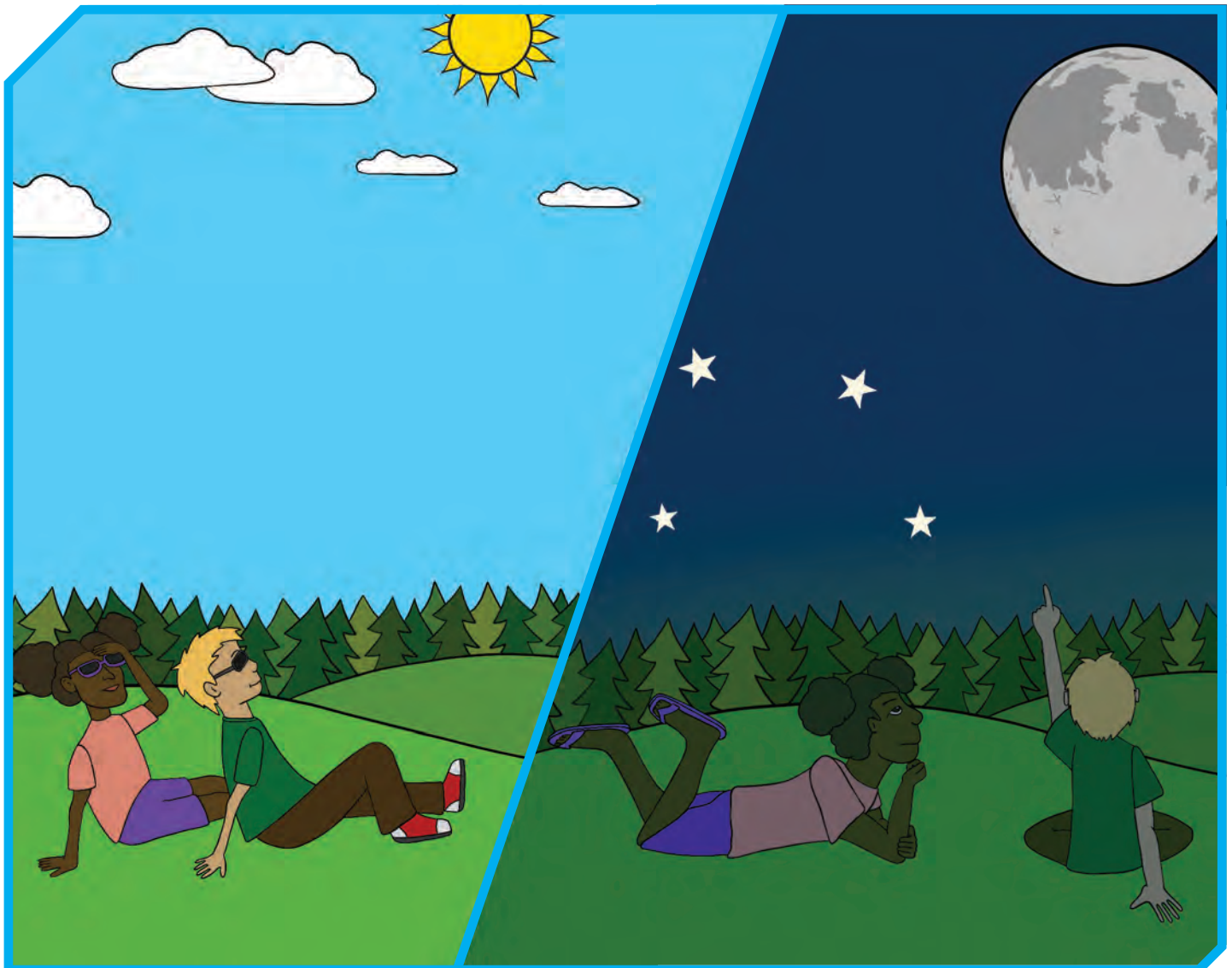


# Teacher Guide and Student Journal

Sample Activity and Planning Pages

# Space Systems: Patterns and Cycles

## 1ENG



SECOND EDITION

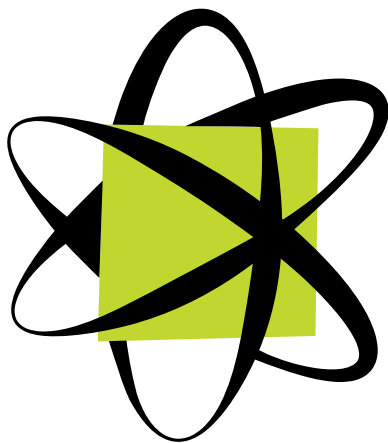
A first grade unit supporting Next Generation Science Standards  
and Michigan Science Standards



S E C O N D E D I T I O N

# Space Systems: Patterns and Cycles 1ENG

A first-grade unit supporting **Next Generation Science Standards** and the **Michigan Science Standards** developed and written by the Battle Creek Area Mathematics and Science Center for



**CEREAL CITY  
SCIENCE™**

by BCAMSC



# Space Systems: Patterns and Cycles

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## NEXT GENERATION SCIENCE STANDARDS

Disciplinary Core Ideas	Activities
<b>ESS1.A: The Universe and Its Stars</b> <ul style="list-style-type: none"><li>Patterns of motion of the sun, moon, and stars in the sky can be observed, described, and predicted.</li></ul>	1,2,3,4,5
<b>1-ESS1-1:</b> Use observations of the sun, moon, and stars to describe patterns that can be predicted.	1,2,3,4,5
<b>ESS1.B: Earth and the Solar System</b> <ul style="list-style-type: none"><li>Seasonal patterns of sunrise and sunset can be observed, described, and predicted.</li></ul>	1,5
<b>1-ESS1-2:</b> Make observations at different times of the year to relate the amount of daylight to the time of year.	1,2,3,4,5

**NEXT GENERATION SCIENCE STANDARDS**

Science and Engineering Practices	Activities
<p><b>Planning and Carrying Out Investigations</b>                      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.</p> <ul style="list-style-type: none"> <li>• Make observations (firsthand and from media) to collect data that can be used to make comparisons.</li> </ul>	1,2,3
<p><b>1-ESS1-2:</b> Make observations at different times of the year to relate the amount of daylight to the time of year.</p>	1,2,3,4,5
<p><b>Analyzing and Interpreting Data</b>                      Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none"> <li>• Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.</li> </ul>	3,5
<p><b>1-ESS1-1:</b> Use observations of the sun, moon, and stars to describe patterns that can be predicted.</p>	1,2,3,4,5

# PLANNING

## NEXT GENERATION SCIENCE STANDARDS

Crosscutting Concepts	Activities
<b>Patterns</b> <ul style="list-style-type: none"><li>• Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.</li></ul>	2,3
<b>1-ESS1-1:</b> Use observations of the sun, moon, and stars to describe patterns that can be predicted.	1,2,3,4,5
<b>1-ESS1-2:</b> Make observations at different times of the year to relate the amount of daylight to the time of year.	1,2,3,4,5
Connections to Nature of Science	
<b>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</b> <ul style="list-style-type: none"><li>• Science assumes natural events happen today as they happened in the past.</li><li>• Many events are repeated.</li></ul>	1,2,3,4,5
<b>1-ESS1-1:</b> Use observations of the sun, moon, and stars to describe patterns that can be predicted.	1,2,3,4,5



**COMMON CORE STATE STANDARDS - READING**

<b>Reading Standards for Informational Text—Grade 1</b>	<b>Activities</b>
<b>Key Ideas and Details</b>	
RI.1.1: Ask and answer questions about key details in a text.	1,2,3,5
RI.1.2: Identify the main topic and retell key details of a text.	1,3,5
RI.1.3: Describe the connection between two individual events, ideas, or pieces of information in a text.	1,2,3,4
<b>Craft and Structure</b>	
RI.1.4: Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.	1,2,3,4
RI.1.5: Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.	
RI.1.6: Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.	1,2,3,4
<b>Integration of Knowledge and Ideas</b>	
RI.1.7: Use the illustration and details in a text to describe its key ideas.	1,2,3,4
RI.1.8: Identify the reasons an author gives to support points in a text.	1,3
RI.1.9: Identify the basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).	1,3
<b>Range of Reading and Level of Text Complexity</b>	
RI.1.10: With prompting and support, read informational texts appropriately complex for grade 1.	3,4

# PLANNING

## COMMON CORE STATE STANDARDS - WRITING

Writing Standards–Grade 1	Activities
<b>Text Types and Purposes</b>	
<b>W.1.1</b> - Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.	1
<b>W.1.2</b> - Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.	1,3,4
<b>W.1.3</b> - Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.	1,4
<b>Production and Distribution of Writing</b>	
<b>W.3.4</b> - (Begins in grade 3)	
<b>W.1.5</b> - With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed.	1,2,3,4
<b>W.1.6</b> - With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.	
<b>Research to Build and Present Knowledge</b>	
<b>W.1.7</b> - 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).	1,3,4
<b>W.1.8</b> - With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.	1,3,4
<b>W.4.9</b> - (Begins in Grade 4)	
<b>Range in Writing</b>	
<b>W.3.10</b> - (Begins in Grade 3)	

**COMMON CORE STATE STANDARDS - LANGUAGE**

Language Standards—Grade 1	Activities
<b>Conventions of Standard English</b>	
<p>L.1.1: Understand the command of the conventions of standard English grammar and usage when writing or speaking.</p> <ul style="list-style-type: none"> <li>a. Print all upper- and lowercase letters.</li> <li>b. Use common, proper, and possessive nouns.</li> <li>c. Use singular and plural nouns with matching verbs in basic sentences (e.g., He hops; We hop).</li> <li>d. Use personal, possessive, and indefinite pronouns (e.g., I, me, my; they, them, their; anyone, everything).</li> <li>e. Use verbs to convey a sense of past, present, and future (e.g., Yesterday I walked home; Today I walk home; Tomorrow I will walk home).</li> <li>f. Use frequently occurring adjectives.</li> <li>g. Use frequently occurring conjunctions (e.g., and, but, or, so, because).</li> <li>h. Use determiners (e.g., articles, demonstratives).</li> <li>i. Use frequently occurring prepositions (e.g., during, beyond, toward).</li> <li>j. Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts.</li> </ul>	<p>1,2,3,4</p>
<p>L.1.2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <ul style="list-style-type: none"> <li>a. Capitalize dates and names of people.</li> <li>b. Use end punctuation for sentences.</li> <li>c. Use commas in dates and to separate single words in a series.</li> <li>d. Use conventional spelling for words with common spelling patterns and for frequently occurring irregular words.</li> <li>e. Spell untaught words phonetically, drawing on phonemic awareness and spelling conventions.</li> </ul>	<p>1,2,3,4</p>

