

Mystery Class Seasons Challenge

Tracking Sunlight to Solve a Mystery



Participation Guide 2019-2020

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Mystery Class Seasons Challenge

Tracking Sunlight to Solve a Mystery

Overview

Mystery Class is a global game of hide-and-seek. Students track seasonal changes in sunlight and then investigate other clues to find ten secret sites around the world. The Challenge begins in January.



Photoperiod Clues

What can seasonal changes in sunlight reveal about a location's latitude?

Track day length to estimate latitude.



Time Clues

How does Universal Time reveal clues about a location's longitude?

Investigate time to estimate longitude.



Continent, Country, City Clues

What clues will each Mystery Class reveal about its unique location?

Research clues to pinpoint locations.



Photoperiod Clues

What can seasonal changes in sunlight reveal about a location's latitude?

Track day length to estimate latitude.

January 27 – April 6, 2020

Print 11 data sheets (page 7). On Mondays:

1. Record Sunrise/Sunset Times

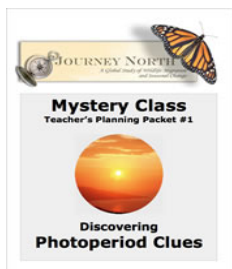
- Record your local sunrise/sunset times on one data sheet.
- Record sunrise/sunset times from each of the ten mystery sites its own data sheet. (Each Monday, sunrise/sunset times will be posted online and in email news updates.)

2. Calculate and Graph Photoperiods

- Calculate photoperiods by counting the number of hours and minutes between sunrise and sunset.
- Record photoperiods on the data sheets. Calculate photoperiods by counting the number of hours and minutes between sunrise and sunset.
- Plot photoperiods on the graph (pages 8-9).

3. Reflect and Analyze

- News updates lead you through the Mystery Class challenge. Use the weekly journal pages to reflect on data.
- Study your Mystery Class graphs to discover how photoperiod reveals latitude.



Teacher's Planning Packet #1

Includes start-to-finish sunrise/sunset data from a prior Mystery Class season and teaching suggestions.

[Discovering Photoperiod Clues](http://bit.ly/1bCO4dq)

<http://bit.ly/1bCO4dq>



Time Clues

How does time reveal clues about a location's longitude?

Investigate Universal Time to estimate longitude.

March 9, 2020

As the spring equinox approaches, each Mystery Class will reveal its time of sunrise on the equinox using Universal Time. To estimate longitude, students will calculate how long the Earth spins between the time of sunrise on the Prime Meridian (in Greenwich, England) and the time of sunrise at each mystery site.

1. Introduce Universal Time

Build understanding about local time, time zones and Universal Time with this introductory lesson:

[Explore Universal Time](http://bit.ly/18kJrCj)

<http://bit.ly/18kJrCj>

2. Estimate Longitude

Use the time clues provided in the March 9th update to estimate the longitude of each Mystery Class.



Teacher's Planning Packet #2

Includes background information, start-to-finish examples, and teaching suggestions.

[Discovering Time Clues](http://bit.ly/15HSZqB)

<http://bit.ly/15HSZqB>



Continent, Country, City Clues

What clues will each Mystery Class reveal about its unique location?

Research clues to pinpoint locations.

March 16 – April 6, 2020

During the final 4 weeks of Mystery Class, the secret sites reveal clues to help students narrow their search from continent to country to city. Facts about history, culture, climate, art, language, customs, and geography lead to specific locations.

1. Sample Continent Clues

"Summer's ending on our continent, and days are getting shorter. In response to daylight changes, we will march to our nesting colonies."

"This mammal is found across the biome that includes our island. Its fur changes color with the seasons, an adaptation for a circumpolar species."

"In our region of the world, lanterns aren't only for festivals; they are also used in the name of this type of cool bug."

2. Sample Country Clues

"In our country, potatoes are one of the main staples of the diet; and Spanish is spoken as an official language."

"Thousands of life-size terracotta figures were discovered in our country, dating back to the third century B.C."

"Our country's biodiversity is a claim to fame because many of our plants and animals are, or were, endemic -- including an elephant now extinct."

3. Sample City Clues

"Unlike a similarly-named city across the pond, no British accents are heard here. This city landmark is named after a Roman god."

"Located on the shore, our city is the largest in the nation. It is also the national capital."

"Our city is on a high plateau, at an elevation of about 4000 feet or 1200 meters. It is among the most populated cities in our country."

