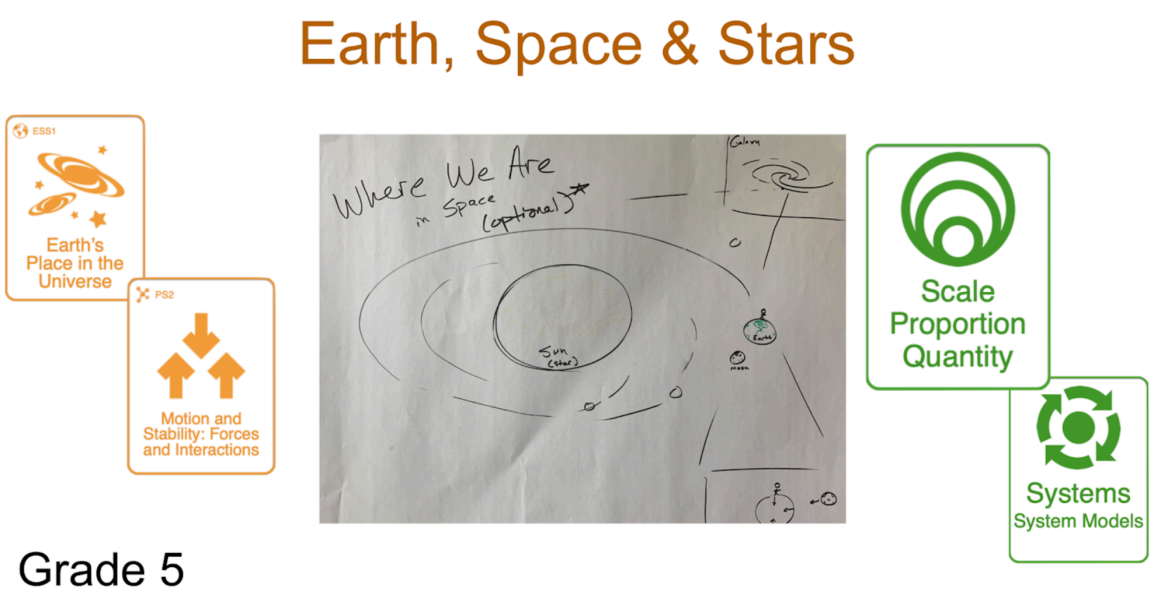
Storyline Unit Design

Understanding by Design (UbD) Template*

Unit		Course(s)	
Designed by		Time Frame	

Anchor Model



*UbD Unit Planner is from Wiggins, Grant and McTighe, Jay. Understanding by Design Guide to Creating High-Quality Units. Alexandria, VA: Association for Supervision and Curriculum Development. 2011.

Stage 1: Desired Results

Performance Expectations

5-ESS1-1: Stellar Brightness and Distance
Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. (Scale, Proportion, and Quantity)

5-ESS1-2: Daily and Seasonal Sky Change
Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

5-PS2-1: Earth's Gravitational Force
Support an argument that the gravitational force exerted by earth on objects is directed down. (Cause and Effect)

Anchoring Phenomenon

Anchoring Phenomenon Worksheet
Collage of astronomical artifacts - what do these mean to you... what do you see, what do you think they are..
Calendars:
Peru (oldest sun observatory)
Hawaii Moon calendar
Nazca (peru)
Mayans
Aztecs
Pyramids Cairo/GAza
Stonehenge
Constellation stories

Enduring Understandings	Essential Questions
Seasons **Planting**	

Stage 2: Assessments

5-ESS1-1 - Which of the Brightest Stars is the Brightest?
5-ESS1-2 - Where Was This Video Shot?
5-PS2-1 - Is the Earth Flat or Spherical?

Assessment Screening Tools

Backward Design Elements

What new skills (practices) will students need to learn?	What thinking concepts will students need to learn?	What science concepts will students need to learn?