## COMMON CORE STATE STANDARDS - LANGUAGE

Language Standards—Grade 1	Activities
<b>Vocabulary Acquisition Use</b>	
<p>L.1.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 1 reading and content, choosing flexibly from an array of strategies.</p> <ul style="list-style-type: none"> <li>a. Use sentence-level context as a clue to the meaning of a word or phrase.</li> <li>b. Use frequently occurring affixes as a clue to the meaning of a word.</li> <li>c. Identify frequently occurring root words (e.g., look) and their inflectional forms (e.g., looks, looked, looking).</li> </ul>	1,2,3,4
<p>L.1.5: With guidance and support from adults, demonstrate understanding of word relationships and nuances in word meanings.</p> <ul style="list-style-type: none"> <li>a. Sort words into categories (e.g., colors, clothing) to gain a sense of the concepts the categories represent.</li> <li>b. Define words by category and by one or more key attributes (e.g. a duck is a bird that swims; a tiger is a large cat with stripes).</li> <li>c. Identify real-life connections between words and their use (e.g., note places at home that are cozy).</li> <li>d. Distinguish shades of meaning among verbs differing in manner (e.g., look, peek, glance, stare, glare, scowl) and adjectives differing in intensity (e.g., large, gigantic) by defining or choosing them or by acting out the meanings</li> </ul>	1,2,3,4
<p>L.1.6: Use words and phrases acquired through conversations, reading, and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships.</p>	1,2,3,4

**COMMON CORE STATE STANDARDS - MATHEMATICS**

<b>Mathematics—Grade 1</b>	<b>Activities</b>
<b>Mathematical Practices</b>	
1. Make sense of problems and persevere in solving them.	1,2,3,4,5
2. Reason abstractly and quantitatively.	1,2,3,4,5
3. Construct viable arguments and critique the reasoning of others.	1,2,3,4,5
4. Model with mathematics	1,2,3,4,5
5. Use appropriate tools strategically.	1,2,3,4,5
6. Attend to precision.	1,2,3,4,5
7. Look for and make use of structure.	1,2,3,4,5
8. Look for and express regularity in repeated reasoning.	1,2,3,4,5
<b>1.OA Operations and Algebraic Thinking</b>	
<b>A. Represent and solve problems involving addition and subtraction.</b>	
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 with a symbol for the unknown number to represent the problem). 2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem).	1
<b>Understand and apply properties of operations and the relationship between addition and subtraction.</b>	
3. Apply properties of operations as strategies to add and subtract. 4. Understand subtraction as an unknown-addend problem.	

## COMMON CORE STATE STANDARDS - MATHEMATICS

Mathematics—Grade 1	Activities
<b>Add and subtract within 20.</b>	
5. Relate counting to addition and subtraction (e.g., by counting on 2 add 2). 6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting; making ten; decomposing a number leading to addition and subtraction; and creating equivalent but easier or known sums.	1
<b>Work with addition and subtraction equations.</b>	
7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. 8. Determine the unknown whole number of an addition or subtraction equation relating three whole numbers.	3
<b>1.NBT Number and Operations in Base Ten</b>	
<b>Extend the counting sequence.</b>	
1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.	
<b>Understand place value.</b>	
2. Understand that two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: c. 10 can be thought of as a bundle of ten ones, called a “ten.” d. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. e. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). 3. Compare two 2-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$ , $=$ , and $<$ .	

**COMMON CORE STATE STANDARDS - MATHEMATICS**

<b>Mathematics—Grade 1</b>	<b>Activities</b>
<b>1.MD Measurement and Data</b>	
<b>Measure lengths indirectly and by iterating lengths in units.</b>	
<ol style="list-style-type: none"> <li>Order three objects by length; compare the lengths of two objects indirectly by using a third object.</li> <li>Express the length of an object as a whole number of length units by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.</li> </ol>	2
<b>Tell and write time.</b>	
<ol style="list-style-type: none"> <li>Tell and write time in hours and half hours using analog and digital clocks.</li> </ol>	1,2,5
<b>Represent and interpret data.</b>	
<ol style="list-style-type: none"> <li>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.</li> </ol>	1,2,3,5
<b>1.G Geometry</b>	
<b>Reason with shapes and their attributes.</b>	
<ol style="list-style-type: none"> <li>Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.</li> <li>Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter circles) or three dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.</li> <li>Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of or four of the shares. Understand for these examples that decomposing into a larger number of equal shares creates smaller shares.</li> </ol>	3

# PLANNING

## UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goal	Phenomenon/ Engineering Challenge	Summary: Students will...
<b>1</b>  <b>Sky Watchers: Objects in the Sky</b>	Preparation: 15–20 min. Activity 1: Lesson 1A: 45–50 min. 2 class periods Lesson 1B: 45–50 min. Lesson 1C: 45–50 min. Data collection will be ongoing throughout the unit and year, if possible.	Use observations and text to collect data and gain information about day and night.	It was dark (or light) when I woke up this morning.  The position of the sun in the sky changes throughout the day.	<ul style="list-style-type: none"> <li>collect data on the position of the sun when they get up in the morning, during the day, and at bedtime.</li> <li>share initial ideas about the changes in amount of daylight.</li> <li>use text to introduce sunrise and sunset as regularly occurring events and gather information about day and night.</li> <li>make observations to track the position of the sun throughout the day.</li> </ul>
<b>2</b>  <b>Day and Night</b>	Preparation: 15–20 min. Activity 2: Lesson 2A: 45–50 min. Lesson 2B: 45–50 min., 2–3 class periods Lesson 2C: 45–50 min.	Use information from text and observations to develop a model of how we get day and night.	The sun appears to move across the sky.  The size and shape of shadows change based on the time of day.	<ul style="list-style-type: none"> <li>use the digital app, Stellarium, to observe the different positions of the sun in the sky throughout the day.</li> <li>develop a model to explain the pattern of day and night.</li> <li>trace and measure shadows in the morning, noon, and afternoon.</li> <li>collect data from shadow measurements.</li> </ul>
<b>3</b>  <b>Observing the Moon</b>	Preparation: 20–30 min. Activity 3: Lesson 3A: 45–50 min., 2 class periods Lesson 3B: 45–50 min., 2–3 class periods Lesson 3C: 45–50 min., 2 class periods	Use information from text to develop a model that demonstrates the regularly occurring pattern of the shapes of the moon.	The moon appears to change shape and position in the sky.	<ul style="list-style-type: none"> <li>raise questions about the changing appearance of the moon through text.</li> <li>make observations of the moon to determine patterns in the shape.</li> <li>determine that the moon is a sphere and the shape we see is the lit part of the moon.</li> </ul>



## UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
<ul style="list-style-type: none"> <li>• make observations and collect data on sunrise and sunset over a period of time.</li> <li>• plan and carry out an investigation to find out if the time the sun comes up changes over a period of time.</li> <li>• relate observations using Stellarium, or another app, to real-life observations.</li> <li>• use information from text to uncover a pattern.</li> </ul>	<p>Planning and Carrying Out Investigations</p> <p>Analyzing and Interpreting Data</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Patterns</p>	<p><b>Formative Assessment</b></p> <p>Class Discussion</p> <p>Journal Entries</p> <p>Science Talk</p> <p>Activity Pages</p> <p>T-chart</p>
<ul style="list-style-type: none"> <li>• make observations of the position of the sun using a digital display and recognize a regular pattern from day to day.</li> <li>• develop a model using their bodies, a lamp, and an <i>Earth</i> sign that explains how we get a pattern of day and night.</li> <li>• interpret data to determine the effect of the position of the sun on shadows.</li> </ul>	<p>Planning and Carrying Out Investigations</p> <p>Analyzing and Interpreting Data</p> <p>Patterns</p> <p>Cause and Effect</p>	<p><b>Formative Assessment</b></p> <p>Science Talk</p> <p><b>Summative Assessment</b></p> <p>Journal Entries</p> <p>Engineering Project</p>
<ul style="list-style-type: none"> <li>• develop a model that explains the pattern in the shape of the moon.</li> <li>• compare two texts to gather information that explains why the moon appears to change shape.</li> <li>• use what they know about the rotation of the earth to explain why the moon appears to move across the sky.</li> </ul>	<p>Obtaining, Evaluating, and Communicating Information</p> <p>Analyzing and Interpreting Data</p> <p>Developing and Using Models</p> <p>Patterns</p>	<p><b>Formative Assessment</b></p> <p>Science Talk</p> <p>Journal Entry</p> <p><b>Summative Assessment</b></p> <p>Student Models</p> <p>Journal Entry</p>

# PLANNING

## UNIT AT A GLANCE

Activity	Time to Complete	Lesson Level Learning Goals	Phenomenon/ Engineering Challenge	Summary: Students will...
4 A Look at the Stars	Preparation: 15–20 min. Activity 4: Lesson 4A: 50–55 min. Lesson 4B: 50–55 min.	Use observations and a model to explain how the stars appear to move across the sky.	The stars appear to move across the sky. After sunrise the only star that is visible is the sun.	<ul style="list-style-type: none"> <li>use the digital app, Stellarium, to observe the different positions of the stars throughout the night.</li> <li>develop a model to explain the seasonal observations of stars.</li> <li>create their own constellation using a star chart.</li> </ul>
5 Making Sense of Our Data	Preparation: 10 min. Activity 5A: Lesson 5: 50–55 min.	Analyze data to explain patterns in the position of the sun, moon, and stars and the changes in the amount of daylight hours through the seasons.	The sun, moon, and stars appear to move across the sky in a pattern. The amount of daylight hours changes with the seasons.	<ul style="list-style-type: none"> <li>use data from observation logs to recognize patterns and develop explanations.</li> </ul>

