Seasons

To solve problems, scientists ask scientific questions. They determine the best methods to answer the question, collect the data, and analyze it to draw evidence-based conclusions that answer the question. You will be practicing these steps in the **process of science** in this lab.

Learning objectives:

- Students will be able to use data to explain changes resulting from seasons and their cause.
- Students will be able to apply and analyze steps in the **process of science** (scientific literacy).
- Students will be able to **read graphs** (quantitative literacy).
- Students will be able to distinguish between **causation and correlation relationships** (scientific literacy).

Materials needed:

- Access to Time and Date (www.timeanddate.com)

Spring flowers blooming in the winter snow. (source J_Blueberry on pixabay.com)

Part 1: Navigating Time and Date

Go to Time and Date. When you first access this website, it automatically detects your location, and time zone. You can change your location by finding the "Current Time" section near the top left and clicking "Set home location."

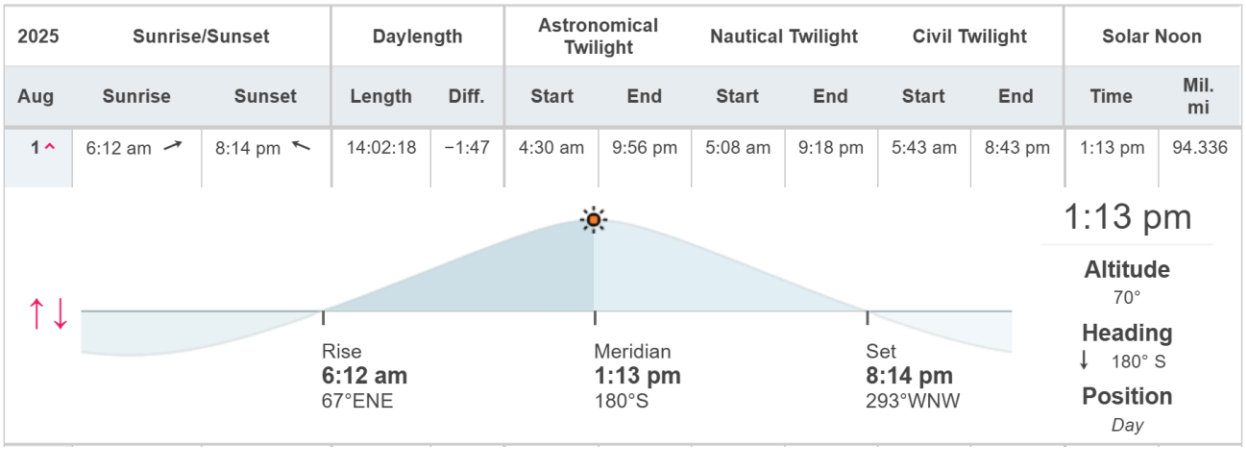
Set home location ›

In the black bar across the top, click on "Sun, Moon & Space," and choose "Sun Calculator." You may need to click on the three lines on the left to open the side bar.

This brings you to the "Sunrise and Sunset Calculator — City Lookup" page. At the top, you will be asked to input your city or choose a location from a map. Choose a city close to your school.

Scroll down the page, looking carefully at the different headings, thinking about what each one means.

Find the large table for the current month. Click on one of the dates to see the diagram regarding the Sun's location in the sky (see the example below). To see how measurements, such as the Sun's altitude (height of the Sun above the horizon) change over the course of one day, click and drag the little orange Sun icon to the left and right.



2025	Sunrise/Sunset		Daylength		Astronomical Twilight		Nautical Twilight		Civil Twilight		Solar Noon	
Aug	Sunrise	Sunset	Length	Diff.	Start	End	Start	End	Start	End	Time	Mil. mi
1	6:12 am	8:14 pm	14:02:18	−1:47	4:30 am	9:56 pm	5:08 am	9:18 pm	5:43 am	8:43 pm	1:13 pm	94.336

1. Match the information you want to learn with where in the table and diagram you would find it.

Number of daylight hours •
Time of sunrise and sunset •
How high the Sun is above the horizon •

- Look at the Sunrise/Sunset column
- Look at the Daylength column
- Move the Sun icon to the time in question, and look at the Altitude

Part 2: Collecting data about the changing length of day

How does the length of the daylight hours change over the course of a year?

Consider the scientific question above about the changing length of day. Using Time and Date, you will collect data to answer this question. The methods to collect data have been figured out for you, but you will need to collect the data and analyze it to use as evidence to critically think about the conclusion proposed below.

