating & Testing Hypotheses Homework	Virtual Classroom	<u>Gravity and Tides</u> Lab	IEP modifications for summative and formative assessment
		Exit Tickets		Alternative assignments
	Providing clear and effective learning feedback			Independent studies
	Setting goals or objectives			Mentoring of other students

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

<u>HS-ESS1-1</u> 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.

<u>HS-ESS1-6</u> 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

<u>HSA-CED.A.2</u> 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.

<u>HSA-SSE.A.1</u> Interpret expressions that represent a quantity in terms of its context.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.2</u> 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.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

MP.4 Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections
WALT classify	Identifying	Do Now	Our Solar System	Less complex
objects in the solar	Similarities and			reading level
system based on	Differences	Self-Evaluation	Journey to scale	Shortened
description or				assignments
position.	Direct Instruction	Highlighter	Planets to scale	D'00 / 1
				Different goals
HS-ESSI-I	Individualized	Transfer the concept	Non Planets	IEP modifications
$\frac{\text{KS1.11-12.1}}{\text{SL}\ 11\ 12\ 4}$	Instruction	Virtual Classroom	Mataora	for summative and
<u>5L.11-12.4</u>		viituai Classioolii	Meteors	formative
	Concept Mapping	Illustrations		ussessment
		mustrations		Alternative
	Providing clear and	Exit Tickets		assignments
	effective learning			Independent
	feedback	One minute paper		studies
				Mentoring of
	Consistent, 'low-			other students
	threat' assessment			
	Question-Answer			
	Relationship			

	KWL Chart			
WALT compare and contrast inner and outer planets. <u>HS-ESS1-6</u> <u>RST.11-12.8</u> <u>WHST.9-12.1</u>	Nonlinguistic RepresentationsIdentifying Similarities and DifferencesHomeworkProvide opportunities for student practiceIndividualized InstructionReciprocal TeachingPromoting student metacognitionDeveloping high expectations for each student	Do Now Three Summaries Self-Evaluation Think-Pair-Share Illustrations Exit Tickets Metacognition sheet	Inner Vs Outer planets Planet Data	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students
WALT Place steps in the formation of the solar system in chronological order and describe each step. <u>HS-ESS1-6</u> <u>HSA-CED.A.4</u> <u>HSN-Q.A.2</u>	Nonlinguistic RepresentationsSummarizing & Note TakingInstructional Planning Using the Nine Categories of StrategiesScaffolding instructionsConcept MappingTeacher clarityHigher-level questioning	Do Now Three Summaries Self-Evaluation Jigsaw Illustrations Letter through time Exit Tickets	Formation Timeline Solar System Math	Less complex reading level Shortened assignments Different goals IEP modifications for summative and formative assessment Alternative assignments Independent studies Mentoring of other students

	Response Notebooks			
WALT apply the	Setting Objectives	Do Now	Uranus Tilt	Less complex
physics concept of angular momentum to	Identifying	Self-Evaluation	Orbit and rotation	Shortened
and revolution.	Differences	Transfer the concept	Is Pluto a Planet?	assignments Different goals
HS-ESS1-6 HSA-SSE.A.1	Provide opportunities	Think-Pair-Share		IEP modifications for summative and
<u>MP.2</u> <u>MP.4</u>	Inquiry_Based	Virtual Classroom		formative assessment
	Teaching	Exit Tickets		Alternative assignments
	Reciprocal Teaching	One minute paper		Independent studies
				Mentoring of
WALT calculate the age of the solar	Reinforcing Effort	Do Now	Carbon Dating Rocks	Less complex reading level
system using radiometric data	Cues, Questions & Advance Organizers	Three Summaries	Meteorite date data	Shortened assignments
collected from meteorites on Earth.	Generating & Testing	Self-Evaluation		Different goals
HS-ESS1-6	Hypotheses	Stop and Go		IEP modifications for summative and
HSA-CED.A.2 HSN-Q.A.1 USN Q.A.2	Individualized Instruction	Exit Tickets		formative assessment
<u>IISN-Q.A.5</u>	Concept Mapping			Alternative assignments
	Teacher clarity			Independent studies
	Higher-level questioning			Mentoring of other students
	Learning feedback that is detailed and specific			
WALT present	Setting Objectives	Do Now	The Role of Density	Less complex reading level
supports the current theory of how the	Summarizing & Note	Three Summaries	Planet Formation	Shortened assignments
solar system formed.	0	Self-Evaluation		Different goals
<u>HS-ESS1-6</u> <u>RST.11-12.1</u>		Think-Pair-Share		

WHST.9-12.2	Generating & Testing	Illustrations	IEP modifications
	Hypotheses		for summative and
	Hypotheses	Errit Tielrote	formative
		EXIT TICKETS	assessment
	Homework		
		One minute paper	Alternative
			assignments
	Provide opportunities		-
	for student practice		Independent
	<u> </u>		studies
	G		
	Setting goals or		Mentoring of
	objectives		other students
1			1

	21 st Century Theme Targeted – Global Awareness					
		21st Century	Skills Targeted			
Creativity	Information	Media Literacy	Critical Thinking	Communication	Life &	
&	Literacy		& Problem Solving	& Collaboration	Careers	
Innovation						
<u>Planet</u>		Formation Timeline		Planets to scale	<u>Carbon</u>	
Formation					Dating	
					<u>Rocks</u>	
Summative As	ssessments: (inc	lude rubrics & exemplars	5)			
Sample Test (Juestions					
		Key	Terms			
Accretion	Angular	Asteroid	Asteroid belt	Coma	Comet	
	momentum					
Dwarf	Half-life	Condensation nuclei	Ion tail	Jovian	Kuiper	
planet					belt	
Meteor	Meteor	Meteorite	Meteoroid	Oort cloud	Orbital	
	shower				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

<u>HS-ESS1-3</u> Communicate scientific ideas about the way stars, over their life cycle, produce elements.

Mathematics

<u>HSA-CED.A.2</u> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

<u>HSA-CED.A.4</u> Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

<u>HSA-SSE.A.1</u> Interpret expressions that represent a quantity in terms of its context.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections

WALT understand	Setting Objectives	Do Now	Features of the Sun	Less complex
the Sun's structure				reading level
and affect on Earth.	Generating & Testing	Three Summaries	Earth's Magnetic	Shortened
	Hypotheses		<u>Field</u>	assignments
HS-ESS1-3		Self-Evaluation		Different cools
<u>MP.2</u> DST 11 12 1	Direct Instruction	Think Dain Chana	Magnetic Spheres	Different goals
$\frac{K51.11-12.1}{S1-11-12.4}$		Inink-Pair-Snare	Solar Structure	IEP modifications
<u>SL.11-12.4</u>	Provide opportunities	Exit Tickets	Solar Structure	for summative and
	for student practice	LAR HEREIS	Spectra	assessment
			<u>opecuu</u>	
	Providing clear and			Alternative
	effective learning			assignments
	feedback			Independent
				studies
	KWL Chart			Mentoring of
				other students
WALT identify types	Cooperative	Do Now	<u>H-R Diagram</u>	Less complex
of stars and how they	Learning		II.D.C.	reading level
are classified using	~	Self-Evaluation	H-R Spectrum	Shortened
the H-K diagram.	Summarizing & Note	Think Dair Shara		assignments
HS-ESS1-3	Taking			Different goals
HSA-SSE.A.1	TT 1	Exit Tickets		C
WHST.9-12.1	Homework			IEP modifications
	0 00 11			formative
	Scatfolding			assessment
	instructions			Alternativa
	Dromoting student			assignments
	metacognition			
	metaeogintion			Independent
	Setting goals or			studies
	objectives			Mentoring of
	o o joo a voo			other students
WALT determine the	Cues, Questions &	Do Now	Star Evolution Chart	Less complex
formation of stars	Advance Organizers	201100	Star 24 of a for a	reading level
from dust particles	8	Three Summaries	Stars resources	Shortened
into a nebula.	Nonlinguistic			assignments
	Representations	Self-Evaluation	Stellar formation	
HS-ESS1-3	*		cards	Different goals
HSN-Q.A.1	Provide opportunities	Transfer the concept		IEP modifications
<u>MP.4</u>	for student practice	Think Dair Ober	Properties of Stars	for summative and
		1 mink-Pair-Share		formative assessment
		Fxit Tickets		assessment
		LAR HOROLO		Alternative
				assignments
				1 · · · · · · · · · · · · · · · · · · ·

