



OVERVIEW

What Is the Mystery Class Investigation?

The Mystery Class investigation is an 11-week hunt in which students try to find 10 secret “Mystery Classes” hiding around the globe. The changing amount of sunlight at each site is the central clue. Students take an inspiring journey from knowing only the sunrise and sunset times, to discovering the exact locations of the 10 Mystery Classes. This investigation demonstrates that, as spring sweeps across the Northern Hemisphere, day length changes everywhere on earth. Students see that these dramatic seasonal changes in sunlight affect the entire web of life.

About the Workshop

The Journey North Mystery Class investigation engages students on a number of levels. Through this workshop, participants will learn to use the Mystery Class investigation with their students. Participants will take part in a hands-on simulation that models what students do. In addition, discussions of the video provide participants with additional techniques and strategies that they can use in their own classrooms.

Objectives/Outcomes

After going through this workshop, participants will be able to:

- describe the basic elements of the Journey North Mystery Class investigation,
- implement the Mystery Class investigation in their classrooms, and
- discuss the relationship between a location’s photoperiod and the changing of the seasons.

Materials You May Need

For the facilitator:

- VCR and television monitor
- overhead projector, blank transparencies, and markers
- flip chart or large sheets of paper and markers
- computer with Internet connection (optional)

For the participants (handouts are provided as blackline masters within this guide):

- Mystery Class Data Sheet handout (p. 48)
- Mystery Class Graph handout (p. 49)
- Mystery Class Clues handout (p. 50)
- globes, atlases, world almanacs, encyclopedias, various reference sources
- a variety of balls
- flashlights



NOTE: BEFORE GOING THROUGH THIS WORKSHOP, PARTICIPANTS SHOULD HAVE WATCHED VIDEO MODULE ONE—INTRODUCTION TO JOURNEY NORTH.

Key Concepts for the Facilitator

The Mystery Class investigation demonstrates the dramatic changes in sunlight throughout the seasons. Changes in sunlight affect the entire food chain, from plants to animals.

Students measure and graph photoperiods. A photoperiod is the amount of daylight between sunrise and sunset each day. (For example, if sunrise is at 6:00 and sunset is at 19:00, the photoperiod is 13 hours.) This activity lets students observe first-hand how the photoperiod changes around the globe with the advance of spring in the Northern Hemisphere.

Analyzing and interpreting photoperiods helps determine the location of the Mystery Classes relative to the equator.

Interdisciplinary clues provided by Journey North during the last six weeks of the activity promote learning and problem solving.

Classrooms all over the world simultaneously work to correctly identify all 10 secret Mystery Classes and submit their guesses to Journey North.

Challenge Questions provided by Journey North throughout the Mystery Class investigation model the types of questions that scientists ask themselves. Students learn to ask themselves these types of questions. (For more on this topic, see the Challenge Question activity on page 5.)



BEFORE WATCHING THE VIDEO

Before introducing any of the activities, provide an overview of the Mystery Class investigation to participants by reading the information in the “What Is the Mystery Class Investigation?” section at the top of the previous page.

ACTIVITY A – Thinking About Daylight and Seasons

Begin by asking participants this Challenge Question:

CHALLENGE QUESTION:

“Are the days longer or shorter 500 miles north of where we are? Why?”

Model good instructional technique by allowing participants to reflect on the Challenge Question before discussing it as a group or providing the answer.

ANSWER:

The answer changes depending upon the season, and your location. For instance, if you are in the Northern Hemisphere, days will be longer to the north in the spring and summer (any time after the Vernal Equinox and before the Autumnal Equinox.) Days will be shorter to the north in the fall and winter (any time after the Autumnal Equinox and before the Vernal Equinox.) It might help to think of the extreme north, the Arctic, which has little daylight during much of that time period.

Separate participants into small groups. Challenge them to come up with a way of explaining or demonstrating why and how the length of daylight (photoperiod) changes throughout a year. Provide groups with materials that they might use for their demonstration such as flashlights, balls, poster paper, markers, etc. Give groups 10 minutes to complete this task.



When groups are finished, they should share their ideas with the entire group. List a summary of each group’s explanation on an overhead or flip chart. Accept all answers and don’t comment whether they are correct or not.

Discuss the concept of accepting all answers with participants. Ask participants to share their strategies and techniques for dealing with wrong answers in an inquiry setting. You may wish to discuss that teachable moments often come from students’ “wrong” answers.

OPTIONAL ACTIVITY – How Do You Teach the Concept of Seasonal Change?

(This activity may be used with teachers who are fairly new to Journey North.) Lead a discussion about how participants are currently teaching the concepts around the changing of the seasons. Ask participants to share ideas about lessons, activities, teaching strategies, or educational products that they have found to be particularly helpful in teaching seasonal change.

What was most effective in helping students grasp the concepts involved? Why?

Explain that the entire Journey North program provides a wealth of activities and lessons that deal with different aspects of seasonal change. Journey North has been created to be used on its own or to complement other curriculum programs. Explain that the Mystery Class activities are especially effective at helping students develop an understanding of how the length of daylight changes as the seasons change and how this affects the entire web of life.



A Private Universe

Many people share similar misconceptions about why we have seasons. Once a person has a deeply rooted misconception, it is very difficult to dispel it, even in the face of solid evidence to the contrary. The video *A Private Universe* examines students' misconceptions concerning the changing seasons and their other misconceptions of science.

You can find more information about *A Private Universe* on the Internet.

Go to:

Private Universe Project

www.learner.org/catalog/science/pup

WATCHING THE VIDEO

What You'll Be Watching

Video Module Four—Sunlight and the Seasons: Mystery Class (running time approx. 17 min.)

The video follows a number of classrooms around the United States as they engage in the Journey North Mystery Class investigation. Students are challenged to find the exact location of 10 secret Mystery Classes located around the world. Beginning with information about sunrise and sunset times, students begin to plot the photoperiods of the Mystery Classes on a graph. As the spring equinox approaches, students begin to realize that the lines on their graphs are converging. Soon students are able to determine the longitude of each of the Mystery Classes. The Journey North staff supplies additional clues about language, culture, geography, or history of the country or area where each Mystery Class is located.

Excitement builds as students use their problem-solving and inquiry skills to zero in on the various locations. Students use a variety of resources to research the clues that will lead them to identifying the 10 Mystery Classes. Students employ skills they've learned in science, math, geography, and language arts, along with problem-solving and research skills, to identify the 10 locations.

At the end of the 11 weeks, the locations are announced, and students celebrate and reflect on their work. Now the students finally get to meet the students of the secret Mystery Classes, who send photos, introductions, and additional information about their schools and locales.



Shadow Sticks



In advance of the spring Mystery Class investigation, some teachers prepare their students with related activities. Beginning as early as the fall season, they direct students to track the sun's position in the sky and measure the length of days or photoperiods. This builds a foundation of knowledge for students to draw upon as they move through the Mystery Class investigation.

The shadow stick activity shown in the video is available on the Journey North Web site. To find the "Shadow Sticks and the Sun" lessons:

Go to:



the "How to Use Journey North" icon on any page



Select the "Classroom Lessons" icon

select the lessons specifically for "Mystery Class"

select "Shadow Sticks and the Sun"

Suggestions for Watching the Video

Before showing the video, you may want to suggest things for the participants to look for as they watch. This will focus their viewing and help generate discussion afterward. For instance:

- Watch for examples of students synthesizing information.
- Watch for examples of teachers functioning as facilitators for student learning.
- Watch for interdisciplinary aspects of the Mystery Class investigation.
- Watch for different ways students become engaged.

After participants have watched the video, you can discuss some of the things that participants watched for, and you may want to use some of the following questions to generate additional discussion. You will want to pick and choose questions based on your particular audience.

- What questions do you still have about the Mystery Class investigation? (Many of the questions will be answered as the participants work through the Mystery Class Simulation.)
- What classroom management issues came to mind as you watched the video? How would you address them?
- After discussing students' response to a Challenge Question, teacher Dave Kust tells his students that they'll "have to wait and see." How do you think this helps further engage students?
- Do you think there is a need to introduce students to various research skills before they participate in the Mystery Class investigation? Why or why not?
- If you have already done the Mystery Class investigation with students, how do you use the Challenge Questions?
- What was the most interesting thing you saw in the video?
- The Mystery Class investigation unfolds and develops over a period of 11 weeks. What are the advantages of a long-term project over short-term projects? What might be some disadvantages and how would you address them?
- Have you ever team-taught? How would the Mystery Class investigation lend itself to interdisciplinary team teaching?
- How do you help students who are going down a blind alley in their research without giving them the answer?
- Why would you do activities with shadow sticks in the fall and throughout the school year when the Mystery Class investigation takes place in the spring?
- How would you assess student learning during the Mystery Class investigation? What skills would you expect students to demonstrate?

AFTER WATCHING THE VIDEO

ACTIVITY B – Mystery Class Simulation

Explain that participants are going to be involved in a Mystery Class investigation of their own. Explain that they are going to follow the same steps as students follow during their 11-week Mystery Class investigation:

- Calculate photoperiods (length of daylight) for the different sites each week.
- Graph photoperiods from week to week.
- Interpret the changes in photoperiod from week to week.
- Use interdisciplinary clues to narrow the search for the Mystery Class sites.

Calculating Photoperiods

Hand out Mystery Class Data Sheets (p. 48). Separate participants into three groups.

Each group should calculate the photoperiods for a single Mystery Class location and the workshop location. (For the purposes of this activity, Mystery Classes #1, #4, and #9 from the Spring 2000 activity were used.) Groups should record the photoperiods on the data sheet. Do not give groups the photoperiods; let them figure out how to calculate them themselves.

Class #	Sunrise	Sunset	Photoperiod	Longitude
MC #1				
Feb. 7	6:20	19:56	13 hr. 36 min.	
Feb. 14	6:27	19:49	13 hr. 22 min.	58.45 W
Feb. 21	6:33	19:41	13 hr. 8 min.	
MC #4				
Feb. 7	6:24	18:32	12 hr. 8 min.	
Feb. 14	6:25	18:32	12 hr. 7 min.	78.50 W
Feb. 21	6:25	18:32	12 hr. 7 min.	
MC #9				
Feb. 7	8:11	17:46	9 hr. 35 min.	
Feb. 14	7:59	17:59	10 hr.	03.93 E
Feb. 21	7:46	18:11	10 hr. 25 min.	

Graphing Photoperiods

After groups have calculated photoperiods, the data for their Mystery Class location and the workshop location should be graphed on the Mystery Class Graph (p. 49).



A BLACKLINE MASTER FOR THE MYSTERY CLASS DATA SHEET HANDOUT CAN BE FOUND ON PAGE 48.

Available on The Web



Participants will also need the sunrise and sunset times for the city or town where you are holding the workshop. Find the sunrise/sunset times for your location on February 7, 14, and 21.

Go to:



the "How to Use Journey North" icon on any page



Select the "Classroom Lessons" icon

select the lessons specifically for "Mystery Class"

select "Sunrise/Sunset Tables"



A BLACKLINE MASTER FOR THE MYSTERY CLASS GRAPH HANDOUT CAN BE FOUND ON PAGE 49.



SUNLIGHT AND THE SEASONS

Mystery Class

Interpreting Data

Pose the following Challenge Questions to the participants and have them write their answers in their journals.

CHALLENGE QUESTIONS:

1. "What do you know about the locations of the Mystery Classes based on the photoperiod data so far?"
2. "What hemisphere do you think each Mystery Class is in?"
3. "How do their photoperiods compare with each other and with your current location, and what does that tell you?"

ANSWERS:

From the photoperiod data so far, you can tell whether a Mystery Class location is in the Northern or Southern Hemisphere. In addition, comparing the data of one class to another, you can tell if the latitude of one Mystery Class is further north or further south than the other Mystery Class.

Using Interdisciplinary Clues

Provide participants with the Mystery Class Clues handout (p. 50). Remind them that by now students would have some information on latitude and longitude and would be working with other resources such as atlases, etc.

Mystery Class #1

Clue #1: "Hot and humid during summer; winter is mild, but humid. Snowfalls are extremely rare in our hometown."

Clue #2: "The temperate climate of our city is characteristic of the river's coastal plain."

Clue #3: "Two important rivers flow into the estuary on whose shore our city is located."

Clue #4: "If you go approximately 1,000 km to the west from our city, you'll find the highest mountain in our country and continent. If you draw a line from our city southward into the Atlantic Ocean, you will probably come across an archipelago that led to a dreadful armed conflict in 1982."

Clue #5: "Our city is the nation's chief port. Our city has an environmental flavor in our local language. World Soccer Cup 1978's inaugural and final games were played in our city."

Mystery Class #4

Clue #1: "Instead of four seasons of the year, our region has only one, but sometimes it is rainy and sometimes it is dry."

Clue #2: "Our official languages here are Spanish and Quechua. Our country has a population of about 12 million people."

Clue #3: "We have a National Park that was visited by Charles Darwin in 1835. He called it a 'living laboratory of evolution' because one of every four species found here is not found anywhere else in the world."



A BLACKLINE MASTER FOR THE MYSTERY CLASS CLUES HANDOUT CAN BE FOUND ON PAGE 50.

Workshop Tip



If you are holding the workshop in a school, it's ideal if participants can use reference sources from the school's library or media center. Otherwise, you will need to have enough reference sources—atlases, world almanacs, etc.—for the participants to research the clues for the Mystery Class locations. A computer with an Internet connection is also helpful.

Clue #4: “Our city was an important city for the Incas and was taken over by the Spanish conqueror, Francisco Pizarro, in 1532.”

Clue #5: “We are our country’s political center, situated amongst snow-capped volcanoes high in the mountains at around 9,500 ft. There’s a huge volcano that’s very near us. It’s an active volcano and sometimes erupts ashes all over our city. Sometimes we close school because of the volcano.”

Mystery Class #9

Clue #1: “Three languages are spoken here: French, Flemish, and German. It is in the country known as the ‘Capital of Europe.’”

Clue #2: “A few of our national products are chocolates, lace, endive, and beer. The franc is the form of currency.”

Clue #3: “Vincent Van Gogh once lived nearby, painting the miners that lived in the area.”

Clue #4: “Next to the main gate of the city hall is the most famous and mischievous inhabitant, the Guard’s Monkey. Visitors never fail to pet the monkey with their left hand; it’s rumored to bring good luck.”

Clue #5: “It is home to the headquarters of the North Atlantic Treaty Organization (NATO), the Supreme Headquarters of the Allied Powers in Europe.”

Allow groups adequate time to do their research. You may want to have groups share where they think their Mystery Class is located before you give them the correct answers.

Lead a discussion of the simulation experience. What did participants learn that will help them manage the Mystery Class investigation with their students?



Available on the Web



Journey North teacher Cathie Plaehn, who appears in the video, shares her advice for implementing the Mystery Class investigation on the Journey North Web site. Her suggestions are helpful for teachers who are new to Mystery Class and might also provide some tips that are useful to teachers who already use Mystery Class with their students.

Go to:



the “How to Use Journey North” icon on any page



select the “Teacher Tips” icon

select “Mystery Class/Cathie Plaehn’s Advice for Mystery Class”

Mystery Class Locations



After completing the Mystery Class simulation, participants may want to visit the actual Mystery Class sites that are shown in the video.

Go to:

www.learner.org/jnorth/spring2000/species/mclass/Update051200.html

Mystery Class #1 - Buenos Aires, Argentina (34.60 S/58.45 W)

Mystery Class #4 - Quito, Ecuador (00.21 S/78.50 W)

Mystery Class #9 - Mons, Belgium (50.45 N/03.93 E)



SUNLIGHT AND THE SEASONS

Mystery Class

ACTIVITY C – Seeing the Light: What Really Shapes the Web of Life?

Journey North is a study of global ecological systems. Sunlight plays a paramount role in all living things. From plants to animals, changes in the availability of sunlight impact the entire web of life. This “webbing” activity is an effective means to refocus and bring participants back to this central concept of all the Journey North investigations.

Separate the participants into small groups. Have them discuss these questions:

- What effect does the sun have on plant growth?
- What effect does the sun have on animal migrations?
- What effect does seasonal change have on the food chain?
- What is the base of the food chain?

Provide each group with a large sheet of paper or posterboard and have them create a web to illustrate the ideas that came up in their discussion. After groups have had time to complete the task, have each group present their web.

As groups present their webs, create a master web that incorporates all groups’ ideas. Point out that the sun is at the base of the food chain, and seasonal changes in sunlight (photoperiods) affect everything in the system, from plants to animals. When studying migration and the return of spring to the Northern Hemisphere, students watch the rebuilding of the food chain and the resulting appearance of plants and animals—at the moment that their habitat is ready.

Close the activity by discussing how a webbing exercise like this one can help tie together and reinforce the concept of seasonal change that students learn during the Mystery Class investigation. The student activity “Seeing the Light” can be found on the Journey North Web site.

Available on the Web



Find the “Seeing the Light” lesson on the Journey North Web site.

Go to:



the “How to Use Journey North” icon on any page



select the “Classroom Lessons” icon

select the lessons specifically for “Mystery Class”

select “Seeing the Light: Recognizing the Sun’s Role in Living Systems”

WRAPPING UP

Learning Log

Provide time for participants to write for a few minutes about what they learned in the workshop and how they plan to apply it in their classrooms. If time allows, participants may wish to share their logs with the group.

KWL

Refer back to the master KWL chart that was created in the Introduction workshop. Fill in information and add to the chart as appropriate.



MYSTERY CLASS DATA SHEET



MYSTERY CLASS #1

Longitude: 58.45 W

Date	Sunrise	Sunset	Photoperiod
Feb. 7	6:20	19:56	
Feb. 14	6:27	19:49	
Feb. 21	6:33	19:41	

MYSTERY CLASS #4

Longitude: 78.50 W

Date	Sunrise	Sunset	Photoperiod
Feb. 7	6:24	18:32	
Feb. 14	6:25	18:32	
Feb. 21	6:25	18:32	

MYSTERY CLASS #9

Longitude: 03.93 E

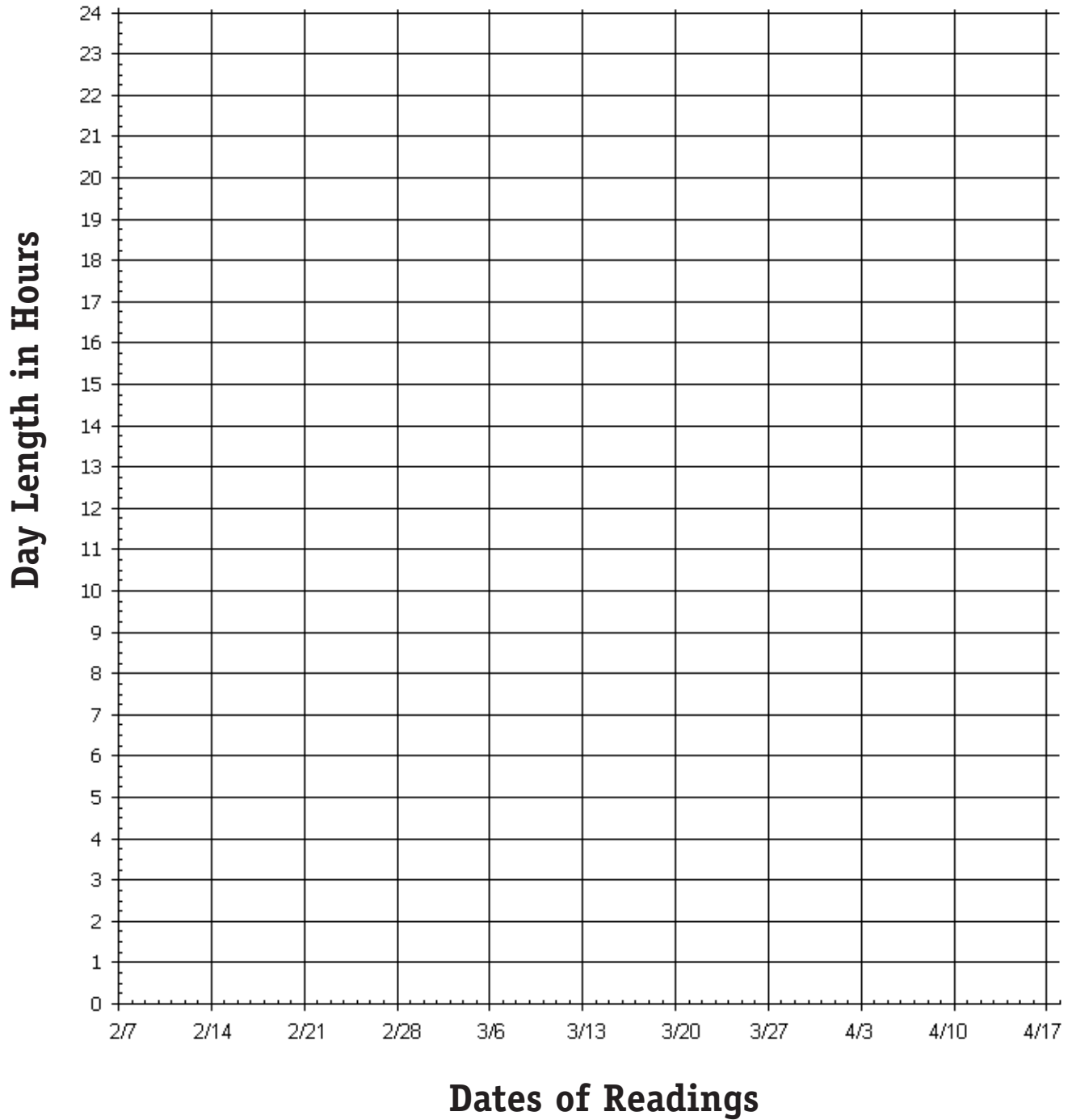
Date	Sunrise	Sunset	Photoperiod
Feb. 7	8:11	17:46	
Feb. 14	7:59	17:59	
Feb. 21	7:46	18:11	

WORKSHOP LOCATION

Longitude: _____

Date	Sunrise	Sunset	Photoperiod
Feb. 7			
Feb. 14			
Feb. 21			

MYSTERY CLASS GRAPH



MYSTERY CLASS CLUES



MYSTERY CLASS #1

Clue #1: “Hot and humid during summer; winter is mild, but humid. Snowfalls are extremely rare in our hometown.”

Clue #2: “The temperate climate of our city is characteristic of the river’s coastal plain.”

Clue #3: “Two important rivers flow into the estuary on whose shore our city is located.”

Clue #4: “If you go approximately 1,000 km to the west from our city, you’ll find the highest mountain in our country and continent. If you draw a line from our city southward into the Atlantic Ocean, you will probably come across an archipelago that led to a dreadful armed conflict in 1982.”

Clue #5: “Our city is the nation’s chief port. Our city has an environmental flavor in our local language. World Soccer Cup 1978’s inaugural and final games were played in our city.”

MYSTERY CLASS #4

Clue #1: “Instead of four seasons of the year, our region has only one, but sometimes it is rainy and sometimes it is dry.”

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Clue #3: “We have a National Park that was visited by Charles Darwin in 1835. He called it a ‘living laboratory of evolution’ because one of every four species found here is not found anywhere else in the world.”

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Clue #3: “Vincent Van Gogh once lived nearby, painting the miners that lived in the area.”

Clue #4: “Next to the main gate of the city hall is the most famous and mischievous inhabitant, the Guard’s Monkey. Visitors never fail to pet the monkey with their left hand; it’s rumored to bring good luck.”

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