In Data Table 1 below, the headers and months are filled in, but the date for the month is not. Pick a date and fill it in for each month (e.g. 15th of each month).

2. What part of the **process of science** did you do, when you identified the date you wanted to fill in for the table?

- ○ Ask a scientific question
- ○ Determine the methods to use
- ○ Make observations and collect data
- ○ Analyze data and develop conclusions
- ○ Share results and conclusions

Use the Time and Date website to next fill in the corresponding length of daylight hours (hours and minutes, ignore seconds) for each date in Data Table 1.

Data Table 1

Date (Month, Day)	Length of Daylight hours	Date (Month, Day)	Length of Daylight hours
January _____	_____ : _____	July _____	_____ : _____
February _____	_____ : _____	August _____	_____ : _____
March _____	_____ : _____	September _____	_____ : _____
April _____	_____ : _____	October _____	_____ : _____
May _____	_____ : _____	November _____	_____ : _____
June _____	_____ : _____	December _____	_____ : _____

3. Why was Data Table 1 designed the way it was? Fill in the blanks using the following words: year, month, date, length of daylight hours.

It has the headers of _____ and _____ because the scientific question asks about change over a _____. Each row is a different _____ to keep the data collection manageable but still measure an entire year.

4. What are two months that have similar lengths of daylight hours?

- ○ February and March
- ○ June and July
- ○ September and October
- ○ April and June
- ○ May and November
- ○ January and July

5. Based on your data, during what two seasons do the daylight hours change the most?

- ○ Winter (December/January) and Spring (March/April)
- ○ Summer (June/July) and Fall (September/October)
- ○ Winter (December/January) and Summer (June/July)
- ○ Spring (March/April) and Fall (September/October)

A fellow student proposes the following conclusion statement: "**The length of daylight hours changes by about one hour each month, with the days getting longer throughout the spring and getting shorter throughout the fall**."

6. Based on the data you collected in Data Table 1, do you agree or disagree with that conclusion statement?

- ○ I agree because the statement IS supported by the data I collected
- ○ I disagree because the statement is NOT supported by the data I collected

7. What part of the **process of science** did you do, when you agreed or disagreed with the statement?

- ○ Ask a scientific question
- ○ Determine the methods to use
- ○ Make observations and collect data
- ○ Analyze data and develop conclusions
- ○ Share results and conclusions

8. More specifically, which part of the statement is NOT supported by your data?

- ○ The length of daylight hours changes by about one hour each month
- ○ Getting longer throughout the spring
- ○ Getting shorter throughout the fall
- ○ Getting longer throughout the spring AND Getting shorter throughout the fall
- ○ None of the statement is supported. It's all inaccurate.
- ○ All of the statement is supported. It's all accurate.

9. What would help fix the statement?

- ○ The length of daylight hours changes about 30 minutes per month.
- ○ The length of daylight hours changes most in the spring and fall and least in the summer and winter.
- ○ The length of daylight hours changes most in the summer and winter and least in the spring and fall.
- ○ The length of daylight hours gets shorter in the spring and longer in the fall.

Scientists distinguish between **causation versus correlation** relationships. Causation is where changing one thing directly produces a change in the other. In comparison, a correlation is where two things change together, but one does not necessarily cause the other or make the other happen. To tell if a relationship is causation or correlation, you need to understand process that links the two things and what is making the changes happen.

10. All of these are examples of correlation, and three also show causation. Which one describes **only correlation and not causation**?

- ○ Colder temperatures are related to lakes freezing.
- ○ Colder temperatures are related to an increase in holiday shopping.
- ○ Colder temperatures are related to an increase in the use of heaters.
- ○ Colder temperatures are related to less sunlight.

11. Why did you select the answer about correlation in the previous question about **causation versus correlation**?

- ○ Because the cold air does NOT freeze the water.
- ○ Because the cold air does NOT cause people to shop.
- ○ Because the cold air does NOT cause people to be cold.
- ○ Because the Sun does NOT heat Earth's surface.

12. How do your data illustrate the **causation versus correlation** relationship between the daylight hours and the temperature of the season?

- ○ There is a causation relationship: More daylight hours cause warmer weather in the summer, and fewer daylight hours cause colder weather because the Sun causes Earth's surface to warm.
- ○ There is a causation relationship: Warmer weather in the summer causes more daylight hours, and colder weather causes fewer daylight hours because Earth's temperature causes more daylight hours.
- ○ There is a correlation relationship: The amount of daylight hours correlates with the temperature of the season but one does not cause the other.