Mystery Class Seasons Challenge

Calendar 2019-2020

September, 2019 – January, 2020	Countdown to Mystery Class Before Mystery Class begins on January 27, 2020, use our online resources to get ready. See Teacher’s Planning Packets 1 & 2.
Jan. 27 - Apr. 6	Photoperiod Clues Every Monday for 11 weeks, sunrise/sunset data will be provided from all 10 sites. Use it to calculate photoperiod. Then use photoperiod to estimate the latitude of each site.
Mar. 9	Time Clues As the spring equinox approaches, time clues will be posted on March 9 to help students estimate the longitude of each site.
Mar. 16 - Apr. 6	Continent, Country, City Clues During the final 4 weeks, clues will be provided to help you narrow your search from continent, to country, and then to city. Research to pinpoint locations.
April 13	Mystery Classes Revealed Locations of the 10 Mystery sites are posted.

Mystery Class updates
are posted to the website on
Mondays.

Mystery Class Data Sheet



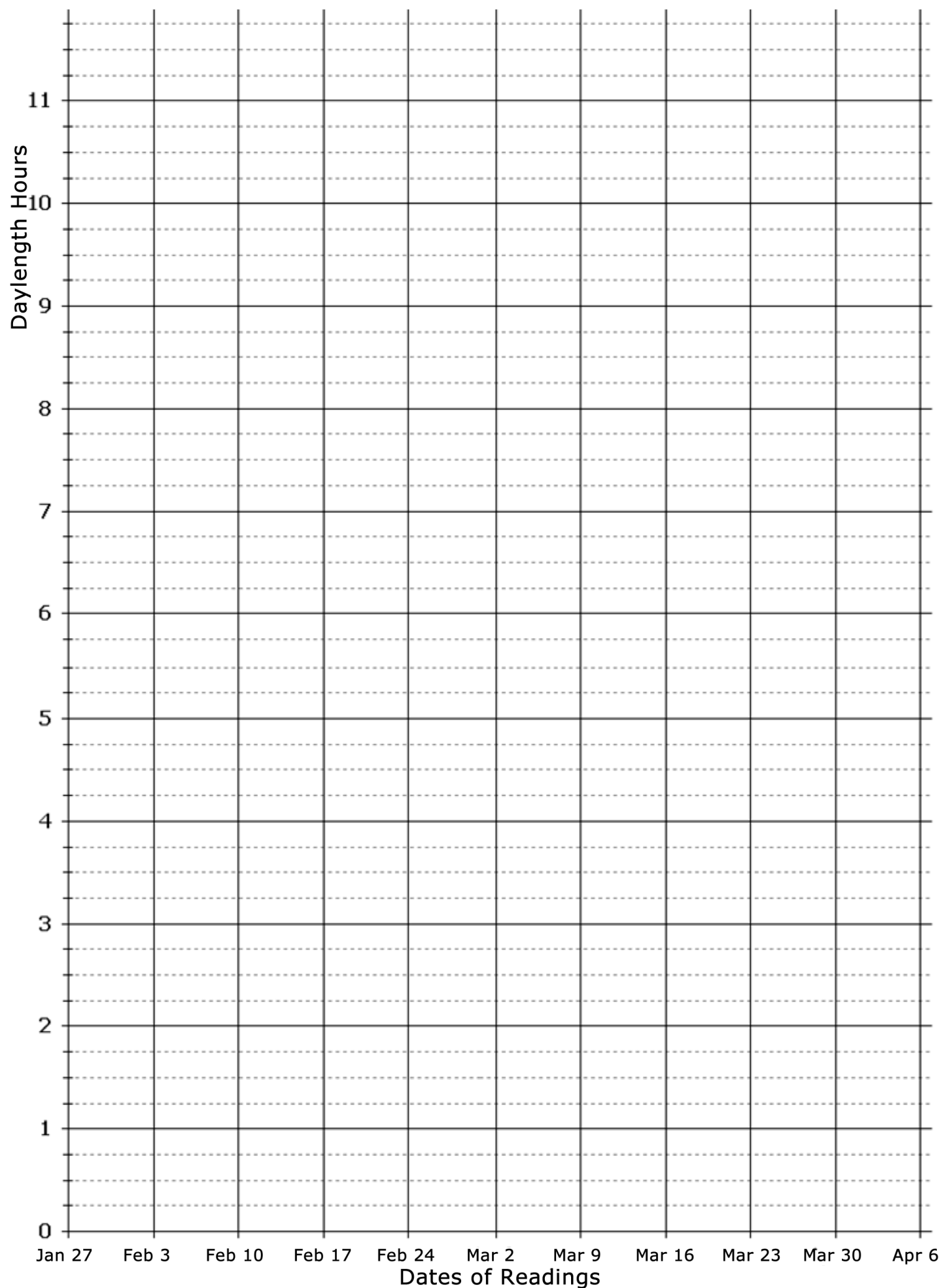
Name(s) _____

Locations _____

(Mystery Class #1, 2,3,4,5,6,7,8,9,10 or Home)

