#### **EPSD Curriculum and**

#### HMH SCIENCE DIMENSIONS 2018 Alignment TEMPLATE

#### **GRADE 6**

### EPSD Unit 5: Space Systems (part II) Fourth Marking Period

Overview: This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe. There is a strong emphasis on a systems approach and using models of the solar system to explain the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences data in order to understand the processes and events in Earth's history. The crosscutting concepts of patterns, scale, proportion, and quantity and systems and systems models provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models and analyzing and interpreting data. Students are also expected to use these practices to demonstrate understanding of the core ideas.

**Standards:** (MS-ESS1-1) Develop and use a model of the Earth-sun moon system to Instructional Days: 60-65

#### **HMH Science Dimensions Program Resources Module H**

#### **Unit 2: The Solar System and Universe**

Unit Video: (Milky Way galaxy); Why it Matters p. 58; Unit Starter p. 59; Vocabulary p. 59l; Unit Project p. 59M; Unit Connections p. 144; Unit Review pp. 145-148; Unit Performance Task pp. 149-150

**Standard for all Units:** (D) Interactive Multilingual Glossary; (D/P) Unit Pretest; (D) Lesson Quizzes; (D/P) Unit Tests

Lesson 1: The Formation of the Solar System pp. 60-81	Lesson 2: Earth and the Solar System pp. 82-103	Lesson 3: Earth's Place in the Universe pp. 104- 121	Lesson 4: Gravity in the Universe pp. 122-143
	D/P – WIM		D/P – WIM
D/P – WIM Questions p. 58	Questions p. 58	D/P – WIM Questions p. 58	Questions p. 58
	D/P- CYEI (video)	·	D/P- CYEI (video)
D/P- CYEI (video)	What are	D/P- CYEI (digital	What could explain
Why do all the	"shooting" stars?	picture) How can	the motion of
planets in the solar system orbit the	p. 83	we make a model of the Milky Way	these stars? p. 123
sun in the same	P- ENB (prompt)	galaxy that shows	P- ENB (prompt)
direction? p. 61	Students gather evidence to help	Earth's location? p. 105	Students gather evidence to help
P- ENB (prompt)	explain why		explain the
Students gather evidence to explain	shooting stars behave differently	P- ENB (prompt) Students gather	movement of stars. p. 123

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describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (MS-ESS1-2) Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. (MS-ESS1-3) Analyze and interpret data to determine scale properties of objects in the solar system.

**Objective 1:** Students will: Explain the cause of day and night, the cycle of seasons, moon phases, eclipses, and tides. Explain how gravity and inertia keep objects in orbit.

**Objective 2:** Students will: Compare and contrast geocentric and heliocentric solar system models. Identify evidence that supports the heliocentric solar system model. Relate the structure and features of the sun to how each impacts Earth. Identify the major features or the planets and group them based on similarities. Compare and contrast features of comets, asteroids, meteors, and planets. Identify the conditions needed for living things to survive beyond Earth.

**Objective 3:** Students will: Identify criteria used to classify stars. Explain how distances to stars can be calculated. Trace the life cycle of a star. Compare and contrast star systems and galaxies.

why all planets in the solar system orbit the sun in the same direction. p. 61 P- ENB (prompt) Explain what observations would show that planets all move in the same direction around the sun. Record Evidence. p. 64 D/P- Laplace Refines Kant's Model (Students view animation of Laplace's Hypothesis of Solar System Formation.) p. 68 D/P0 HOL Activity Model Nebular Disk Formation (Students construct a model of nebular disk formation that is consistent with Laplace's hypothesis of solar

than other stars do. p. 83 D/P- LS Interpret Words and Visuals (Students use the meaning of word parts to interpret words.) p. 85 D/P- HOL Activity **Investigate Parallax** (Students use parallax to compare the relative distances between objects.) p. 88 P- ENB (prompt) Some people believe that shooting stars are stars that fell from the sky. Students identify evidence they have that supports or contradicts this belief. p. 89 P- ENB (prompt) Students use information from text about small

evidence to explain how scientists determine Earth's location within the Milky Way galaxy. p. 105 D/P- The Milky Way through a Telescope (Students watch video to see how an object looks from different perspectives.) p. 107 D/P- HOL Activity Determine your Location within a Field of Objects p. 108 P- ENB (prompt) Students identify how knowing Earth's position relative to the center of the Milky Way might help them make a map of the Milky Way. p. 109