Part 3: Analyzing data about temperatures in opposite hemispheres

Some people think that the seasons are caused because Earth is closer to the Sun in the summer and farther from the Sun in the winter. In Part 3, we will learn that it is NOT a causation relationship.

13. Make a prediction: **IF** the seasons are caused by the distance between Earth and Sun, then how would the temperature of the Northern and Southern Hemispheres compare when Earth is closer to the Sun?

- ○ We would expect cold temperatures in the Northern Hemisphere and warm temperatures in the Southern Hemisphere at the same time.
- ○ We would expect warm temperatures in the Northern Hemisphere and cold temperatures in the Southern Hemisphere at the same time.
- ○ We would expect the Northern and Southern Hemisphere temperatures to both be warm.
- ○ We would expect the Northern and Southern Hemisphere temperatures to both be cold.

14. Make a prediction: **IF** the seasons are caused by the distance between Earth and Sun, then which of these statements describes the expected **causation versus correlation** relationship between temperatures in the Northern and Southern Hemispheres?

- ○ There would be a causation relationship: Warmer temperatures in the Northern Hemisphere would cause warmer temperatures in the Southern Hemisphere.
- ○ There would be a causation relationship: Warmer temperatures in the Southern Hemisphere would cause warmer temperatures in the Northern Hemisphere.
- ○ There would be a correlational relationship: The temperature in the Northern Hemisphere correlates with the temperature in the Southern Hemisphere, but one does not cause the other.

To examine whether seasons are caused by the distance between Earth and Sun, we ask the following scientific question:

> ❓ **How do the high temperatures in the Northern Hemisphere compare to the high temperatures in the Southern Hemisphere over the course of a year?**

A student examined the scientific question above about the temperatures in the Northern and Southern Hemisphere over a year. The student decided the best method to answer this question was to use the Time and Date website, in the "Weather" tab, looking at "Climate (Averages)". They chose the cities of Chicago in the Northern Hemisphere and Santiago in the Southern Hemisphere. They collected the following data in Data Table 2. What conclusions can you make from the data?

Data Table 2

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chicago, Illinois	33°	36°	47°	59°	71°	81°	85°	83°	76°	63°	49°	38°
Santiago, Chile	88°	87°	84°	77°	68°	62°	62°	65°	69°	75°	81°	85°

15. Select **two** evidence-based conclusions that both are valid ways to answer the scientific question above regarding the temperature in the Northern and Southern Hemisphere over the course of a year.

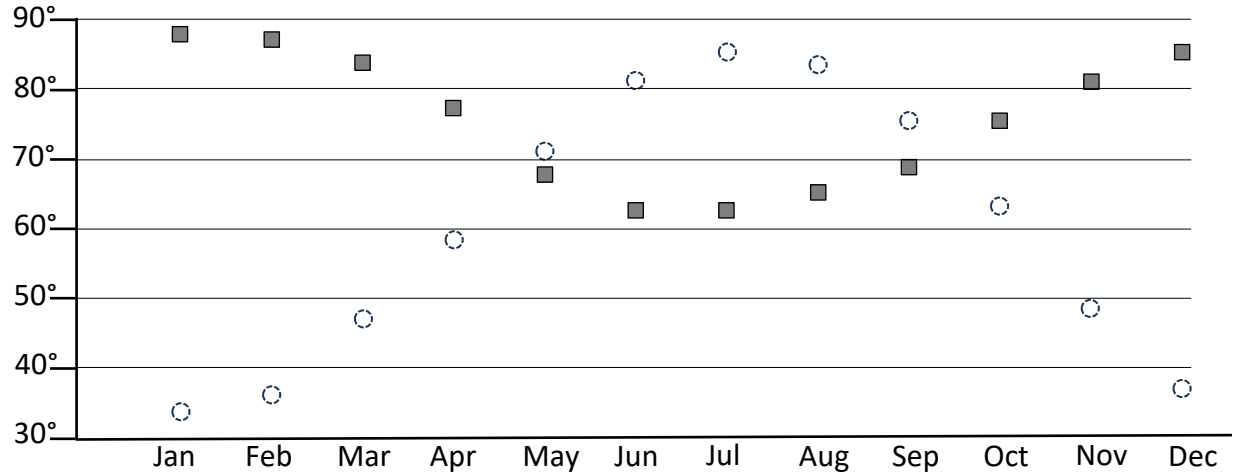
- ☐ The temperatures in Chicago are colder at any given time of year compared to Santiago.
- ☐ As the temperatures in Chicago increase, the temperatures in Santiago decrease, and as the temperatures in Chicago decrease, the temperatures in Santiago increase.
- ☐ The temperatures in Santiago are generally cooler than the temperatures in Chicago.
- ☐ The highest temperatures in Chicago are at the same time as the coldest temperatures in Santiago, and the opposite is also true.
- ☐ Both Chile and Chicago are affected by the direction of the wind, giving them rainy summers and windy winters.

16. What numerical evidence did you use to draw your conclusion for answering the question regarding the temperature in the Northern and Southern Hemisphere over the course of a year?

- ○ I looked across the Chicago row and took the average temperature for all 12 months and found that it was 60°, with a maximum of 85° and a minimum of 22°. For Santiago, it averaged 75°, with a maximum of 88° and a minimum of 62°.
- ○ I looked across the Chicago row, and the coldest temperature was in January at 33° with the warmest temperature in July at 85°. For the Santiago row, the warmest temperature was in January at 88° with the coldest temperatures in June and July at 62°.
- ○ I looked down the month columns and averaged the two temperatures in each month. I found that the average is lowest in January at 61°. The average rises to a high of 74° in August, and it falls to 62° in December.
- ○ I looked down the month columns and circled the highest temperature in each row for each month. I circled 7 months for Santiago compared to 5 for Chicago.

Scientists use graphs to interpret data because they turn numbers into visual patterns that are easier to understand. They help communicate data by showing trends and patterns and making comparison easier. To **read a graph**, start by examining the labels to understand what the axes represent. Then look at the data points to identify trends, patterns, or comparisons.

The student decided that it would be helpful to interpret the data by graphing it, but the student forgot to label the graph. Reread the question, examine Data Table 1, and write in the labels for the left and bottom axis of the graph. Then, identify the symbol used to depict the data for Chicago and for Santiago.



17. When you **read the graph**, what are the appropriate labels for the axes?

- ○ The left axis is "month," and the bottom axis is "temperature"
- ○ The left axis is "month," and the bottom axis is "city"
- ○ The left axis is "temperature," and the bottom axis is "month"
- ○ The left axis is "temperature," and the bottom axis is "city"
- ○ The left axis is "city," and the bottom axis is "temperature"
- ○ The left axis is "city," and the bottom axis is "month"

18. When you **read the graph**, which shape represents the temperatures of a city in the Northern Hemisphere?

- ○ Grey squares
- ○ White circles
- ○ There is not enough information to answer this question.

19. When you **read the graph**, you can make observations about the trends, patterns or comparisons of the data. All of the statements below are correct observations of the data except one. Which one is NOT a correct observation?

- ○ Each city's high temperatures and low temperatures are approximately six months apart.
- ○ The time of high temperatures in one city is the time of low temperatures in the other city.
- ○ The temperatures of the two cities show opposite patterns.
- ○ The highest temperatures are about the same for the two cities.
- ○ The lowest temperatures are about the same for the two cities.

20. Do the temperatures in the two cities have a **causation or correlation** relationship?

- ○ There is a causation relationship: Warm temperatures in the Northern Hemisphere cause cold temperatures in the Southern Hemisphere.
- ○ There is a causation relationship: Warm temperatures in the Southern Hemisphere cause cold temperatures in the Northern Hemisphere.
- ○ There is a correlation relationship: Warm temperatures in the Northern Hemisphere correlate with cold temperatures in the Southern Hemisphere, but one does not cause the other.

Re-examine your predictions regarding temperatures if seasons are caused by Earth's distance from the Sun in the questions at the beginning of Part 3.

21. How do the data in the graph show that the seasons are NOT caused by Earth's distance from the Sun?

- ○ The temperatures for the Northern and Southern hemispheres show opposite patterns, but the distance from the Sun would result in identical patterns, so the distance cannot cause seasons.
- ○ The data are all positive temperatures, which means they are all above freezing, so the distance from the Sun cannot cause winter temperatures.
- ○ The lowest temperature for Santiago is warmer than the lowest temperature for Chicago, which means that seasons cause the direction of the wind, so the distance cannot cause seasons.
- ○ The graph shows that warm temperatures always follow cold temperatures. Therefore, winter season temperatures must cause summer season temperatures, and the distance cannot cause them.

Part 4: Planning methods to answer a scientific question about the Sun's height and seasonal temperatures

How does the average high temperature in Springfield compare to the Sun's height above the horizon at noon over the course of a year?

The methods section of a scientific study gives the specific step-by-step strategy used to collect data to answer a scientific question. You are asked the above scientific question about temperatures and Sun's altitude (height above the horizon) in Springfield. What methods would you use to collect data to answer the scientific question? You are just figuring out a plan, and you will not collect the data.
Here are the steps (out of order) to answer the scientific question. Put the steps in order (Step 1, Step 2, etc.). One step will not be used.

- Record the high temperature each month. Also record the Sun's altitude when it is noon for each month.
- Create a table to record the data, with 12 rows and the columns labeled "Month", "Average high temperature", and "Sun's altitude (height above the horizon)."

- Determine which data you should collect to answer the question. In this case, collect data on the 15th of each month for each of the 12 months of the year.
- Go to the Time and Date website for Springfield. Find the data for average high temperature and Sun's altitude for each month, starting with January 15th.
- Plot the data points in a graph with the horizontal axis as the time of day and the vertical axis as the month of the year.

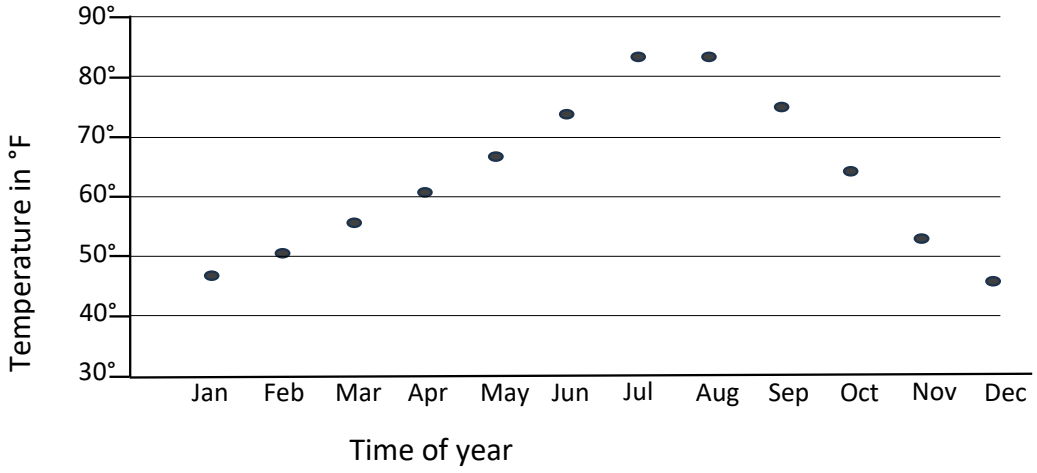
22. What is Step 1?

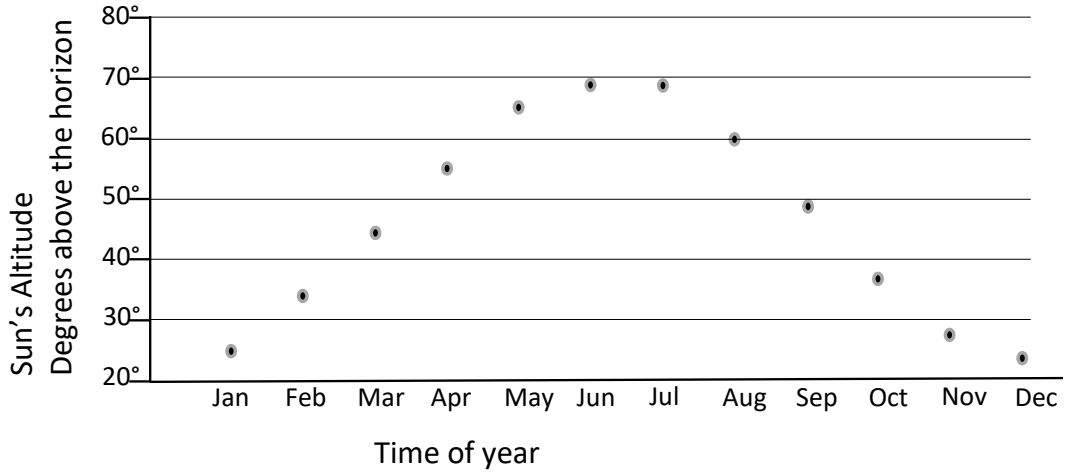
23. What is Step 2?

24. What is Step 3?

25. What is Step 4?

A fellow student collects the data using the methods you planned above and then creates two graphs with the data they recorded in their tables.





26. **Read the graphs**. Why are the data shown in two graphs instead of one?

- ○ The "Time" axis is drawn differently.
- ○ They represent different locations.
- ○ They represent different periods of time.
- ○ They have different units on the left axis.

27. What is a conclusion statement to the scientific question about the temperature and the Sun's height above the horizon that you can make based on the graphs?

- ○ The high temperature matches the Sun's height, with both being highest in the summer and lowest in the winter.
- ○ The high temperature matches the Sun's height, with both being lowest in the summer and highest in the winter.
- ○ The high temperature is opposite the Sun's height, with temperature being highest and the Sun's height being lowest in the summer, and the opposite is true in the winter.
- ○ The high temperature is not related to the Sun's height.

Part 5: Determining why the observed patterns exist

In this lab so far, you have identified many patterns that are related to seasons.

Why are there patterns in the daylight hours, the altitude of the Sun, and the temperature in different hemispheres over the course of a year?

You are asked the scientific question above about the cause of the patterns you identified. The questions below guide you through the scientific reasoning needed to determine the likely cause of the patterns and answer the question.

28. Which option completing the statement best summarizes the patterns you observed?
In summer in the Northern Hemisphere, temperatures are warmer, daylight is _____, and the Sun is _____ in the sky at noon.

- ○ daylight is longer, and the Sun is higher in the sky at noon.
- ○ daylight is longer, and the Sun is lower in the sky at noon.
- ○ daylight is shorter, and the Sun is higher in the sky at noon.
- ○ daylight is shorter, and the Sun is lower in the sky at noon.

Do some brief independent research to learn about how seasons relate to the tilt of Earth's axis. Find a diagram with Earth's axis labeled that shows the Earth and Sun in the summer compared to in the winter.

29. What is the **causation versus correlation** relationship between the tilt of Earth's axis and the number of daylight hours?

- ○ There is a causation relationship: More daylight hours in the summer causes Earth's axis to tilt towards the Sun in the summer. The opposite is true in the winter.
- ○ There is a causation relationship: Earth's axis to tilt towards the Sun in the summer causes more daylight hours in the summer. The opposite is true in the winter.
- ○ There is a correlation relationship: Daylight hours correlates with Earth's axis to tilt, but one does not cause the other.

30. What is the **causation versus correlation** relationship between the tilt of Earth's axis and the altitude of the Sun at noon?

- ○ There is a causation relationship: The Sun's higher altitude in the sky and intensity in the summer causes Earth's axis to tilt towards the Sun in the summer. The opposite is true in the winter.
- ○ There is a causation relationship: The tilt of Earth's axis towards the Sun in the summer causes the Sun to be higher in the sky and more intense in the summer. The opposite is true in the winter.
- ○ There is a correlation relationship: The Sun's altitude at noon and intensity correlate with the tilt of Earth's axis relative to the Sun, but one does not cause the other.

31. Why do daylight hours, the altitude and intensity of the Sun, and temperature relate to each other?

- ○ The number of daylight hours is caused by Earth's tilt, and the daylight hours cause the altitude and intensity of the Sun and warmer temperatures in the summer.
- ○ The number of daylight hours and the altitude and intensity of the Sun are both caused by Earth's tilt, and together they cause warmer temperatures in the summer.
- ○ The altitude and intensity of the Sun is caused by Earth's tilt, and it causes the number of daylight hours and warmer temperatures in the summer.
- ○ Warmer temperatures in the summer and the altitude and intensity of the Sun are caused by Earth's tilt, and they cause the number of daylight hours.

32. In summary, choose **three** of these that cause seasons.

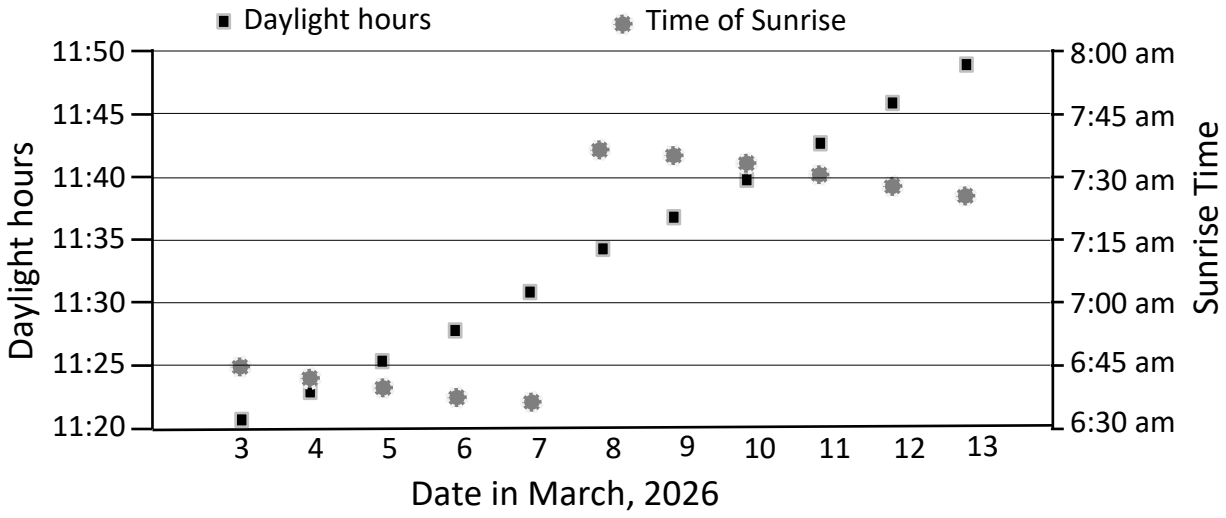
- □ Warmer winds in summer versus winter
- □ Tilt of Earth's axis towards the Sun in summer versus winter
- □ High temperatures in June and July and low temperatures in December and January
- □ Higher sun altitude in the sky in summer versus winter
- □ Longer daylight hours in summer versus winter
- □ Closer distance to the Sun in summer versus winter

Part 6: Determining how to answer scientific questions

Below are scientific questions (Questions A-E) that you will use to answer questions in Part 6.

- **Question A. "How does the direction that the Sun sets change during the spring and summer months as observed from Rhode Island?"**
- **Question B. "How is the noon-time Sun's height above the southern horizon in the summer affected by how far north your position is?"**
- **Question C. "How does the time the Sun rises in the east change over the course of a year as observed from Rhode Island?"**
- **Question D. "Does daylight saving time affect which season the Sun is brightest as viewed from Rhode Island?"**
- **Question E. "Does daylight saving time change the number of daylight hours?"**

Read the graph below. To **read this graph**, note that there are two axes. The left axis shows daylight hours, and that data is marked by a black square. The right axis shows sunrise time, and that data is marked by stars. The change in the time of sunrise is when clocks shifted for daylight saving time.



33. When you **read the graph**, which axis and symbol would you use to determine the sunrise time between March 7 and 8?

○ Left axis, gray star	○ Right axis, gray star	○ Bottom axis, black square
○ Bottom axis gray star	○ Left axis, black square	○ Right axis, black square

34. Which of the scientific questions (Questions A-E above) would need a graph like this to answer the question?

○ Question A ○ Question B ○ Question C ○ Question D ○ Question E

Read the following Methods Section that describes the plan to answer a scientific question:

1) First, choose four locations at different distances north and south: 1) Honolulu, Hawaii 2) San Diego, California 3) San Jose, California 4) Providence, Rhode Island.
2) Second, create a table in which to record the data, with the row headers labeled as each of the four locations and the column header labeled as the height of the Sun above the southern horizon at noon in July.
3) Third, set the Time and Date website for each of the locations and then choose the date and time as July at noon.
4) Last, record the height of the Sun above the horizon in degrees.

35. Which of the scientific questions (A-E above) is answerable using these methods?

○ Question A ○ Question B ○ Question C ○ Question D ○ Question E

Read Data Table 3:

Data Table 3

Date (2023)	Mar 15	Apr 15	May 15	Jun 15	Jul 15	Aug 15
Direction Sun sets						

36. Which of the scientific questions (A-E, above) needs a table like Data Table 3?

○ Question A ○ Question B ○ Question C ○ Question D ○ Question E

Read this evidence-based conclusion statement:

"**The sunrise time changes each month, rising earlier in the spring until it rises at 5:46am, and then rising later in the fall and winter until it rises at 7:14am. The sunrise time changes the least between June and July and December and January, and it changes the fastest in fall and spring.**"

37. Which of the scientific questions (A-E, above) is related to this conclusion?

○ Question A ○ Question B ○ Question C ○ Question D ○ Question E

Part 7: Synthesizing the process of science

Which month has the longest number of daylight hours for a person near Anchorage, Alaska?