Date	Sunrise Local time	Sunset Local time	Photoperiod
Jan. 27			
Feb. 3			
Feb. 10			
Feb. 17			
Feb. 24			
Mar. 2			
Mar. 9			
Mar. 16			
Mar. 23			
Mar. 30			
Apr. 6			

A blank graph paper template with a grid of 12 columns and 24 rows. The rows are numbered 12 to 24 on the left side. The grid is composed of solid lines for the main structure and dashed lines for finer subdivisions.



Addressing Educational Standards

Mystery Class and Educational Standards

Mystery Class is a content-rich learning experience that aligns with current educational standards in science, mathematics, language arts, geography, and technology. With standards-based instruction, students build content knowledge and essential skills by making scientific observations, recording/analyzing data, making predictions, describing patterns, reading informational texts, and building effective research/media skills.

Content Knowledge

These Mystery Class essential questions reveal the core concepts that students come to KNOW as they observe daily and seasonal cycles to search for ten secret sites around the globe:

- What makes day and night?
- What causes seasons?
- What can seasonal changes in daylight reveal about a location's latitude on Earth?
- How can Universal Time reveal a location's longitude on Earth?

Core Skills

Cornerstone tasks summarize the core skills that students are able to DO by the end of Mystery Class:

- Record and analyze local sunrise and sunset times
- Calculate, graph, and analyze changing photoperiods
- Record, graph, and analyze sunrise/sunset times from locations around the globe
- Use Universal Time to estimate longitude of locations
- Interpret and compare data to make predictions
- Utilize technology and reference materials to research and decipher continent-country-city clues to pinpoint locations.

Next Generation Science Standards (NGSS)

Mystery Class aligns with the new Framework for K-12 Science Education that emphasizes the integration of scientific practices, core ideas, and crosscutting concepts. Each performance expectation incorporates all three dimensions from the Framework—a science or engineering practice, a core disciplinary idea, and a crosscutting concept. Each set of performance expectations lists connections to other ideas within the disciplines of science and engineering, and with Common Core State Standards in Mathematics and English Language Arts.

Scientific and Engineering Practices in the NGSS

The NGSS Framework identifies eight science and engineering practices that mirror the practices of professional scientists and engineers. Use of the practices in the performance expectations is not only intended to strengthen students' skills in these practices but also to develop students' understanding of the nature of science and engineering.

Throughout Mystery Class students are:

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Disciplinary Core Ideas (DCIs)

The NGSS Framework identifies essential ideas in major science disciplines. Mystery Class supports the guiding principles that underlie the structure of the framework which include the natural investigative nature of children; the emphasis on a limited set of core ideas to allow for deeper exploration and understanding; and the recognition that science requires both knowledge and practice. The framework also describes learning where students “build progressively more sophisticated explanations of natural phenomena” rather than focusing only on description in early years and leaving explanation for later grades. In general, the framework and standards stress the importance of giving students experience with authentic scientific practices in the context of important core ideas.

Mystery Class aligns with NGSS Earth and Space Sciences: Students who demonstrate understanding can "use observations of the sun, moon, and stars to describe patterns that can be predicted. They can make observations at different times of the year to relate the amount of daylight to the time of year."

Mystery Class aligns with Earth and Space Sciences DCIs:

1. Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.
2. Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

Concepts are developed over time through the grades:

K-2: Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.

3-5: The Earth's orbit and rotation and the orbit of the moon around the Earth cause observable patterns.

6-8: Solar System models explain and predict eclipses, lunar phases, and seasons.

Crosscutting Concepts

Mystery Class provides multiple opportunities to build concepts that cut across all content areas:

1. Patterns
2. Cause and Effect
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter
6. Structure and Function
7. Stability and Change

Connections with Common Core Standards

A majority of states have adopted Common Core Standards for English Language Arts and Mathematics. Mystery Class provides rigorous and relevant opportunities to build concepts and skills across the curriculum.

Common Core Math Standards are addressed when students "make and use graphs to represent data and solve problems involving measurement and estimation of intervals of time."

Common Core Language Arts Standards emphasize integration of language skills with other topics through the use of a variety of texts, including informational texts.

Common Core Writing Standards are addressed as students "conduct research projects that build knowledge of a topic through investigation," and "recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories."