1st Grade Unit 4
6 weeks

Space Systems: Patterns and Cycles - Part II

Unit Planning Team:
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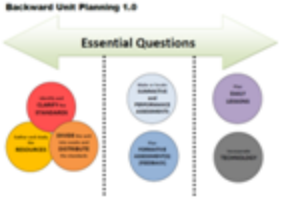
Essential Questions



How can we observe, describe and predict patterns of objects in the sky?

How does the amount of daylight change throughout the year?

Space Systems: Patterns and Cycles

Students who demonstrate understanding can:

1-ESS1-1 **Use observations of the sun, moon, and stars to describe patterns that can be predicted.** [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars, other than our sun, are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

1-ESS1-2 **Make observations at different times of year to relate the amount of daylight to the time of year.** [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

The performance expectations above were 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
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2) **Analyzing and Interpreting Data** Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)	**ESS1.A: The Universe and its Stars** • Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **ESS1.B: Earth and the Solar System** • Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	**Patterns** • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1, 1-ESS1-2) --- **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes natural events happen today as they happened in the past. (1-ESS1-1) • Many events are repeated. (1-ESS1-1)

Connections to other DCIs in first grade: N/A

Connections to other DCIs across grade levels: **3.PS2.A** (1-ESS1-1); **5.PS2.B** (1-ESS1-1, 1-ESS1-2) **5-ESS1.B** (1-ESS1-1, 1-ESS1-2)

Common Core State Standards Connections:

ELA/Literacy –

W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-ESS1-1, 1-ESS1-2)

W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1, 1-ESS1-2)

Mathematics –

MP.2 Reason abstractly and quantitatively. (1-ESS1-2)

MP.4 Model with mathematics. (1-ESS1-2)

MP.5 Use appropriate tools strategically. (1-ESS1-2)

1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)

1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

Space Systems: Patterns and Cycles

Background knowledge videos:

ESS1.A The Universe and its Stars

ESS1.B Earth and the Solar System

These videos are designed to assist in providing background knowledge with the associated DCI. The information in the videos follows the progression through high school.

Additional Background Knowledge and Understanding of Progression of Instruction

p.188-189 How the understanding develops - lower elementary

From *Disciplinary Core Ideas: Reshaping Teaching and Learning*
by Ravit Golan Duncan, Joseph Krajcik, and Ann E. Rivet
**Rogers RPS30/Google Account needed to access*

How can we observe, describe and predict patterns of objects in the sky?

How does the amount of daylight change throughout the year?

Big Ideas

★ Observations can be used to describe patterns in the natural world

★ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

This unit explores these patterns:

- The Sun appears to rise in one part of the sky, move across the sky, and set
- Seasonal patterns of sunrise and sunset (longer periods of sunlight in summer/less sunlight in winter)
- The moon has a pattern which can be observed through its changing phases.
- Stars, other than our sun, are visible at night but not during the day.

Space Systems: Patterns and Cycles

Students who demonstrate understanding can:

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.

[Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars, other than our sun, are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

[Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

Disciplinary Core Ideas

ESS1.A: The Universe and its Stars

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

Clarifications:

This unit continues and extends the learning you began at the beginning of the year. You will use the observations and data you've collected throughout the year about hours of sunlight/sunrise & sunset and formalize understandings about how the patterns we see in that data can help us make predictions.

The first 3 weeks of the unit will be spent formalizing the ideas about how the patterns of the motion of the sun create seasonal patterns and day and night.

The last 3 weeks of the unit will be spent understanding patterns in the night sky with the moon and stars.

Gather and study the RESOURCES

Discovery Education Techbook:

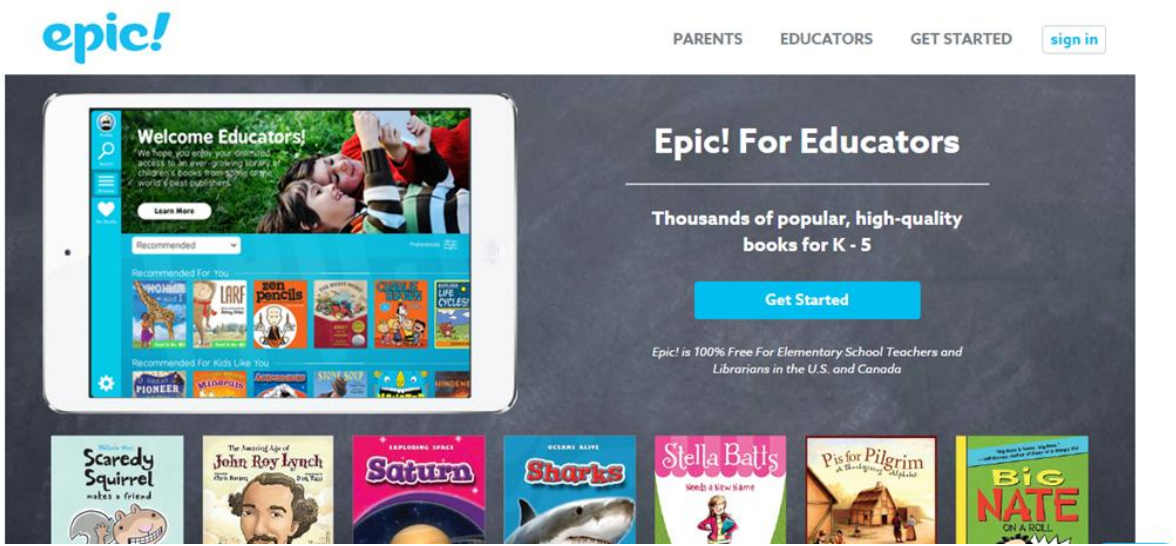
*Some of the lessons in Objects in the Sky were completed during Unit 1.

Get EPIC!

Epic! For Educators – FREE resource for book for Kindergarten – 5th grade.

Sign up for a FREE educator account: Create collections, add your class, assign books, read as read alouds, audio books, and more!

Go to www.getepic.com and click on the EDUCATORS tab to get started.



We have selected books for you to use in this science unit. In order to use these books, you will need to have an account.

Books will be labeled throughout the unit with ***EPIC!*** and a picture of the book.

Weeks 1-2

Patterns of the motion of the Sun - Part 1

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars, other than our sun, are visible at night but not during the day.

1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.

Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.

Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Big Idea: position of the sun throughout the day and amount of daylight

Engage:

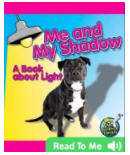
Accessing prior knowledge about day and night

- What they might you see during the day and during the night Draw and describe Day and Night
- DE Video Segment Describing Day and Night
- EPIC book *Day and Night* by Patricia Armentrout

Explore:

- Where is the Sun? observation activity
- How do our shadows change? Shadow chalk drawings exploration
- DE Video Segments: The Sun at Different Times of the Day Shadows, Sunrises, and Sunsets
- EPIC books *Day and Night* by Conrad Storad; *Me and My Shadow* by Buffy Silverman
- Daytime Shadows - interactive animation of how shadows change throughout the day

EPIC! Books



Weeks 1-2

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Big Idea: position of the sun throughout the day and amount of daylight

Explain/Elaborate:

- Day and Night: Hokey Pokey BetterLesson.com
- DE Video Segment What Causes Day and Night
- Analyze data you recorded with your students of hours of daylight throughout the year (observation chart from Unit 1 Example Chart with data)

  Data Analysis Teacher Support - teacher guide for analyzing the data you've collected

  **If you have not collected this type of data throughout the year, you can use the data found in this website for this activity https://www.timeanddate.com/sun/usa/rogers

Evaluate:

DE Primary Assessment: Objects in the Sky *(only pages 1-4)*

Additional Resources:

Lessons from Betterlesson.com on the Sun and Patterns in the sky:

Introduction and Pre-Assessment
Observing the Sun
Analyzing the Sun Data
Sun: Facts and Figures
Patterns in the Sky
Patterns of Daylight

Weeks 2-3

Patterns of the motion of the Sun / Seasons - Part 2

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
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Big Idea: Seasonal Patterns

Engage:

Access prior knowledge of seasons

- Write & draw about their favorite season/activity in a season
- Seasons' Song Video
- DE Engage Tab: How Do the Seasons Change throughout the Year

Explore

Explore the characteristics of each season:

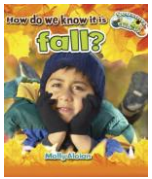
- DE Explore & Explore More Resources
- Mini-Research Project:
  - Explore each season
  - Small groups or whole group
  - Read various trade books, watch videos, use DE Boards, etc., to explore characteristics of each season. *(possible resources on right and/or choose from your own resources)*
  - Create a season notebook, poster, or presentation to record and share all the information they learn about each season

Season Resources:

Four Seasons Lesson
DE Boards: Seasons The Four Seasons
DE Ebook: Changing Seasons
DE Reading Passage: Seasons and You
DE Video: Seasons

Fall Lesson Winter Lesson
Spring Lesson

EPIC! Books:
How Do We Know It's Spring
How Do We Know It's Summer
How Do We Know It's Fall
How Do We Know It's Winter



Vocabulary:
Seasons, Fall, Winter, Summer, Spring, Patterns, Characteristics, Cycle

Weeks 2-3

Patterns of the motion of the Sun / Seasons - Part 2

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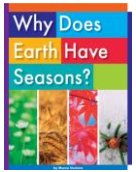
Big Idea: Seasonal Patterns, continued

Explain

Students will begin to formalize explanations about the patterns that are created by the four seasons

- Brain Pop Video - Seasons
- *EPIC!* video Why do we have seasons
- *EPIC!* Book: Why Does the Earth Have Seasons?



Elaborate:

Students will generalize that the motion of the sun is creating these patterns with daytime, nighttime, and seasons.

- Why Do We Have Seasons BetterLessons.com
- Predictable Patterns of the Sun and the Seasons BetterLesson.com
- DE Video Segment What Causes Day and Night
- DE STEM in Action: Climate Changes

Evaluate:

DE Primary Assessment Seasons of the Year

Additional Resources

DE STEM Project 1: Reason for the Seasons
DE STEM Project 2: What Season Is It?

Vocabulary:
Seasons, Fall, Winter, Summer, Spring, Patterns, Characteristics, Cycle

Week 4-6

Patterns in the Night Sky - Part 1

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.

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Big Idea: Patterns in the Night Sky

Engage:

- Formative Assessment Probe: What Lights up the Moon
  This probe connects to understanding from the Unit on light. Before students can understand the phases of the moon they first master the idea that light is reflected and the moon gets it light from the sun.
- Watch Time Lapse Lunar Cycle video: record students' questions and what they think they know on a KLEWS chart
- Formative Assessment Probe: When is the Next Full Moon

Explore:

- DE Video Segment: The Night Sky and Sunrise Record their learning on KLEWS chart
- Begin charting moon phases for April and May...***DO NOT complete all at one time.***
  Recommended dates in order to see a full lunar cycle (April 3, 6, 10, 13, 17, 20, 24, 26, May 2, 4) extra moons are on the recording sheet in order to predict the phase pattern.
  Students will add to their personal recording sheet throughout the following weeks until end of school:
  - Student moon phase recording sheet for each student.
  - Use Moon Phases calendar on Smartboard or via projector.
  - Using a white crayon, students color the portion of the moon that matches the Moon phase calendar and record the date next to the moon.
  - Continue this process throughout the remaining weeks of school (not at one time)

Additional Resources:

Website for teacher calendar that shows moon phases by month

Vocabulary:

Previous vocabulary: moon, star, patterns, prediction, observe, observation

New vocabulary: phases, full moon, new moon, crescent moon, quarter moon

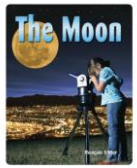
Week 4-6

Patterns in the Night Sky - Part 2

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
[Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars, other than our sun, are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

Big Idea: Patterns in the Night Sky, continued

Explain *(select multiple resources from the options below to further explain)*



- EPIC book: *The Moon*
- *Look at the Moon* Read Aloud PDF PPT Teacher Guide
- Phases of the moon poster set
- Moon phases flash-cards/flip-book cards
- Phases of the Moon Flip-book Lesson
- Teacher created model : foam balls, foam board, flashlight (example photo) Use flashlight to represent the sun. Student represents Earth. Have them turn the board while flashlight is shining on the moon to represent the portion of the moon that we see from Earth.
- See additional resources on the right

Elaborate:
Students could create their own model of moon phases by a two dimensional drawing or a three dimensional model
Examples: Moon Phases Demonstration-NASA Education 3-D Moon Phase Projects for Kids

Evaluate:
Formative Assessment Probes: What Lights up the Moon; When is the Next Full Moon

(Continue to have students chart on their Student moon phase recording sheet)

Additional Resources

Epic Video: The Sun, The Moon, and The Stars,
Epic Book:
The Moon Exploring Space

The Next Time you See the Moon: NSTA Kids

So That's How the Moon Changes Shape
(Rookie Reader) by Allan Fowler

Moon Phases Demonstration - NASA Education

Lessons from Betterlesson.com:
The Man in the Moon
Planning and Conducting a Moon Investigation
The Moon: Facts and Figures

Vocabulary:
phases, full moon, new moon, crescent moon, quarter moon

Week 4-6

Patterns in the Night Sky - Part 3

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
[Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars, other than our sun, are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

Big Idea: Patterns in the Night Sky, continued

(Continue to have students chart on their student moon phase recording sheet)

Engage:

National Geographic Explore Science: Size of Stars demonstration lesson
Lesson includes:

- Stars in the Sky slideshow PPT PDF
- Starry Sky read-aloud PPT PDF

Explore/Explain

- Night Sky Comes Alive time lapse video
- DE Exploration: Constellations
- DE video segment: Constellation
- DE video segment: Stars and Seasons
- DE board builder: All About Stars

Elaborate:

DE Hands-on Activity: Star Patterns

Evaluate:

- Complete Student moon phase chart by predicting the moon phases for the last three remaining moons
- Unit Assessment Student Assessment Teacher Key

Additional literature:

The Big Dipper by Franklyn M. Branley

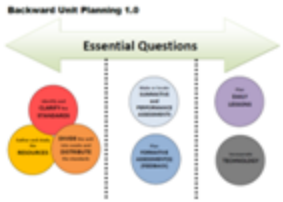
Additional Lessons:

Star Light, Star Bright Patterns
Observing Stars - a fiction connection

DE Unit: Objects in the Sky

Vocabulary:

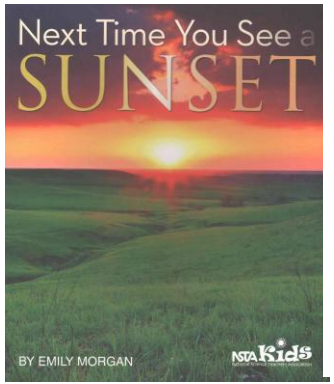
Constellation



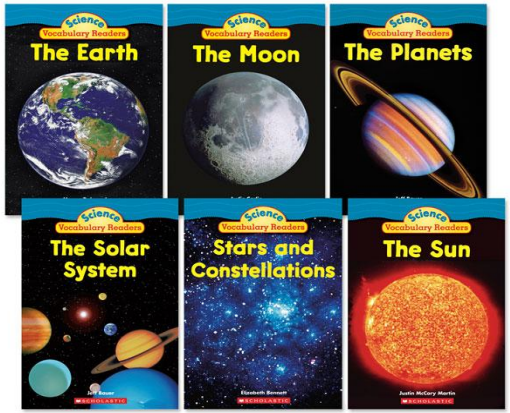
Additional Resources:

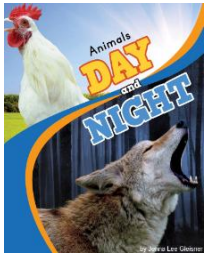
*not part of district resources

Background knowledge for teachers:
http://earthsky.org/space/when-can-you-see-a-daytime-moon