Imagine you are trying to answer the above scientific question about daylight hours. Take a few minutes to think about how you would collect data to answer the question.

A student writes a research report after collecting data. The student asks you to read the report as a peer reviewer to check for errors, an important step in science. Analyze the report and determine what is wrong with it.

Student's Research Report:
In Anchorage, Alaska, which month has the longest average number of daylight hours? To determine the answer to this question, I used the Time and Date website and drew a table with one row for the date and one row for the sunrise time. To identify the number of daylight hours, I went to the Sunrise & Sunset tab for the 1st of each month and recorded the time in the "Alaska Sunrise time" row in the table below. The earlier the Sun rises, the longer the day. So, I determined that the longest number of daylight hours occurs in July. If the Sun rises at 4:28 am, that is 7 hours and 32 minutes before noon. To find out the total number of daylight hours, I doubled it, so July has 15 hours and 4 minutes of daylight hours.

Data Table 4

Month Day	**Jan 1st**	**Feb 1st**	**Mar 1st**	**Apr 1st**	**May 1st**	**Jun 1st**	**Jul 1st**	**Aug 1st**	**Sep 1st**	**Oct 1st**	**Nov 1st**	**Dec 1st**
Alaska sunrise time	10:13 am	9:19 am	7:59 am	7:22 am	5:50 am	4:36 am	4:28 am	5:32 am	6:52 am	8:06 am	8:28 am	9:45 am

38. What part of the **process of science** does the student do in the **first sentence** of this report?

- ○ Ask a scientific question
- ○ Determine the methods to use
- ○ Make observations and collect data
- ○ Analyze data and develop conclusions
- ○ Share results and conclusions

39. What part of the **process of science** is the student trying do, when they asked you to peer review the report so they could publish it?

- ○ Ask a scientific question
- ○ Determine the methods to use
- ○ Make observations and collect data
- ○ Analyze data and develop conclusions
- ○ Share results and conclusions

40. Select **two** statements that describe problems with this research report.

- ☐ They did not collect relevant data to determine the daylight hours for each day.
- ☐ They did not follow their procedure because they did not make the table the same as the methods description.
- ☐ They incorrectly assumed that the Sun always rises in the east.
- ☐ They incorrectly assumed that the Sun rises the same number of hours before noon that it sets after noon.
- ☐ They decided to collect data for sunrise time but should have focused on sunset time.
- ☐ They used the Time and Date website instead of an online textbook.

You want to answer the scientific question about the month with the longest number of daylight hours for the city in which you live. Based on the data in Part 2, you determined that the longest daylight hours must be in June or July, so you can focus your data collection on those months. Collect data using the Time and Date website, and use Data Table 5 below to record the data you collect.

Data Table 5

City: _____

Month, Day	**Jun 1**	**Jun 7**	**Jun 14**	**Jun 21**	**Jul 1**	**Jul 7**	**Jul 14**	**Jul 21**
Length of day								

41. What interpretation of the data can you make from the data you collected in Data Table 5?

- ○ June has the longest day.
- ○ July has the longest day.
- ○ The longest day in June was the same length as the longest day in July.
- ○ There is not enough information to make conclusions.

42. What part of the **process of science** did you just do, in the preceding question?

- ○ Ask a scientific question
- ○ Determine the methods to use
- ○ Make observations and collect data
- ○ Analyze data and develop conclusions
- ○ Share results and conclusions

43. How do your conclusions from the data in your city compare to the student's conclusions for Anchorage?

- ○ We both concluded the longest day was in July because we used the same methods.
- ○ I concluded June and the student concluded July because we looked at different cities.
- ○ I concluded June and the student concluded July because I collected better data.

44. Your friend is writing a mystery novel where five clues are revealed in five different cities on the longest day of the year. When should your friend set the novel?

- ○ June
- ○ July
- ○ June and July, since it depends on the locations of the cities

Reflection

45. Which question in this lab connects to your personal experience? Consider the lab topic, math skills, and the process of science. You may also consider your lived experience or stories you've encountered. To earn credit, list the question number and explain how it relates in 2-3 sentences.