	Developing high expectations for each			Independent studies
	student			Mentoring of other students
	Setting goals or objectives			
	Comparison Matrix			
WALT evaluate the life cycle of stars and	Summarizing & Note Taking	Do Now	Star Life	Less complex reading level
how individual star's	Homoryali	Partner Quiz	Mass Dependence	Shortened
its mass and fuel	Homework	Transfer the concept	Star Clusters	Different goals
Suppry.	Scaffolding instructions	Think-Pair-Share		IEP modifications
HSA-CED A 4	Individualized	Virtual Classroom		for summative and formative
<u>WHST.9-12.2</u>	Instruction	Illustrations		Alternative
	Concept Mapping	Exit Tickets		assignments
	Developing high	Metacognition sheet		studies
	student			Mentoring of other students
	Response Notebooks			
WALT understand stellar explosions and	Setting Objective	Do Now	<u>Supernova</u>	Less complex reading level
the formation of neutron stars and	Identifying	Self-Evaluation	Supernova Model	Shortened
black holes.	Differences	Partner Quiz		Different goals
HS-ESS1-3 HSN-Q A 3	Generating & Testing	Transfer the concept		IEP modifications
<u>RST.11-12.1</u>	Hypotheses	Think-Pair-Share		for summative and formative assessment
	Reciprocal Teaching	Jigsaw		Alternative
	Promoting student metacognition	Exit Tickets		assignments
	Teacher clarity			studies
	Consistent (1			Mentoring of other students
	threat' assessment			

Learning feedback that is detailed and		
specific		

		21st Contury Thoma Ta	ngotod Clobal Awayan	000	
		21° Century Theme Ta	rgeteu – Giobai Awaren	ess	
	1	21st Century	Skills Targeted	1	1
Creativity	Information	Media Literacy	Critical Thinking &	Communicatio	Life &
&	Literacy		Problem Solving	n &	Careers
Innovation				Collaboration	
	Earth's	Spectra	Mass Dependence	Stellar	
	Magnetic			formation cards	
	Field				
		Stars resources			
Summative A	ssessments:		1		
Review					
Sample Ouiz					
		Kev	Terms		
Absolute	Apparent	Luminosity class	Magnetic field	Radiation zone	Red giant
magnitude	magnitude				8
Aurora	Binaries	Black dwarf	Black hole	Chromosphere	Convective
1 Iul ol u	Dimarios	Diuch uttuit		emomosphere	zone
Corona	Fission	Fusion	Luminosity	Main sequence	Nebula
Neutron star	Nova	Hertzsprung-Russell	Parallax	Parsec	Solar flare
redución star	11010	(H-R) diagram	1 urunux	1 disee	Solar Hare
Prominence	Protostar	Photosphere	Pulsar	Solar cycle	Solar wind
Sin a atminute	Crievlee	Superet	Curren et evele	Solar cycle	Variable
Spectrum	spicules	Sunspot	Sunspot cycle	Supernova	variable
					star
White dwarf					

Unit 5: Galaxies Time Frame: 11 Days

Essential Questions

- 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

<u>HS-ESS1-2</u> 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

<u>HSA-SSE.A.1</u> Interpret expressions that represent a quantity in terms of its context.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.2</u> Define appropriate quantities for the purpose of descriptive modeling.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections
WALT describe our	Setting Objectives	Do Now	Earth in the Milky	Less complex
home galaxy, the			Way	reading level
Milky Way, in terms	Cooperative Learning	Three Summaries		Shortened
of properties, size,			Galaxy Size	assignments
and location.	Summarizing & Note	Self-Evaluation		5100
	Taking		Formation of the	Different goals
HS-ESS1-2	1 411118	Think-Pair-Share	<u>Milky Way</u>	IEP modifications
HSN-Q.A.1	Direct Instruction			for summative and
<u>MP.4</u>	<u>Direct instruction</u>		Milky Way Timeline	formative
	Concept Manning	Illustrations		assessment
	Concept Mapping		<u>Milky Way Map</u>	Alternative
		Exit Tickets		assignments
	Promoting student		Milky Way Model	
	metacognition			Independent
	~		Milky Way Quiz	studies
	Setting goals or			Mentoring of
	objectives			other students
WALT classify	Cooperative Learning	Do Now	Galaxy Classification	Less complex
galaxies by shape and				reading level
describe how they	Nonlinguistic	Three Summaries	Model the three types	Shortened
form.	Representations		of galaxies	assignments
		Self-Evaluation		Different goals
<u>HS-ESS1-2</u>				Different goals

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

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

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

<u>HS-ESS1-2</u> 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

<u>HSA-CED.A.2</u> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

<u>HSA-CED.A.4</u> 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.

<u>HSN-Q.A.1</u> 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.

<u>HSN-Q.A.2</u> Define appropriate quantities for the purpose of descriptive modeling.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections
WALT understand	Setting Objectives	Do Now	Other Theories	Less complex
the formation of the				reading level
universe and the Big	Summarizing & Note	Three Summaries	Cosmic Calendar	Shortened
Bang theory.	Taking			assignments
		Self-Evaluation		
HS-ESS1-2	Direct Instruction			Different goals
HSN-Q.A.2				IEP modifications
HSN-Q.A.3	Concept Mapping	Think-Pair-Share		for summative and
<u>K51.11-12.8</u>		Illustrations		formative
	Providing clear and	Latter through time		assessment
	effective learning	Letter unough time		Alternative
	feedback	Exit Tickets		assignments
		LAIT HEREIS		Independent
	Higher-level			studies
	questioning			Mantaning of
				other students
	KWL Chart			
WALT model the	Reinforcing	Do Now	There is no Middle	Less complex
shape of the universe.	Effort/Providing			reading level
	Recognition	Three Summaries	Big Bang	Shortened
<u>HS-ESS1-2</u>				assignments
HSA-CED.A.2	Nonlinguistic		Shape of the Universe	
HSA-CED.A.4	Representations	Transfer the concept		Different goals
		Tiles et and ' a ma		IEP modifications
	Generating & Testing	Inustrations		for summative and
	Hypotheses	Exit Tickets		assessment
		LAIT HEREIS		
	Homework	One minute paper		Alternative
		one minere paper		assignments
	<u>Scaffolding</u>			Independent
	instructions			studies
				Mentoring of
	Individualized			other students
	Instruction			
	Providing clear and			
	effective learning			
	тееараск			
	Catting and I			
	Setting goals or			
	objectives			
WALT provide	Nonlinguistic	Do Nov	Rig Rand Evidence	Less complex
evidence of Rig Rang	Representations	DOTION	Dig Daliu Evidelice	reading level
and expansion	representations	Hand it in Pass it out	CMB Video	
und expansion.		mana n m, i ass n out		

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

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

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

Creativity &	Information Literacy	Media Literacy	Critical Thinking & Problem Solving	Communication & Collaboration	Life & Careers
Innovation			0		
Cosmic	Dark		Fate of the		<u>Other</u>
Calendar	Energy		Universe		Theories
Summative A	ssessments: U	nit Test			
		Key	Terms		
Antimatter	Antiquark	Big Bang theory	Blue shift	Closed universe	Cosmology
Critical	Dark matter	Cosmic background	Cosmological	Exotic particles	Flat
density		radiation	principle		universe
Grand	Hubble's	Cosmic microwave	Fundamental force	Gravitational	Inflation
Unification	law	background		singularity	
Inflationary	Interstellar	Isotropic	Nucleosynthesis	Open universe	Planck
epoch	matter	_			
Plasma	Quark	Primordial synthesis	Universal recession	Redshift	Vacuum

Unit 7: Exoplanets
Time Frame: 9 Days
Essential Questions
• 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

<u>HS-ESS1-1</u> 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.