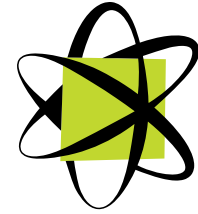
## UNIT AT A GLANCE

Students Figure Out How To:	Practices and Crosscutting Concepts	Assessment
<ul style="list-style-type: none"> <li>• use observations to collect information about the changing of position of the stars.</li> <li>• use a model to explain how positions of the stars change throughout the seasons.</li> <li>• create a constellation with a story.</li> </ul>	<p>Obtaining, Evaluating, and Communicating Information            Developing and Using Models            Patterns</p>	<p><b>Summative Assessment</b>            Science Talk            Journal Entry</p>
<ul style="list-style-type: none"> <li>• analyze data from <i>Where Is the Sun?</i> data to explain how the amount of daylight hours changes with the seasons.</li> <li>• Use the <i>Moon Observation Log</i> to recognize patterns in shapes and position in the sky.</li> </ul>	<p>Analyzing and Interpreting Data            Cause and Effect            Patterns</p>	<p><b>Summative Assessment</b>            Science Talk            Journal Entry</p>

# PLANNING

Dear Parent,

Your child is beginning a unit created by the Battle Creek Area Mathematics and Science Center. This unit was designed to promote science and engineering literacy and integrate reading and writing skills into high-interest science content. During the next twelve weeks, your child will be actively involved with the *Space Systems: Patterns and Cycles* unit. This unit is geared for first-grade students and focuses on the big ideas of obtaining information to determine the seasonal patterns of the sunrise and sunset and the observable patterns of the motion of the sun, moon, and stars.



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1. Obtain information through observations, reading, models, and discussions to describe patterns in sunrise and sunset that can be predicted.
2. Obtain information through investigations, models, and discussions to describe patterns in the position of the moon in the sky.
3. Plan and design a model to explain why we get day and night.

First-grade students are also encouraged to think and act like scientists and engineers, and begin to develop observation and communication skills in science.

1. Make purposeful observation of objects in the sky.
2. Generate questions based on their observations.
3. Plan and conduct simple investigations into how patterns can be used to predict future positions of objects in the sky.
4. Manipulate simple tools that aid observation and data collection.
5. Construct simple charts from data and observations of how the position of objects in the sky changes.
6. Work in teams to design a model to explain how we get day and night.

In this unit, the activities are geared to build on the inherent knowledge and experience that young students have already acquired and use their knowledge in a wider range of tasks. Students will be given the opportunity to observe, research, reflect upon, describe, and discuss how patterns develop in the position and motion of objects in the sky. Suggestions for activities to do at home are included with this letter. These activities will reinforce the concepts taught during this unit instruction.

May you enjoy quality time with your child while discussing the concepts involved with the *Space Systems: Patterns and Cycles* unit. Let us know if we may be of assistance.

The Outreach Staff  
Battle Creek Area Mathematics and Science Center  
(269) 213-3907 or (269) 213-3905

## ACTIVITIES TO DO AT HOME

1. Make sunrise and sunset observations with your child. Keep a record of the time of day the sun rises and sets. Discuss how the amount of daylight and darkness changes throughout the year.
2. Visit a local planetarium. Check out the program schedule for exhibits that include the moon and constellations.
3. Plan on an evening sky watch to make observations of the moon and stars. Ask your student to find “faces” in the moon or connect the stars to make different shapes and figures. Locate the position of the moon and record its position relative to a landmark. Find the North Star or Big Dipper and record where it is located in the sky. Repeat the evening outing several weeks later and note the difference in the shape of the moon and the position of the stars. Discuss how the position of the moon and stars has changed over time.
4. If you live on a street with street lights that come on at dusk and go off at dawn, keep a log of the time each day the lights come on and go off. Discuss with your child the light sensors that turn the lights on when it is growing dark and turn the lights off when it is getting light. After collecting data for several weeks, ask students if the lights are coming on earlier each evening (fall) or later each evening (spring).

5. Make your own constellation projection device. You will need:

flashlight

paper

sharp pencil or hole punch

note card

Have your student make his/her own constellation or an existing constellation on a note card. Punch out the stars or use a sharp pencil and poke holes where each star is drawn. Shine the flashlight through the holes and project the star clusters on the wall or ceiling. Turn out the lights and pull the blinds closed for a more dramatic effect. Have your student tell a story about the constellation.

6. Go to the library and check out books to read related to light and sound. Example titles:

*What Makes Day and Night?*, by Franklyn M. Branley

*Stories in the Stars*, by Allison K. Lim

*How the Moon Regained Her Shape*, by Janet Ruth Heller

*What Do You See in the Moon?*, by Lara Winegar

*The Moon Seems to Change*, by Franklyn M. Branley

*Moon*, by Melanie Mitchell

*So That's How the Moon Changes Shape*, by Allan Fowler

*Zoo in the Sky: A Book of Animal Constellations*, by Jacqueline Mitton

*The Moon Book*, by Gail Gibbons

# ACTIVITY 1

## SKY WATCHERS: OBJECTS IN THE SKY

### Teacher Background Information

In the kindergarten unit *Weather and Climate*, students became “Weather Watchers” and kept an eye to the sky to make observations of patterns in weather. In first grade, they will continue to observe the sky and look for patterns in sunrise, sunset, and the position of the sun and moon throughout the day. Later lessons will include the stars and further observations of the moon.

**Safety:** Observations of the sky do not include direct observations of the sun. Students should be aware that staring directly at the sun without protective glasses can result in damage to their eyes.

The phenomenon for this unit develops over multiple lessons that include observations of the daytime sky. Students make observations at different times of day and raise questions about the position of the sun in the sky during the day and how the sky (amount of light) changes in the morning as they go to school.

### Considerations for Students With Special Needs, Diverse Backgrounds, and Emerging Bilingual Learners

All prompts and passages in the Student Journal should be read aloud, with repeated directions and checking for understanding prior to writing.

Students are asked to draw and write in their Student Journals. Students may benefit by working with a partner in the longer writing pieces. Students with an IEP should be allowed to dictate their ideas and answers.

Pair students for sky observations on the school yard to accommodate students that have difficulty understanding directions or need multiple reminders of the purpose of the outing.

Read *Twilight Comes Twice* aloud to students. Stop and ask students to retell the passage. Ask a bilingual speaking student/ or adult translator to translate or retell the passages in Spanish or another language that is common in your classroom.

### Engage the Learner

This initial phase of learning activates students’ prior knowledge and preconceptions regarding day and night. Students begin to make connections between what they have observed in the morning and throughout the day and the patterns that occur over time.

### ESTIMATED TIME

Lesson 1A: 45–50 minutes  
2 classes  
Lesson 1B: 45–50 minutes  
Lesson 1C: 45–50 minutes

### LESSON LEVEL LEARNING GOALS

- Use observations and text to collect data and gain information about day and night.

### MATERIALS NEEDED

#### For each student:

student pages

#### For the class:

handout: *Sky Watcher*  
handout: *Observation Parent Letter*  
handout: *Day and Night*  
handout: *Observation Log*  
handout: *Moon Observation Log*  
book: *Twilight Comes Twice*  
booklet: *When the Street Lights Come On!*

#### Teacher provides:

chart paper  
markers

### ESS1.B: EARTH AND THE SOLAR SYSTEM

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

# LESSON 1A

## DEVELOPING AND USING MODELS

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatizations, or storyboard) that represent concrete events or design solutions.

- Distinguish between a model and the actual object, process, and/or events the model represents.
- **Compare models to identify common features and differences.**
- Develop and/or use a model to represent amounts, relationships, relative scales, and/or patterns in the natural and designed world(s).
- ~~Develop a simple model based on evidence to represent a proposed object or tool.~~

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### TEACHING TIP

If your school has a relatively late start time (after 8:30 a.m.) you will need to change the question to if it is light or dark when they get out of bed on a school morning.

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### TEACHING TIP

As you circulate among the students, carry a clipboard and take notes about their ideas to use as conversation and question starters during Science Talk.

## LESSON 1A: SKY WATCHERS: ON THE WAY TO SCHOOL

### Advance Preparation

Duplicate copies of the unit *Parent Letter*, *Activities to Do at Home*, *Day and Night Observation Log*, *Moon Observation Log*, and the *Sky Watchers Observation Parent Letter* that accompanies the logs. Each student will take home the *Parent Letter* and *Activities to Do at Home*. One or two students per week will be selected to take home the *Day and Night Observation Log*, the booklet *When the Street Lights Come On!*, and the *Moon Observation Log*.

The following lessons will require the free computer program, Stellarium ([www.stellarium.org](http://www.stellarium.org)), to be installed on a computer.

After installing and opening Stellarium, take some time to become familiar with the program. Move the cursor to the far lower left of the screen, select the Location window, and select a location near your city. Move the cursor to the bottom of the screen and a new menu panel will pop up. Explore all the options. Set the Date and Time window. Practice changing the time and date by clicking the arrows up and down. Change the direction you are facing by clicking on the screen and dragging the cursor to the left and right. To begin the lesson, you will show the current sky and have students note the location of the sun.

If you do not have a computer in your room, arrange for one (with Stellarium installed) and a projector to use for several weeks.

Do a schoolyard survey and plan for a time for students to go outdoors and make observations of the sky.

Prepare a What We Think chart to have visible in the classroom throughout the unit.

What We Think	Questions We Have	What We Did	What We Figured Out	How Does That Help Us Figure Out the Phenomenon?



**Procedure**

*Engage the learner.*

Review with the class their experiences in kindergarten as “Weather Watchers” and their daily observing and recording of weather conditions. Discuss what they learned from their observations and the information they gathered. Each day they recorded the temperature, cloud cover, wind speed and direction, and precipitation.

Inform the class that they are going to continue to keep an eye on the sky but with a different purpose than weather. Ask students for their ideas of what they might learn, other than the weather, by watching the sky. Accept all ideas at this time.

Listen for and record ideas of observations of the sun and moon in the sky. Confirm their ideas by informing them that they will be sky watchers in first grade and focus their attention on the sun, moon, and stars and their location in the sky throughout the day. Ask students for their initial ideas of what they can find out by observing the daytime sky and the nighttime sky. Record their initial ideas on the What We Think chart.

Have the students draw and label their initial ideas of the daytime sky and nighttime sky in their Student Journals.

1. *Draw and label a picture of the sky in the day.*
2. *Draw and label a picture of the sky at night.*

Facilitate the student drawings in their Student Journals by circulating among the class and observing their ideas. To help students rely on their experiences, ask:

- Can you explain what you have drawn so far?
- What have you observed that makes you think \_\_\_\_\_ is an important part of the sky in the day? Night?
- I see that you included \_\_\_\_\_ in your drawing of day/night? Can you explain why?
- What other observations have you made of the sky in the day/night?
- How can you include that idea in your picture?
- Is the moon always visible in the night? When might you see stars and not the moon?
- Is the moon ever visible in the day? Tell me more about that.

**TEACHING TIP**

The responses will be dependent upon the time of year you begin this unit. Include the student observations during the daily calendar routine to provide sufficient data for students to develop an explanation. At the end of the first grade unit students will use firsthand observations to support the claim that at different times of the year the amount of daylight varies and patterns can be observed.

**TEACHING TIP**

**Science Talk** is a conversation among students that allows them to have the opportunity to orally express their ideas and listen to the ideas of others. Allow sufficient time for each student to express ideas and opinions. Encourage “student-led” conversation in the classroom.

**TEACHING TIP**

Throughout the activities in the Teacher Guide you will notice that specific student instructions from the Student Journal pages are given first and italicized. Additional information for the teacher follows the italicized instructions in plain print.

# LESSON 1A

Example: Objects in the Sky	
Daytime	Nighttime
sun	stars
moon	moon
clouds	owls
airplanes	shooting stars
birds	

## ASKING QUESTIONS AND DEFINING PROBLEMS

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

- **Ask questions based on observations to find more information about the natural and/or designed world(s).**
- Ask and/or identify questions that can be answered by an investigation.
- ~~Define a simple problem that can be solved through the development of a new or improved object or tool.~~

## Science Talk

Ask the students to bring their drawings and gather in a circle to share their ideas of the sky in the day and the sky in the night. Ask a student volunteer to share their drawings with the class and explain why they chose the different objects in the daytime sky and nighttime sky. Ask:

- \_\_\_\_\_, I notice you included \_\_\_\_\_ in your drawing of the daytime sky. Can you say more about that?
- Did anyone else include \_\_\_\_\_ in their drawing? Why do you think that was important?
- Who has something different to share?
- What do all the daytime sky pictures have in common? Why do you think that is important?

Take notice if any student drawings include the moon in the day and night. Ask students to explain why they drew the moon in the daytime and nighttime. Encourage other students to express their ideas of when they see the moon.

Make a t-chart to record their initial ideas. Keep the chart as a record to refer to as their ideas change and new information leads to conceptual shifts in their thinking.

Students may include birds, clouds, and airplanes in their initial drawings. Take this opportunity to discuss the difference between the objects close to Earth and objects way out in space.

Have the students refer to their pictures of the daytime sky and ask the class to think about if the sky in their picture looked like the sky when they came to school this morning. Was it a daytime sky or a nighttime sky? Make a chart on the board or chart paper and make tally marks that display a record of their observations of light or dark in the morning. Students may leave their homes at different times in the morning and may have different responses to the question. Ask students who:

- ride the bus to describe if it was dark when they were at the bus stop and if it was still dark or light when they arrived at school.
- get a ride to school if it was dark when they first got into the car and if the sky changed by the time they arrived at school.
- walk to school to describe the sky when they left their house and if it changed by the time they arrived at school.

Ask:

- Do you think we will experience the same darkness or brightness tomorrow when we go to school.

- What about the next day, next week, or next month?
- What makes you think that?
- Can someone add to that idea?
- How is the sky different right now from when you arrived at school this morning?

Ask students to think of questions they have about when it gets light in the morning and dark in the evening. Record their questions on the Questions We Have column of the What We Think chart. To help students generate questions about patterns in daytime and nighttime, ask:

- Who has a question about the time in the morning when the sun comes up?
- Can someone add to that question?
- What about the time in the evening when the sun goes down? What questions do you have about when the sun goes down?
- What questions can we investigate about the sky in the daytime and the sky in the nighttime?

Ask students how they can figure out the answer to their questions. Accept all reasonable answers at this time.

Direct student thinking to sunset and ask:

- Does it get dark in the evening at the same time throughout the year?
- What makes you think that?
- How can we find out?

As a class, discuss ideas of how they can find out if the morning and evening sky will change as the school year progresses. Listen for ideas that relate to making observations and collecting data. Write the question on the board:

*How can we find out how the sun changes position in the sky from morning to night?*

Take this opportunity to read-aloud *Twilight Comes Twice*. The reading has the potential to generate more questions for the What We Think chart. Examples of discussion and text to revisit and discuss following the reading:

- Discuss the term *twilight* and ask students what the author means by twilight.
- Ask: What do you think the title of the book means?
- Does twilight really come twice? When?

## READING

### Key Ideas and Details

**RI.1.1:** Ask and answer questions about key details in a text.

**RI.1.2:** Identify the main topic and retell key details of a text.

**RI.1.3:** Describe the connection between two individual events, ideas, or pieces of information in a text.

### Craft and Structure

**RI.1.4:** Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.

**RI.1.6:** Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

### Integration of Knowledge and Ideas

**RI.1.7:** Use the illustration and details in a text to describe its key ideas.

# LESSON 1A

## TEACHING TIP

The *Moon Observation Log* and *Day and Night Observation Log* can be copied for each student or one for the class. Each student engaging in observations over time allows for comparison of data at the conclusion of the observation period.

Be sure all students have the opportunity to make and enter observations in the *Day and Night Observation Log*.

- Is there another term we could use for twilight in the morning? Twilight in the evening?
- Listen for responses that include dawn and dusk. What causes dawn and dusk to occur each day? What is happening at those times of the day?
- Does the book give us information to help us answer the class question? What makes you think that?
- Does anyone have more questions about day and night or twilight after reading the book?

Write the key terms from the class discussion and reading on the board: *sunrise*, *sunset*, and *twilight*. As a class, define the terms. After the students are satisfied with their definitions, write them on the board and have students enter them in the Key Terms section of the Student Journal.

Show the class the *Day and Night Observation Log* and the *Moon Observation Log*. Explain that one or two students each week will be selected to be the sky watcher and enter the data in the log for the week. Tell them that the sky watcher is to go outside with an adult in the assigned area and observe whether it is light, twilight, or dark when they wake up and go to bed and record the time of their observations. Their adult helper can help them to record the time of day and write their questions and observations on the data pages.

Explain that there is a story that accompanies the *Day and Night Observation Log* called *When the Street Lights Come On!* Ask the students to read the story with an adult and discuss the questions at the end of the reading.

Review the *Moon Observation Log* and how the observations can be done at different times of the day and how to enter the data on the chart.

Develop a rotation chart and assign the first student to enter data in the logs.

### **Assessment: Formative**

Use the Science Talk and Activity Pages to assess the students' initial ideas of the sky in daytime and nighttime.

## LESSON 1B: SKY WATCHERS: TRACKING THE SUN

### Advance Preparation

Plan to conduct this lesson in the morning when the sun is still fairly low in the eastern sky. Choose a partly cloudy or clear day for observations. If the sky is too cloudy, you may have to reserve the observations for the next available clear to partly cloudy day or use the Stellarium program for your observations if they are deterred for too long due to weather. Check the newspaper or online source for the moon rise and moon set to see if there is an opportunity to observe the moon during the day.

Make a survey of the best location on the schoolyard to observe the sunrise or morning sun. Observations should be made facing south and with the eastern horizon on your left. Make note of any points of reference (rooftops, playground equipment, tops of trees, etc.) that students can use to describe and draw in the position of the sun in the sky.

The following lessons will require the free computer program, Stellarium ([www.stellarium.org](http://www.stellarium.org)), to be installed on a computer.

### Procedure

*Engage the learner.*

Review the What We Think chart, student initial ideas, questions and the overarching question the class is trying to figure out.

How can we find out how the sun changes position in the sky from morning to night?

Ask students what they observed about the sky when they came to school in the morning. Remind students that they are not focusing on the weather, but on the location of the sun, moon, and stars in the sky. Ask:

- What did the sky look like when you came to school this morning?
- Was that the same as yesterday?

Ask the class for their ideas of how they can become scientists and investigate their question. Accept all ideas at this time.

Listen for ideas of making observations of the sun and tracking its position in the sky. Ask if they think they could gather information by observing the sky at different times of the day.

Inform the class that they are going to go outside and observe the position of the sun in the sky this morning. Review the Activity Page in the Student Journal as a class. Ask a student to explain what they are to record in their Student Journals.

### MATERIALS NEEDED

#### For each student:

- student pages
- solar glasses

#### For the class:

- signs: North, South, East, West

#### Teacher provides:

- computer
- projector
- chart paper
- markers

### ESS1.B: EARTH AND THE SOLAR SYSTEM

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

### TEACHING TIP

Throughout this unit you will find examples of questions that will aid in facilitation of student-led discussion and collaboration. This facilitation guide is intended to draw ideas from previous knowledge, observations, and investigations.

### FORMATIVE ASSESSMENT

Use the student responses to the What We Think chart as an ongoing assessment of student understanding and conceptual shifts. Refer to students' initial ideas and emerging ideas as a result of observations, evidence, and information gathering.



# LESSON 1B

## 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.

- With guidance, plan and conduct an investigation in collaboration with peers (for K).
- **Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.**
- Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
- **Make observations (firsthand and from media) to collect data that can be used to make comparisons.**
- ~~Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.~~
- Make predictions based on prior experiences.

Caution students against staring directly at the sun. Staring directly at the sun without protective glasses can be harmful to their eyes. Ask students if they think they might also observe the moon in the sky during their observations. Ask students how they know that.

Distribute one pair of solar glasses to each student. Divide the class into teams of two students and ask them to be observation buddies and use their solar glasses to locate the sun in the sky and describe its location to one another. Have students take their Student Journals and pencils and go outside to draw their observations.

1. *Draw a picture of where you saw the sun in the morning sky. Draw if you saw the moon.*
2. *Predict: Draw a picture of where you think the sun will be at lunchtime. Do you think you will see the moon? Draw where you think it will be in the sky.*
3. *Predict: Draw a picture of where you think the sun will be at dinnertime. Do you think you will see the moon? Draw where you think it will be in the sky.*

Explain the position the students should use and have all students face south when making their observations. Place the *North, South, East, West* signs in the appropriate location for students to use as a reference. Facilitate the observations and entries in the Student Journal by circulating among the teams and listening to their descriptions. To help students elaborate on their explanations, ask:

- How have you described the position of the sun in the sky to one another? What does that look like in your drawing in the Student Journal?
- What do you mean when you say...?
- Can you use the tops of the trees or houses to help you describe the sun in the sky?
- What did the sky look like when you came to school today? Was the sun in the same position/location? How was it similar? How was it different?
- What have you drawn so far in your Student Journal? Can you tell me more about your drawing?

Repeat the observations of the sky at noon and again in the late afternoon.

**Science Talk**

Return to the classroom for a whole class discussion on their observations of the position of the sun. Ask:

- Who can describe the position and location of the sun in the sky this morning?
- What do you mean when you say \_\_\_\_\_? Would you say the sun was low in the sky or high in the sky? Can you tell me what you mean when you say “low”?
- Does someone have the same idea but a new way to describe it?
- Where was the sun when you came to school this morning? Was the sun in the same spot? How can we find out?
- Was it light outside or dark outside when you came to school today? Did anyone notice today?
- What does that tell you about the position of the sun in the sky?

Record student responses and initial ideas on the What We Think chart. Accept all ideas at this time. Keep the chart available throughout the lessons to have a record of students’ initial ideas and conceptual shifts as the unit progresses.

Take this opportunity to reinforce the students’ understanding of the vocabulary used in their observations. Write the terms *sun*, *morning*, *noon*, and *afternoon* on the board or chart paper. Ask students to define the terms in their own words. Have them write their definitions in the Key Terms section in the Student Journal.

Repeat the outing later in the day and have students record their observations.

1. *Draw a picture of where you saw the sun in the sky at noon. Draw if you saw the moon.*
2. *Draw a picture of where you saw the sun in the sky in the afternoon. Draw if you saw the moon.*
3. *Is the sun higher in the sky at noon or in the afternoon? Write why you think that.*

**Assessment: Formative**

Use the Science Talk and Activity Page to assess the students’ initial ideas about the position of the sun in the sky throughout the day and seasons.

**WRITING****Text Types and Purposes**

**W.1.1:** Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.

**W.1.2:** Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

**Research to Build and Present Knowledge**

**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).

**W.1.8:** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

# PLANNING



**LESSON 1C: KEEPING A RECORD OF THE POSITION OF THE SUN****Teacher Background Information**

Included in this lesson is a reading integration that addresses shadows and how they change throughout the day. In the first-grade unit, *Waves: Light and Sound*, students investigate how shadows are made and the effect of the position of the light source on the size and location of the shadows. If your class has already completed the *Waves: Light and Sound* unit, take this opportunity to review their learning and help them apply what they know to the concept of the different positions of the sun in the sky throughout the day. If students are confident and accurate in their understanding, the shadow investigation does not need to be repeated. If your class has not completed the *Waves: Light and Sound* unit, complete this shadow investigation and review their discoveries and findings when they reach that lesson in *Waves: Light and Sound*.

**Advance Preparation**

This lesson may require the free computer program, Stellarium ([www.stellarium.org](http://www.stellarium.org)), to be installed on a computer. If you do not have a computer in your room, arrange for one (with Stellarium installed) and a projector to use for several weeks.

Choose students to make regular observations of the position of the sun at the determined observation times from the previous lessons.

Make copies of the *Where Is the Sun?* handout and place them in a binder or folder for the daily classroom data collection.

**Procedure**

*Explore the concept.*

Review the observations of the position of the sun from the previous lesson. Review the question students are investigating. Ask student volunteers to share their entries in the Student Journal. Invite students to challenge one another and engage in discourse or argumentation based on their early ideas about the position of the sun in the sky. To facilitate the class discussion and help students to make sense of one another's ideas, ask:

- What do you think about what \_\_\_\_\_ said?
- Do the rest of you agree? Why or why not?
- Does anyone have a different idea?
- Do you understand what \_\_\_\_\_ is saying?
- Can you explain why your idea makes sense?
- Why do you think the position of the sun in the sky changes?

**MATERIALS NEEDED****For each student:**

student pages

**For the class:**

book: *Sun Up, Sun Down: The*

*Story of Day and Night*

book: *Twilight Comes Twice*

handout: *Where Is the Sun?*

outdoor thermometer

**Teacher provides:**

chart paper

markers

globe

**ESS1.B: EARTH AND THE SOLAR SYSTEM**

- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

**TEACHING TIP**

If your class has already completed the unit *Waves: Light and Sound*, review their shadow investigations and what they learned about how shadows are formed. Relate their understandings about shadows to the changing position of the sun in the sky.

# LESSON 1C

## TEACHING TIP

Determine a schedule for regular observations of the position of the sun. If your class goes outdoors for recess on a regular schedule, combine observations with recess time and ask two students each day to make and record observations of the position of the sun before or after recess and then record their findings on the class chart.

## READING

### Key Ideas and Details

**RI.1.1:** Ask and answer questions about key details in a text.

**RI.1.2:** Identify the main topic and retell key details of a text.

**RI.1.3:** Describe the connection between two individual events, ideas, or pieces of information in a text.

### Craft and Structure

**RI.1.4:** Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.

**RI.1.6:** Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.

### Integration of Knowledge and Ideas

**RI.1.7:** Use the illustration and details in a text to describe its key ideas.

**RI.1.8:** Identify the reasons an author gives to support points in a text.

Ask the class for ideas of how they can find out if they will experience the same amount of darkness or sunlight throughout the year. Ask: How can we find out if the sun is in the same position in the sky at the same time one week from now or two weeks from now? Listen for responses that may include keeping a daily record of whether it is dark or light outside when they go to school. Encourage students to think about how they can conduct an investigation. Guide the class in raising a question that can be investigated. Example questions:

- Does the time the sun rises change?
- Will the sun rise earlier in the morning or later in the morning?
- Does the sunrise/sunset always happen at the same time every day?

Write the class question on the board or chart paper.

Ask students for their ideas of how they can conduct an investigation to find out the answer to their question. Listen for ideas that may include looking up or researching the time of the sunrise, making observations over a period of time, and keeping a record of when they observe the sunrise every day or in a regular sequence. Students may also mention watching the weather report that gives the sunrise and sunset times.

Project the *Where Is the Sun?* handout. Discuss the headings on the chart and record the data from the students' initial observations from this lesson. Ask students what they think they might observe tomorrow and one week from today. Determine an observation schedule that meets the needs of your classroom. As a class, make the first entry in the data table for the class investigation.

*Explain the concept and define the terms.*

Ask students to describe the sunrise and tell what they think is happening when the sun peeks over the horizon on the eastern sky.

- Where does the sun go when it is not in the sky?
- When the sun "comes up," where is it coming from?
- When the sun "goes down," where is it going?

Read the book *Sun Up, Sun Down: The Story of Day and Night*. Examples of discussion and text to revisit and discuss during or following the reading:

- Page 7: Discuss the term dawn and ask students what the author means by "It was dawn-time to start another day."

- Ask students to recall the book *Twilight Comes Twice*. Reread the authors' descriptions of sunrise and ask students to tell how they are similar and how they are different in the two books.
- Page 12: What does the author mean by "the sun climbed higher and higher in the sky"? Does the sun really climb?
- Why do you think the air was warmer in the afternoon than in the morning? Do the rest of you agree? Why or why not?
- Pages 14–15: The author talks about shade and shadows. Can someone explain how we get shadows?
- Project the sequence of pictures on page 15. Ask students to explain the different positions of the shadow of the house and why the illustrator changed the position of the sun.
- Review the science behind shadows on page 14.
- Pages 18–19: Have students study the illustration of the earth and the house with the "zzzzzz" and the shadow on one side. Can someone tell the class what this picture is supposed to explain to the reader? What does the shaded part of Earth represent? What does the house with the "zzzzzz" above it mean? Why did the illustrator put arrows in the picture?
- Project the sequence of pictures on page 20 and ask student volunteers to explain what is happening to the sun in the sky in daytime and nighttime.

### Science Talk

Ask the students to sit in a circle and discuss the two readings, *Twilight Comes Twice* and *Sun Up, Sun Down: The Story of Day and Night*. Ask students to compare the books and discuss the similarities and differences. Ask:

- What information did we learn from the first book, *Twilight Comes Twice*?
- What information did we learn from the second book, *Sun Up, Sun Down: The Story of Day and Night*?
- How is the information similar?
- How is the information different?
- Does the information from the books help us to answer any of our questions about the position sun, moon, and stars in the sky throughout the day?

Record some of the students' key ideas on the What We Think chart using words and simple drawings. Add to the What We Did and What We Figured Out columns. Ask if the class has answered any of the questions from previous lessons.