Part of Harcourt Leveled Science Readers with former adoption materials

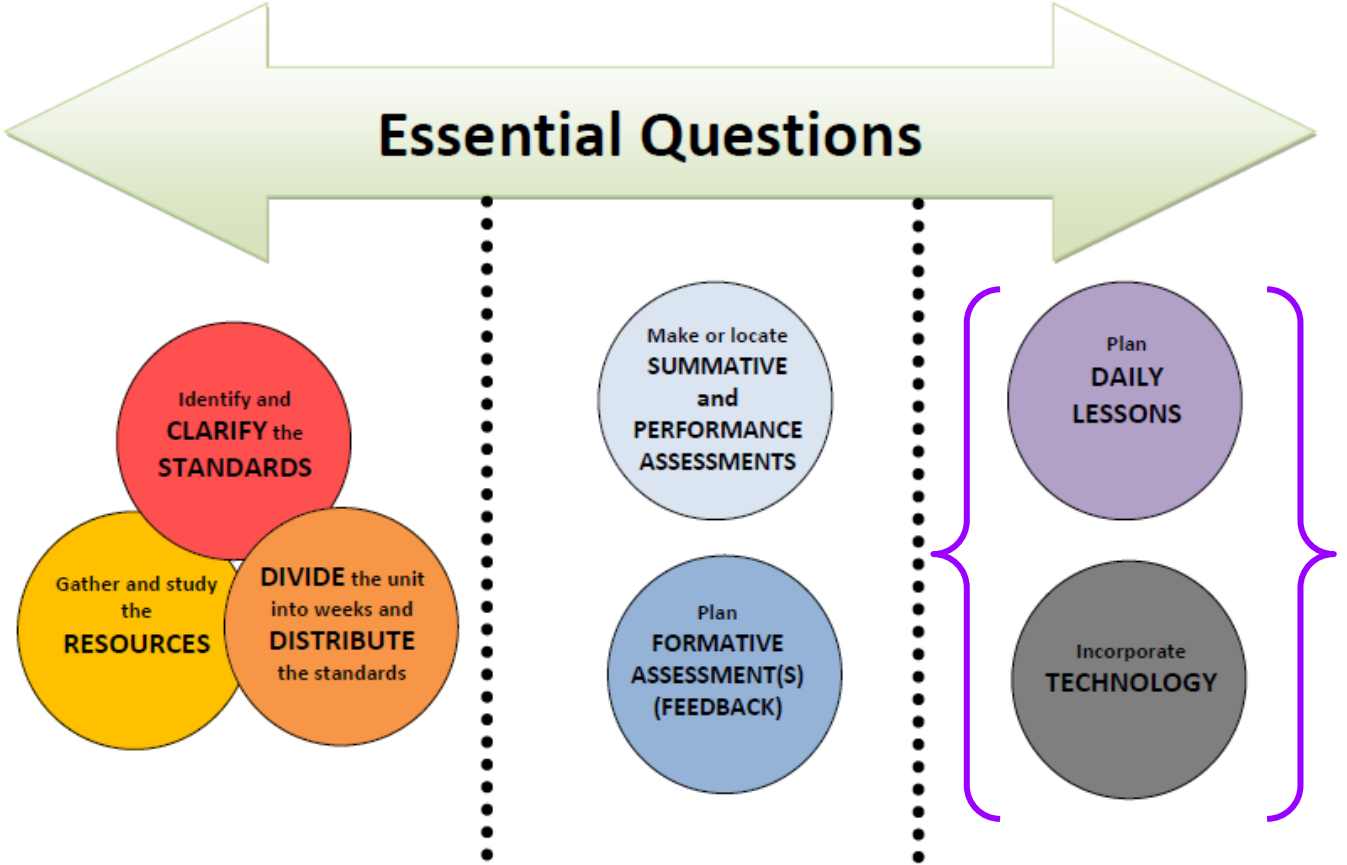




Extend: How does day and night affect animals?

EPIC! Book: Animals Day and Night by Jenna Lee Gleisner.

Backward Unit Planning 1.0



Now you're ready to plan your daily lessons!