Stage 3: Learning Plan			
Phenomenon or Problem	Learning Performance - What will they do? The three dimensions woven together into a single learning performance.	Why is this important? How does this activity help build understanding of the anchoring phenomenon?	Learning Experience - How will they do it? Graphic organizers, protocols, scaffolds, labs, mini-lesson, student discourse, etc.
Astronomical Artifacts	Students will ask questions about patterns in ancient space observing artifacts.	Questioning to elicit curiosity and pull wonder from the students. To gather information about what students know about space. Connects students' questions to ancient questions.	Show students photos - no context. Students make observations and ask questions. What do you notice, what do you wonder? Mini-lesson on observational patterns. Mini lesson on similarities and differences. Provide information about how the ancient scientists observed and used patterns in the sky
Formative Assessment - What information are you collecting to know that they met the target?		Gather questions on a poster - make sure each group has questions related to observational patterns - similar structures. Or student's self assess their questions.	
Stick in ground outside	Students will investigate patterns of change in the shadow over time. *Students will develop model of how the structure helped ancient scientists to understand objects in the sky*	Students become scientists collecting data - imitating scientists from long ago.	Identify space outside to place sticks where they will remain undisturbed during the day. Students collect data, measurements of shadow and time of day. Draw shadow, which direction it points
Formative Assessment - What information are you collecting to know that they met the target?		Students will identify the purpose of the investigation and collect data.	
	Students will analyze patterns in shadow data over one day.	Students analyze data like scientists - imitating scientists from long ago.	We look at the whole generation of data, what patterns do we see? Students show and organize their data.
Formative Assessment - What information are you collecting to know that they met the target?			

Formative Assessment - What information are you collecting to know that they met the target?			
Summative Assessment What information are you collecting to know that they met the target?			
Shadow on a Sundial	Use Data to construct a claim of patterns in shadows.		
Formative Assessment - What information are you collecting to know that they met the target?			
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Summative Assessment What information are you collecting to know that they met the target?			

Materials / Resources

Vocabulary

5-ESS1-1
Stars (including Sun)
Earth
Distance
Stellar

5-ESS1-2
Daily changes (e.g. length and direction of shadow, day and night)
Seasonal changes (e.g. stars in the night sky)
Earth
Sun
Patterns

5-PS2-1
Earth
Gravitational force
Objects
"Down"
Cause and Effect

Mini Lessons

Scale Level 1 - Describing Scale
Scale Level 1 - Describing Scale Thinking Slides
Patterns Level 3 - Similarities and Differences Mini-Lesson
Patterns Level 3 - Similarities and Differences Thinking Slides
Causation Level 3 - Causal Relationships Mini-Lesson
Causation Level 3 - Causal Relationships Thinking Slides

Graphic Organizers

5-ESS1-1 - Stellar Scales Graphic Organizer (Student Version)
5-ESS1-1 - Stellar Scales Graphic Organizer (Teacher Version)
5-ESS1-2 - Sky Patterns Graphic Organizer (Student Version)
5-ESS1-2 - Sky Patterns Graphic Organizer (Teacher Version)
5-PS2-1 - The Effect of Gravity Graphic Organizer (Student Version)
5-PS2-1 - The Effect of Gravity Graphic Organizer (Teacher Version)
Phenomena Observation Graphic Organizer
Questioning Graphic Organizer
Modeling Graphic Organizer
Planning an Investigation Organizer
Investigation Evidence Organizer
Engaging in Argumentation Organizer

Differentiation / Modifications

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Phenomenon Worksheet

Return to Stage 1

◁ **5-ESS1-1 - Stellar Brightness and Distance**
◁ **5-ESS1-2 - Daily and Seasonal Sky Changes**
◁ **5-PS2-1 - Earth's Gravitational Force**
◁ **Local**
◁ **Favorite**
◁
◁

Artifacts of Astronomers over Time
Size of Sun and Moon ◁◁◁
Constellations ◁◁
Stars with varying brightness ◁
Forced perspective ◁
Sun is a star ◁
Streetlights at varying distance ◁
Seasonal constellations ◁◁
Sundial ◁
Seasonal and daily changes in shadows ◁
North star and star trails (Southern cross ◁◁
Lahaina noon ◁
SAD - Seasonal Affective Disorder ◁
Navigating with the stars (Sextant) ◁
Migrations (e.g. birds using the stars) ◁
Seasonal changes in plants (e.g. dropping leaves) ◁
Objects in the Solar System are all round (Sun, moons, planets, etc.) ◁
Earth is flat ◁
Evidence Earth is flat ◁
- Ships sail over horizon ◁
- Earth's shadow on Moon during eclipse ◁
- Height of North Star above horizon as you travel north ◁

Objects fall straight down (in both hemispheres) ◁
Object sink in water ◁
Weightless in freefall in space ◁
Minnesota North Stars ◁
Newton's apple ◁
Native american constellations and stories ◁◁

Screening Tools

Back to Stage 2

5-ESS1-1: Stellar Brightness and Distance

Evidence Statement

Assessment: Which of the Brightest Stars is Brightest? (PDF) (Google Template)

The performance expectation above was developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model.	**ESS1.A: The Universe and its Stars** • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	**Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large.

Reflections: *Type Here*

	No	Partial	Yes
1. The assessment contains a **phenomenon** (science) or a **problem** (engineering)			**x**
2. The **prompts** match the Science and Engineering Practice (SEP) and engage students in sense making.			**x**
3. The **stimuli** have multiple and sufficient information needed to utilize the SEP. (e.g. multiple data sets to analyze)			**x**
4. The **prompts** elicit observable understanding of the Disciplinary Core Idea (DCI).			**x**
5. The **prompts** explicitly mention the Crosscutting Concept (CCC).			**x**
6. The **prompts** include language (i.e. bullets) from grade appropriate progressions. (SEP)(DCI)(CCC)			**x**
7. The **phenomenon** or **problem** is novel to show the transfer of knowledge. (i.e. not in the unit)		**x**	

Screening Tools

Back to Stage 2

5-ESS1-2: Daily and Seasonal Sky Change

Evidence Statement

Assessment: Where Was This Video Shot? (PDF) (Google Template)

The performance expectation above was developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.	**ESS1.B: Earth and the Solar System** • The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.	**Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

Reflections: *Type Here*

	No	Partial	Yes
1. The assessment contains a **phenomenon** (science) or a **problem** (engineering)			x
2. The **prompts** match the Science and Engineering Practice (SEP) and engage students in sense making.			x
3. The **stimuli** have multiple and sufficient information needed to utilize the SEP. (e.g. multiple data sets to analyze)			x
4. The **prompts** elicit observable understanding of the Disciplinary Core Idea (DCI).		x	
5. The **prompts** explicitly mention the Crosscutting Concept (CCC).			x
6. The **prompts** include language (i.e. bullets) from grade appropriate progressions. (SEP)(DCI)(CCC)			x
7. The **phenomenon** or **problem** is novel to show the transfer of knowledge. (i.e. not in the unit)			x

Screening Tools

Back to Stage 2

5-PS2-1: Earth's Gravitational Force

Evidence Statement

Assessment: Is the Earth Flat or Spherical? (PDF) (Google Template)

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model.	**PS2.B: Types of Interactions** • The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change.

Reflections: *Type Here*

	No	Partial	Yes
1. The assessment contains a **phenomenon** (science) or a **problem** (engineering)			
2. The **prompts** match the Science and Engineering Practice (SEP) and engage students in sense making.			
3. The **stimuli** have multiple and sufficient information needed to utilize the SEP. (e.g. multiple data sets to analyze)			
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7. The **phenomenon** or **problem** is novel to show the transfer of knowledge. (i.e. not in the unit)