### WRITING

#### Text Types and Purposes

**W.1.2:** Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.

**W.1.3:** Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.

#### Production and Distribution of Writing

**W.1.5:** With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed.

#### Research to Build and Present Knowledge

**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).

**W.1.8:** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

# LESSON 1C

Example t-chart:

Day and Night	
Day	Night
light outside	dark outside
sun in sky	no sun
playing	moon
working	stars
breakfast, lunch, dinner	owls
squirrels gather nuts	raccoon
birds sing	sleeping
school	streetlights
warmer	cooler
	fireflies

## OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- **Read grade-appropriate texts and/or use media to obtain information to determine patterns in and/or evidence about the natural and designed world(s).**
- Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

Encourage students to use the ideas in their responses in the Student Journal. Read the Student Journal prompt as a class.

Listen for ideas that relate to day and night and that Earth rotates. Students may express ideas that relate to half of Earth experiences night while the other half is experiencing day. They may also have ideas that darkness is due to a shadow.

### Pre-Writing Strategy: Think Aloud

Do a “think aloud” with the class to let them hear how you would go about answering the Journal Entry. First, ask the students what they are being asked to write about. Listen for responses that include day and night. Orally go through the thought process:

- What do I know about day and night?
- Make a t-chart and list and draw what you know about day and what you know about night (see example). Invite students to help you with your t-chart.
- I might draw the sun in the sky for my daytime picture and the stars and moon for my nighttime picture.
- I think I will write about what people and animals do in the day.
- I think I will write about the darkness and how quiet it gets at night when everyone is asleep.
- I think I will include how the sun always rises again in the morning.

Divide the students into groups of four. Allow sufficient time for students to discuss their ideas and then complete the Journal Entry. Encourage students to use the What We Think chart as a reference.

### Journal Entry/Respond to Text

*Draw and write a story of day and night. Tell how day always follows night and night always follows day.*

### Assessment

Use the Science Talk, t-chart, and Journal Entry to assess the students’ understanding of observations of daytime and the pattern of day and night.



## ENGINEERING DESIGN PROCESS

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The Engineering Design Process provides students with a series of steps to guide them as they solve problems and design and test products, models, and solutions. The process is cyclical, yet not necessarily in an order. Students are encouraged to evaluate as they progress through the process, revisit the mission often, and revise thinking and their plan multiple times as the process unfolds.

Engineers do not always follow the Engineering Design Process steps in order, one after another. It is very common to design something, test it, find a problem, and then go back to an earlier step to make a modification or change the design. Engineers must always keep in mind the mission or problem they are trying to solve and the limitations (cost, time, material, etc.) that are part of the solution to the problem. Two key elements in working as an engineer are teamwork and design-test-and-redesign.

### **Mission**

- Defines the problem and what the engineers are trying to design or build.
- Describes the limitations within which the engineers must solve the problem.

### **Brainstorm Ideas**

- Imagine, discuss, and sketch possible solutions.
- Conduct research into what has already been done.
- Discover what materials are available, time frame, and other limitations.

### **Plan and Design**

- Draw and write a plan.
- Design your solution through drawing and manipulating materials.
- Develop a plan or steps and a schedule.

### **Build**

- Construct your engineering device or project.
- Follow your plan.
- Adjust and test along the way.

### **Test and Adjust**

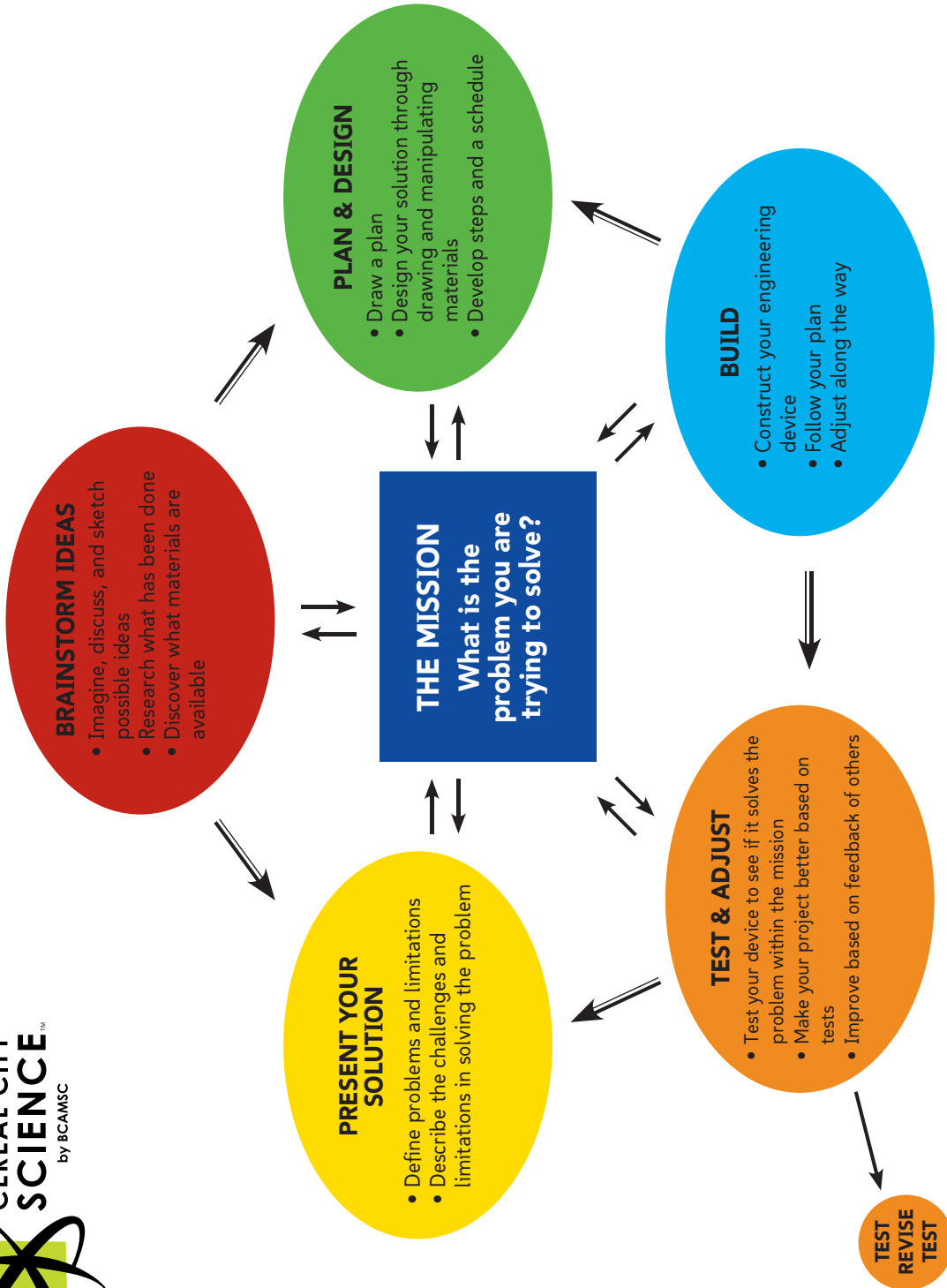
- Test your device to see if it solves the problem within the mission and limitations.
- Make your project better based on tests: Test → Revise → Test.
- Improve based on feedback of others.

### **Present Your Solution**

- Demonstrate how your solution solves the problem.
- Define problems and limitations.
- Describe the challenges and limitations in solving the problem.
- Describe additional revisions that could improve the device or project.

ENGINEERING DESIGN PROCESS

ENGINEERING DESIGN PROCESS



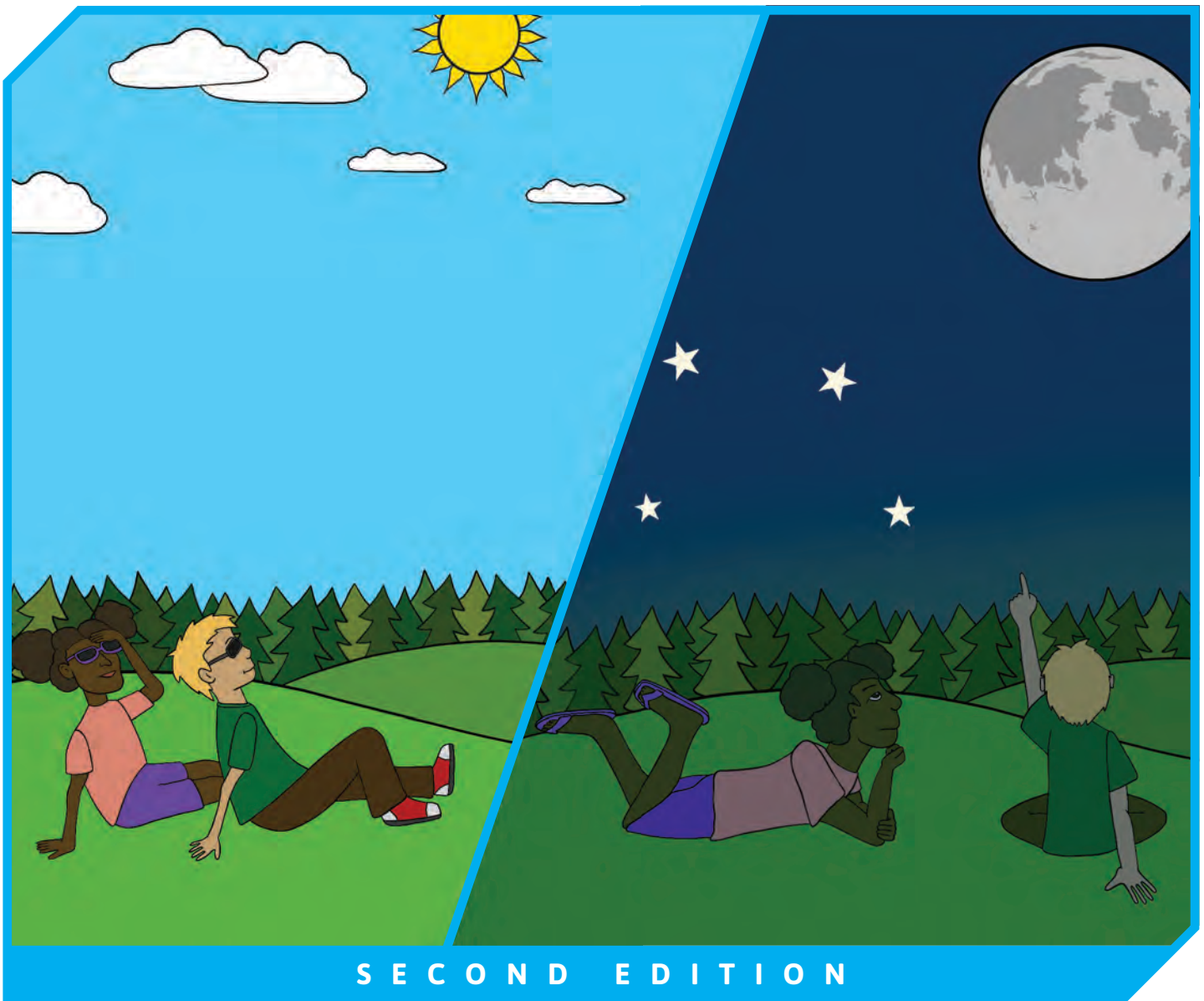
by Battle Creek Area Mathematics and Science Center  
Cereal City Science  
Adopted from the Carnegie Mellon Robotics Academy





# Space Systems: Patterns and Cycles

## 1ENG



**S E C O N D E D I T I O N**

A first grade unit supporting Next Generation Science Standards  
and Michigan Science Standards

Name: \_\_\_\_\_

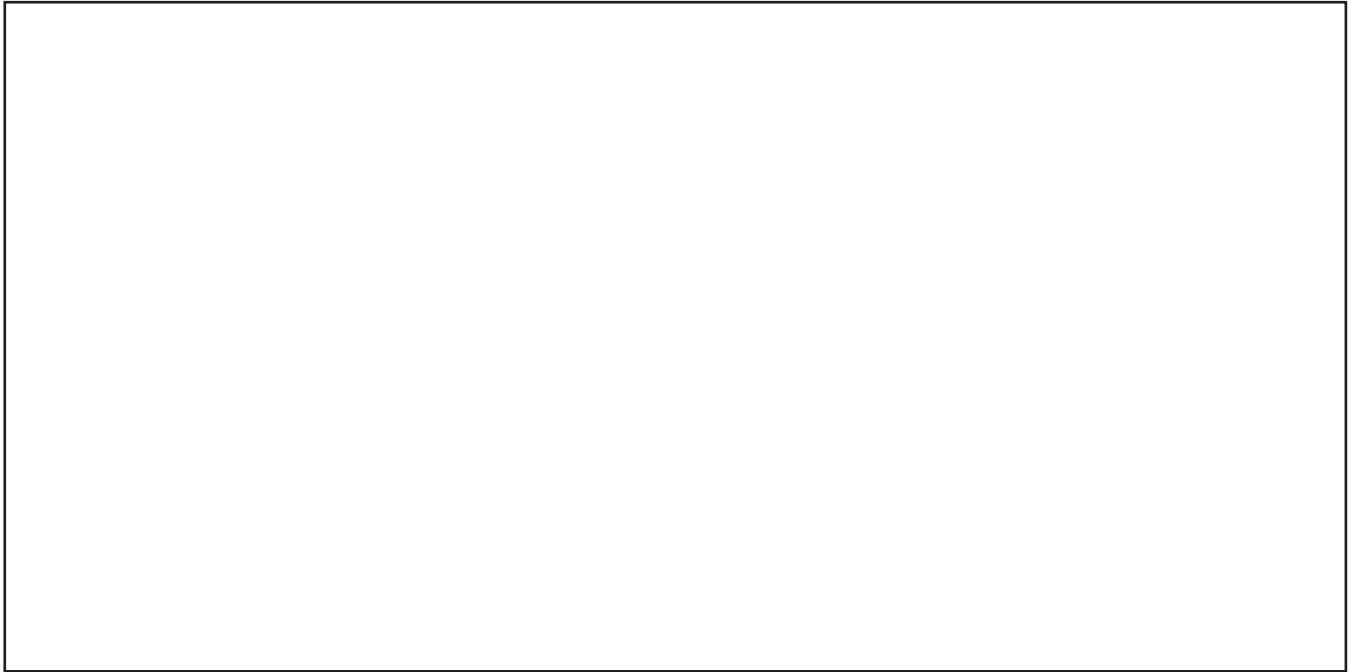


Name \_\_\_\_\_

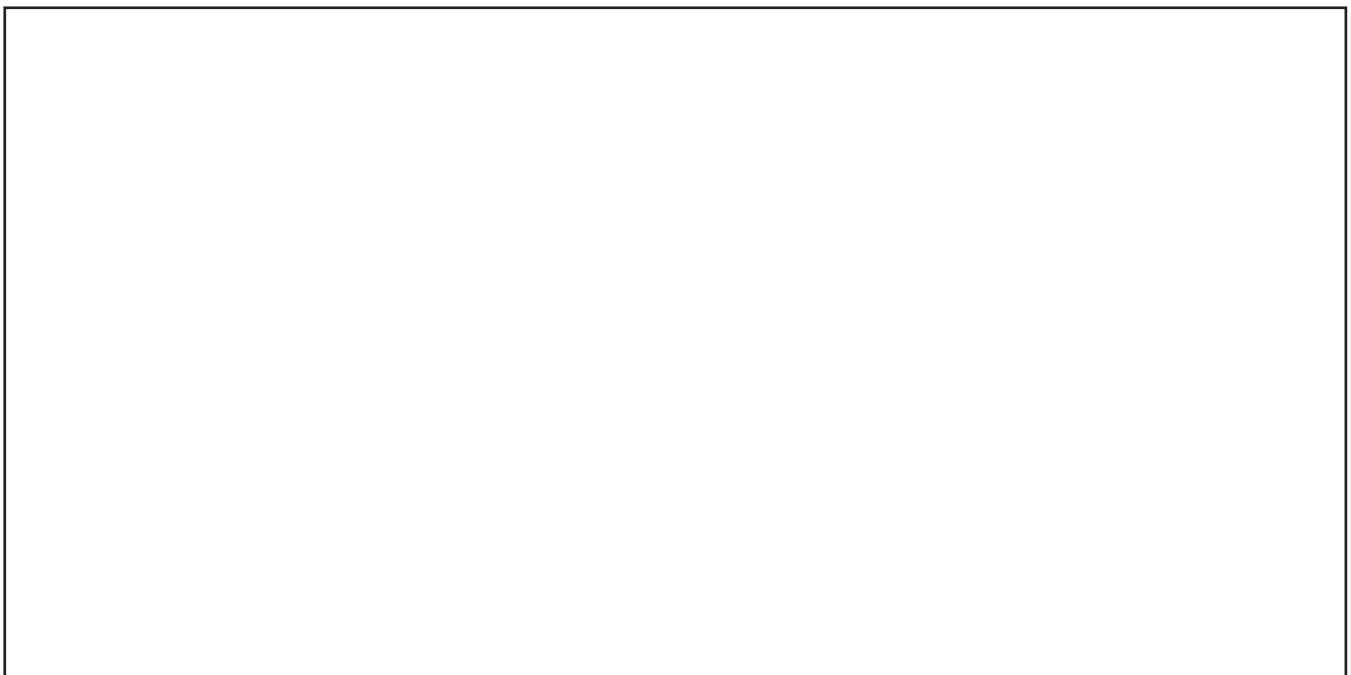
Date \_\_\_\_\_

.....

1. Draw and label a picture of the sky in the day.



2. Draw and label a picture of the sky at night.



# 1B

## A C T I V I T Y

### Sky Watchers: Tracking the Sun

Name \_\_\_\_\_

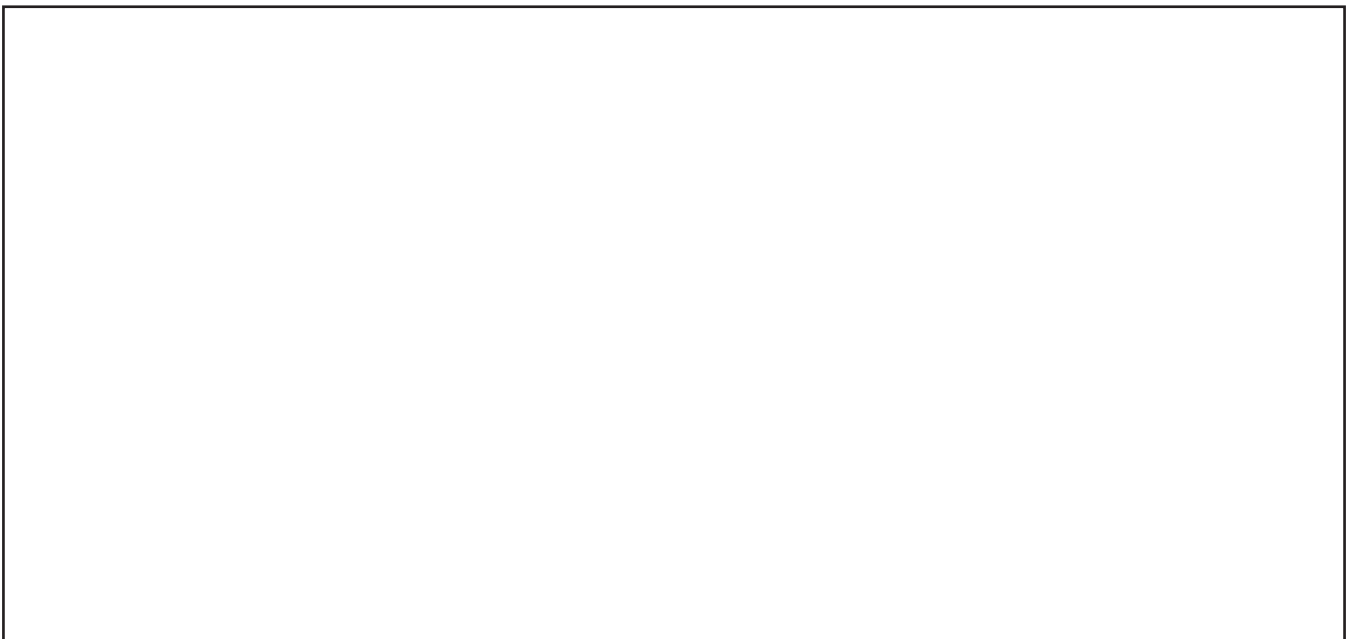
Date \_\_\_\_\_

.....

1. Draw a picture of where you saw the sun in the **morning** sky. Draw if you saw the moon.



2. Predict: Draw a picture of where you think the sun will be at **lunch time**. Do you think you will see the moon? Draw where you think it will be in the sky.



Name \_\_\_\_\_

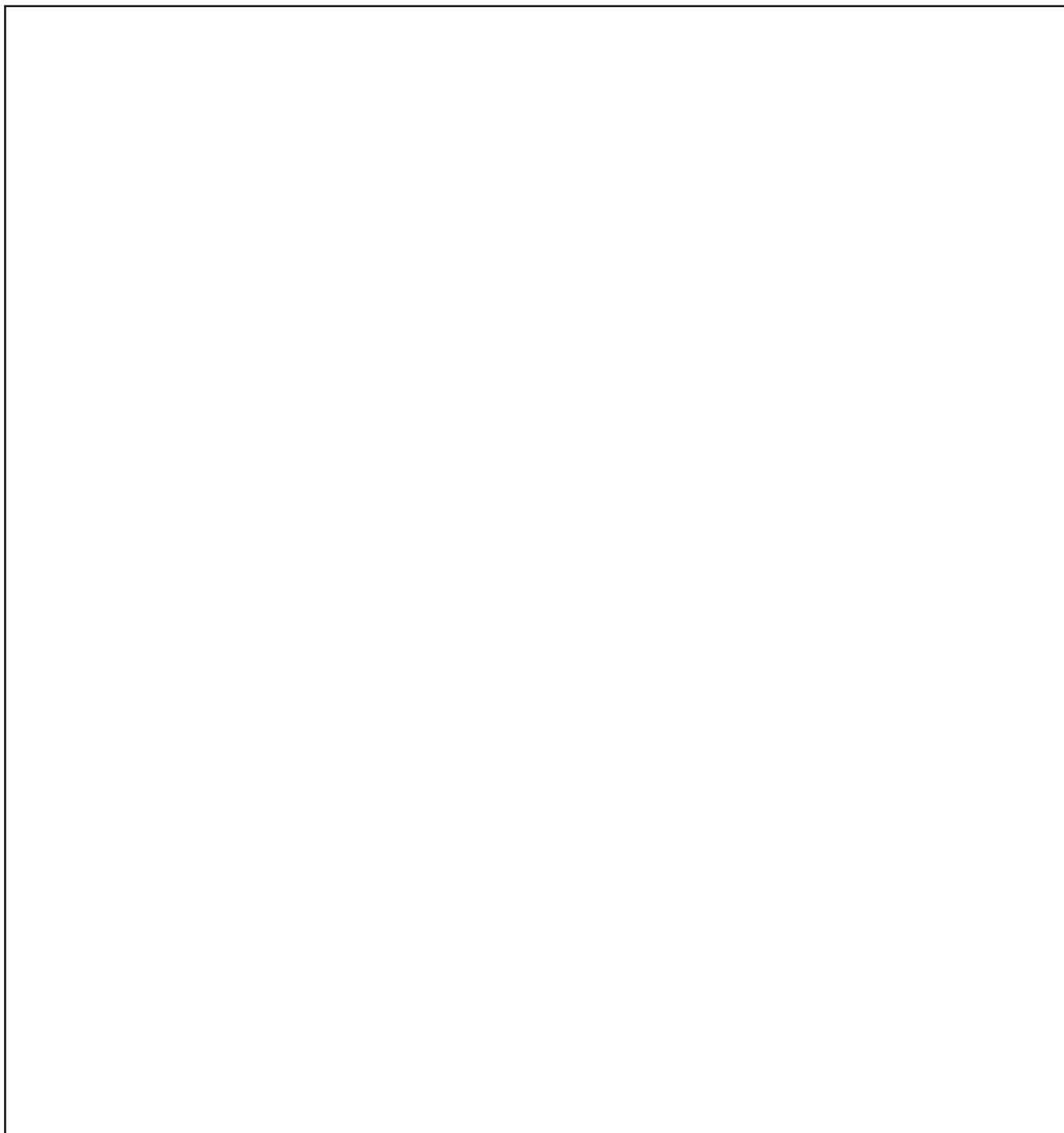
Date \_\_\_\_\_

A C T I V I T Y  
Sky Watchers: Tracking  
the Sun

# 1B

.....

3. Predict: Draw a picture of where you think the sun will be at **dinner time**. Do you think you will see the moon? Draw where you think it will be in the sky.



# 1B

## A C T I V I T Y

### Sky Watchers: Tracking the Sun

Name \_\_\_\_\_

Date \_\_\_\_\_

.....

1. Draw a picture of where you saw the sun in the sky at noon. Draw if you saw the moon.



2. Draw a picture of where you saw the sun in the sky in the afternoon. Draw if you saw the moon.



Name \_\_\_\_\_

Date \_\_\_\_\_

.....

3. Is the sun higher in the sky at noon or in the afternoon?  
Write why you think that.

The sun is higher in the sky at \_\_\_\_\_.

because

# 1C

JOURNAL

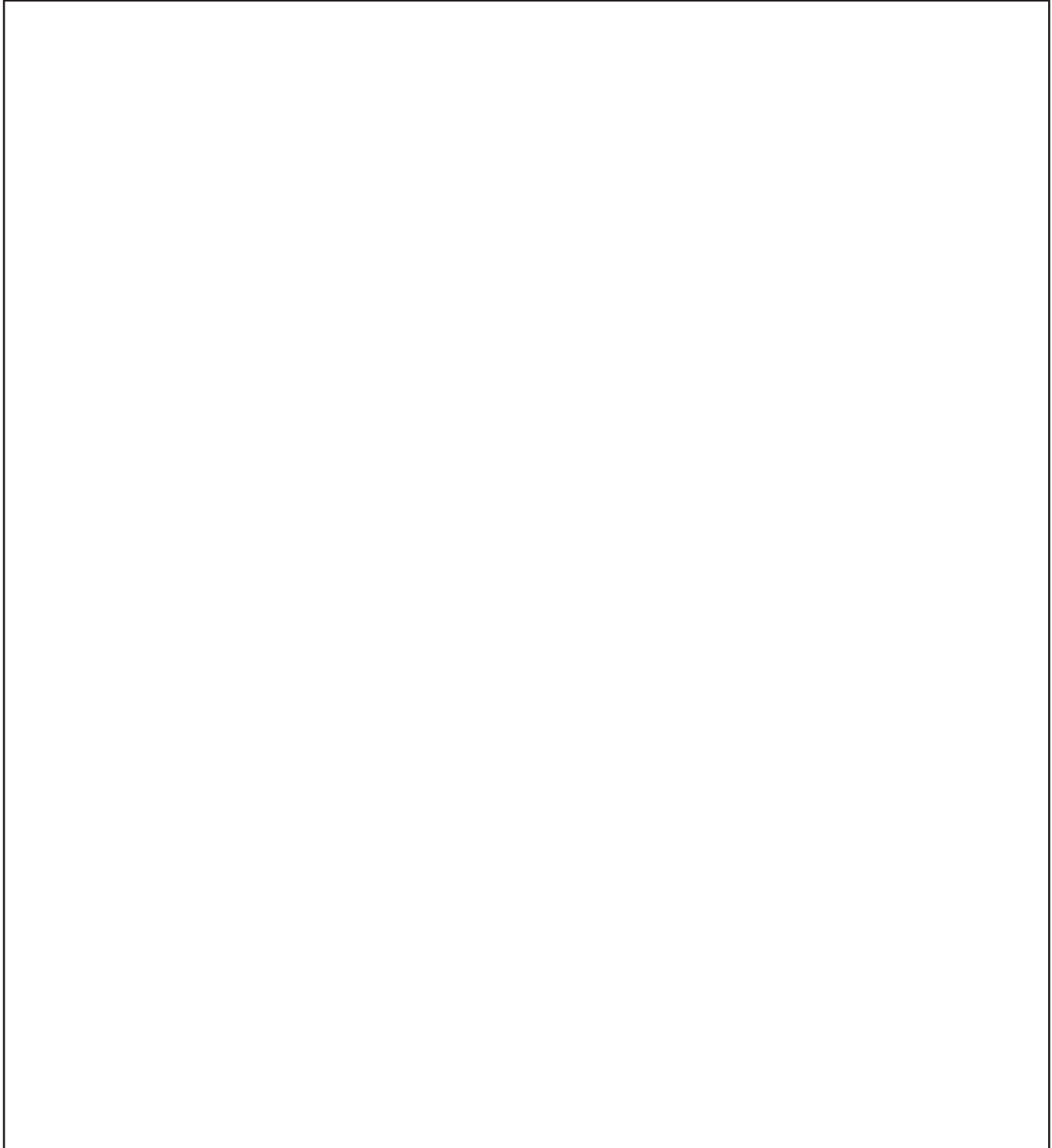
## Keeping a Record of the Position of the Sun

Name \_\_\_\_\_

Date \_\_\_\_\_

.....

Draw and write a story of day and night. Tell how day always follows night and night always follows day.







**K E Y T E R M S**

Name \_\_\_\_\_

Date \_\_\_\_\_

.....

Handwriting practice lines consisting of solid top and bottom lines with a dashed midline, repeated 10 times.