D/P- Newton's Law of Motion (Students watch video to observe motion in a carnival ride.) p. 124 D/P- ENGIT Students analyze a proposed design for a ship, in order to explain why the ship must rotate so that passengers feel effects similar to gravity. p. 126 D/P-DTM Students analyze the equation for gravitational force to determine which changes in variables will increase the force. p. 128 D/P- DTM Students analyze how the equation of gravitational force relates to planets

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Evaluate evidence for the big bang and expanding universe.

**Topic 1:** Earth in Space; Gravity and Motion; Phases, Eclipses, and Tides; Earth's Moon; and Twenty-First Century Themes and Skills (TFCTS) to include: The Four C's Life and Career Skills

**Topic 2:** Solar System; Sun Structure; Planets; Comets, Asteroids, and Meteors; Life Beyond Earth; and TFCTS including Information and Media literacy

**Topic 3:** Characteristics of Stars; Lives of Stars; Star Systems and Galaxies; The Expanding Universe and TFCTS

Essential Questions: What pattern in the Earth—sun—moon system can be used to explain lunar phases, eclipses of the sun and moon, and seasons? What is the role of gravity in the motions within galaxies and the solar system? What are the scale properties of objects in the solar system?

system formation; students can view procedural video.) pp. 69-70 D/P-ENGIT Students identify the need to understand how gravity impacts orbits. p. 70 P- ENB (prompt) Students explain the relationship between the sun's motion and the motion of the planets. p. 71 D/P- Computer Modeling and Simulation (Students watch video of a computer model that shows dense areas of gas.) p. 73 D/P- LS Students choose the solar system, the sun, or a planet, and write an origin story. p. 73 P- ENB (prompt)

Explain how the

bodies in the solar system to record evidence that might help them identify the source of shooting stars. p. 92 D/P- HOL Activity Model the Solar System (Students create a scale model of the sun and planets.) pp. 96-97 D/P- ENGIT Students consider the tradeoffs in developing a model solar system. p. 97 D/P- DTM Calculate Scale as a Ratio (Students compare how scale can be used to express the size of various large systems in a model.) p. 98

D/P- TIF (enrich)
People in Science:
Contributions of

D/P- LS Students construct a written argument that identifies evidence that might be needed to determine if a blurry patch of light is located within the Milky Way galaxy or beyond it. p. 111 P- ENB (prompt) How would the ability to observe other galaxies help in generating models of the Milky Way galaxy? p. 111 D/P- ENGIT Measure Distances **Using Brightness** (Students consider how the brightness of a star can be used to measure its distance from Earth.) p. 112 P- ENB (prompt) How does knowing the distance across the Milky Way help

of different masses. p. 130 D/P- Explain Earth's Shape (Students watch video of spinning paper sphere.) p. 130 D/P- Projectile Motion (Student watch video to observe the path of a basketball free throw.) p. 131 D/P- HOL Activity **Explore the Motion** of a Falling Object (Students explore how the velocity of a ball rolling on a table affects its path after it rolls off the table and becomes a projectile.) pp. 132-133 D/P- Students can go online to view the animation of the cannonball being launched into space. p. 133 P- LS Students use evidence from the

formation of the solar system caused the planets to orbit the sun in the same direction. p.75 D/P- DTM Graph the Density of the Planets p. 76 D/P- TIF (enrich)	Indian and Arab Astronomers pp. 99-100 D- Hands-On Lab; Engineer It: Reflecting and Refracting Telescopes; Propose Your Own Path	to model the galaxy? p. 114 D/P- DTM Model the Scale of the Milky Way (Students use order of magnitude and exponential notation to express very large numbers related to the size	text to support a claim relating to geostationary satellites. p. 134 P- ENB (prompt) What causes an object to orbit another object? Record evidence. p. 135 D/P- ENGIT Choose
Careers in Science:	D/D Losson Solf		•
Careers in Science: Conceptual Space	D/P- Lesson Self Check pp. 101-103	of the Milky Way. p. 115	a Launch Site (Students respond
Artist pp. 77-78	D- Lesson Quiz	þ. 113	to the following
D- Hands-On Lab;	D- Make Your Own	D/P- TIF (enrich)	question: Where is
Structure of Other	Study Guide	The Kepler Mission	the best place to
Solar Systems;	,	pp. 117-118	locate a launch site
Propose Your Own	P- DI (ELL/RTI) p.	D- Hands-On Lab;	to get an object
Path	591	Other Galaxies;	into orbit?) p. 135
	P- Extension p. 59I	Propose Your Own	P- ENB (prompt)
D/P- Lesson Self	P- COLLAB p. 59J	Path	Because we cannot
Check pp. 79-81	P- Connections to		see the black hole,
D- Lesson Quiz	Other Disciplines p.	D/P- Lesson Self	what evidence
D- Make Your Own	59J	Check pp. 119-121	could be used to
Study Guide		D- Lesson Quiz	locate the black
D D1/511/5=0	D- Science Safety	D- Make Your Own	hole? p. 138
P- DI (ELL/RTI) p.	HB	Study Guide	D/D TIE /
591	D-CCC-HB	D DI (ELI (DTI)	D/P- TIF (enrich)
P- Extension p. 591	D- ELA – HB	P- DI (ELL/RTI) p.	Building a Space
P- COLLAB p. 59J	D- Math – HB	591	Elevator pp. 139-
P- Connections to	D-SEP-HB	P- Extension p. 591	140
Other Disciplines p.	D- ScienceSaurus	P- COLLAB p. 59J	D- Hands-On Lab;
59J	Reference HB		The Expanding

D- Science Safety HB D- CCC-HB D- ELA-HB D- Math-HB D- SEP-HB D- ScienceSaurus Reference HB  D- VL Making Meteor Showers D- YSI Simulation How Can You Design a Satellite's Orbit?	Other Disciplines p. 59J  D- Science Safety HB D-CCC-HB D- ELA-HB D- Math-HB D- SEP-HB D- ScienceSaurus Reference HB	Universe; Propose Your Own Path  D/P- Lesson Self Check pp. 141-143 D- Lesson Quiz D- Make Your Own Study Guide  P- DI (ELL/RTI) p. 59I P- Extension p. 59I P- COLLAB p. 59J P- COLLAB p. 59J P- Connections to Other Disciplines p. 59J  D- Science Safety HB D- ELA-HB D- Math-HB D- ScienceSaurus Reference HB  D- VBP Data from Space D- VL Distances in the Universe
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	Curriculum Alignment Common Language (CACL) Guide 6-8		
Acronym	Word/Phrase	Description	
CER	Claims Evidence Reasoning	Students make a claim and gather evidence along the way (during EXPLORATORY activities) to support claim.	
ССС-НВ	Crosscutting Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.	
CYEI	Can You Explain It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.	
CYSI	Can You Solve It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.	
D	Digital	Program resources and features in interactive digital form.	
DI (ELL/RTI)	Differentiated Instruction (English Language		
Extension	Learner/Response to Intervention)	A page that lists all learning activities used to	
COLLAB	Collaboration	differentiate learning, engage students in collaborative	
Connections	Connections to Other Disciplines	activities and connect learning to other subjects.	
to Other			
Disciplines			
DTM	Do the Math	Integrated subject learning.	
ENB	Evidence Notebook	Student notebook or journal used to gather evidence during EXPLORATORY learning activities to support their claims.	
ENGIT	Engineer It	Integrated subject learning.	
ELA-HB	English Language Arts Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.	
HOL	Hands-On Lab	Activities or experiments that enable students to demonstrate scientific procedures and analysis.	
LS	Language SmArts	Integrated subject learning.	

М-НВ	Math Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
Р	Print	Program resources and features in print form.
SEP-HB	Science and Engineer Practices Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
TIF	Take It Further (enrich)	Enrichment activities for students in digital or print.
VBP	Video Based Project	Real life videos related to science and/or engineering that enable students to demonstrate mastery of performance expectations.
VL	Virtual Lab	Fully interactive simulations in which students perform experiments, collect data and answer questions.
WIM	Why It Matters	Questions related to lessons within each unit that asks students to consider how science affects the world around them.
YSI	You Solve It (Simulation)	Open-ended simulation-based learning with multiple answer options.