<u>HS-ESS1-3</u> Communicate scientific ideas about the way stars, over their life cycle, produce elements.

Mathematics

<u>HSA-CED.A.2</u> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

<u>HSA-SSE.A.1</u> Interpret expressions that represent a quantity in terms of its context.

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

<u>HSN-Q.A.3</u> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

<u>MP.2</u> Reason abstractly and quantitatively.

<u>MP.4</u> Model with mathematics.

ELA/Literacy

<u>RST.11-12.1</u> 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.

<u>RST.11-12.8</u> 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.

<u>WHST.9-12.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

<u>SL.11-12.4</u> 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	Student Learning	Formative	Activities	Modifications
Learning Objectives	Strategies	Assessment		& Reflections
WALT understand	Setting Objectives	Do Now	EM Spectrum	Less complex
electromagnetic				reading level
spectrum and types of	Cues, Questions &	Three Summaries	EM Spectrum	Shortened
radiation.	Advance Organizers		<u>Diagram</u>	assignments
	-	Self-Evaluation		D'00 / 1
HS-ESS1-3	Identifying		Color Through a	Different goals
HSA-CED.A.2	Similarities and	Transfer the concept	Prism	IEP modifications
<u>WHST.9-12.2</u>	Differences	T'		for summative and
		Jigsaw		formative
	Scaffolding	Illustrations		assessment
	instructions	mustrations		Alternative
		Exit Tickets		assignments
	Individualized			Independent studies
	Instruction			Ĩ
				Mentoring of other
	Concept Mapping			students
	Consistent, 'low-			
	threat' assessment			

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

WALT understand	Nonlinguistic	Do Now	Space events	Less complex
the history of the	Representations		G	reading level
space program.		Three Summaries	Space Timeline	Shortened
HS-ESS1-1	Identifying Patterns	Self-Evaluation		assignments
HSN-Q.A.2	Souffolding	Sen Evaluation		Different goals
WHST.9-12.1	instructions	Partner Quiz		IFP modifications
	morractions			for summative and
	Reciprocal Teaching	Think-Pair-Share		formative
	1 0	Illustrations		assessment
	Providing clear and	inustrations		Alternative
	effective learning	Letter through time		assignments
	feedback			Independent studies
		Exit Tickets		Mentoring of other
	Setting goals			students
	Higher level			
	questioning			
	questioning			
	Anticipation Guides			
	L.			
WALT predict	Setting Objectives	Do Now	Impacts of Space	Less complex
technological			Travel	reading level
advances.	Generating & Testing	Three Summaries	Trues of Cotallitae	Shortened
HS-FSS1-1	Hypotheses	Self-Evaluation	Types of Saterines	assignments
MP.4	Homowork	Sell Evaluation		Different goals
<u>SL.11-12.4</u>	Homework	Highlighter		IFP modifications
	Direct Instruction			for summative and
	<u>Direct instruction</u>	Transfer the concept		formative
	Provide opportunities	Think-Pair-Share		assessment
	for student practice			Alternative
		Virtual Classroom		assignments
	Reciprocal Teaching			Independent studies
		Illustrations		Mentoring of other
	Promoting student	Letter through time		students
	metaeogintion			
		Exit Tickets		
WALT explore	Reinforcing	Do Now	Astronomy News	Less complex reading level
current events.	Recognition	Three Summaries	Sky and Telescope	
HS-ESS1-1	1000gintion		sky und relescope	Shortened assignments
<u>RST.11-12.1</u>	Summarizing & Note	Self-Evaluation	Universe Today	
<u>RST.11-12.8</u>	Taking			Different goals
<u>SL.11-12.4</u>		Think-Pair-Share	Space.com	IEP modifications
				for summative and

H	Iomework	Illustrations	formative assessment
In Te Ro Co th	nquiry-Based Teaching Reciprocal Teaching Consistent, 'low- hreat' assessment	Exit Tickets Metacognition sheet	Alternative assignments Independent studies Mentoring of other students

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