

Earth

Science

Genre

Informational Nonfiction

explains facts about real persons, places, or events.



Text Feature

Graphs are visual representations of numbers or quantities. Graphs make it easy to compare data.

Content Vocabulary

axis **equator**
satellites **revolution**



How Do We Know Earth Is Rotating?

We talk about the sun rising in the morning and setting at dusk, but in reality the sun isn't moving—we are! Earth rotates, or spins on its **axis**, just like a spinning top. The axis is an imaginary line through Earth from the North Pole to the South Pole.

It takes about 24 hours for Earth to make one rotation, or complete spin, on the axis. As each part of Earth rotates toward and away from the sun, we experience periods of daylight and darkness. As the day begins, the sun appears to “rise” in the east. By midday, the sun reaches its highest point in the sky. In the afternoon, as Earth keeps rotating, the sun appears to get lower in the sky, until it “sets” in the west. Earth makes this rotation about 365 times each year.

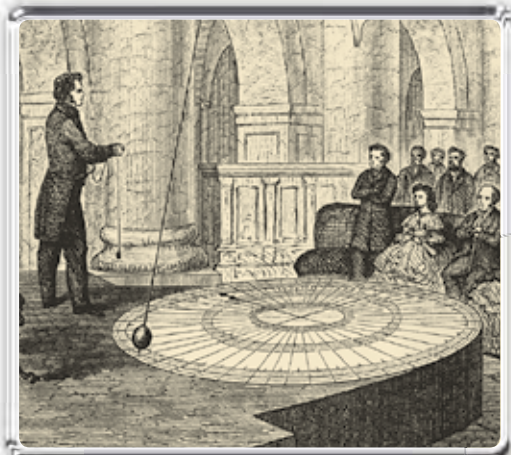
and the Sun

How do we know that Earth is spinning? One way is data from **satellites**. Satellites can observe the rotation of Earth from space.

An early piece of evidence was discovered by a French scientist named Jean Foucault (foo-KOH). A pendulum, or suspended weight, was hung by a long string. It was made to swing back and forth, north to south. As hours passed, the direction the pendulum was swinging moved around in a clockwise direction. After a while, it was swinging northeast-southwest; after a bit, it was

swinging east-west, then southeast-northwest, then finally north-south again. What caused this change in the pendulum's direction of swing was that Earth was rotating under it.

The shape of Earth is also a clue that it is rotating. Earth is not a perfect sphere. It is slightly flattened at the North and South Poles and bulges slightly at the **equator**. It is similar to what happens in a washing machine. As the clothes spin around, they get thrown to the edge. As Earth spins, its matter also gets shifted to the "edge," creating a slightly bulging equator.



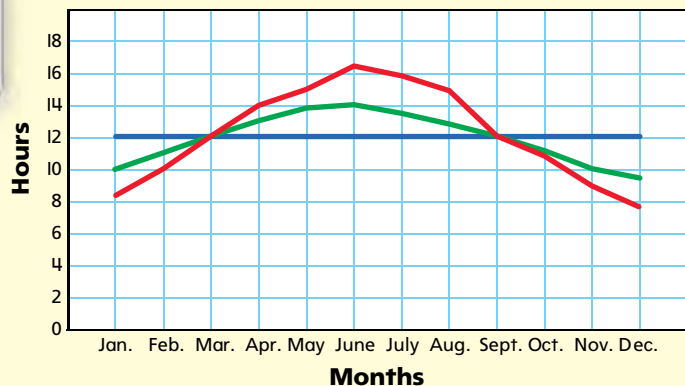
Foucault's pendulum showed that Earth rotated.

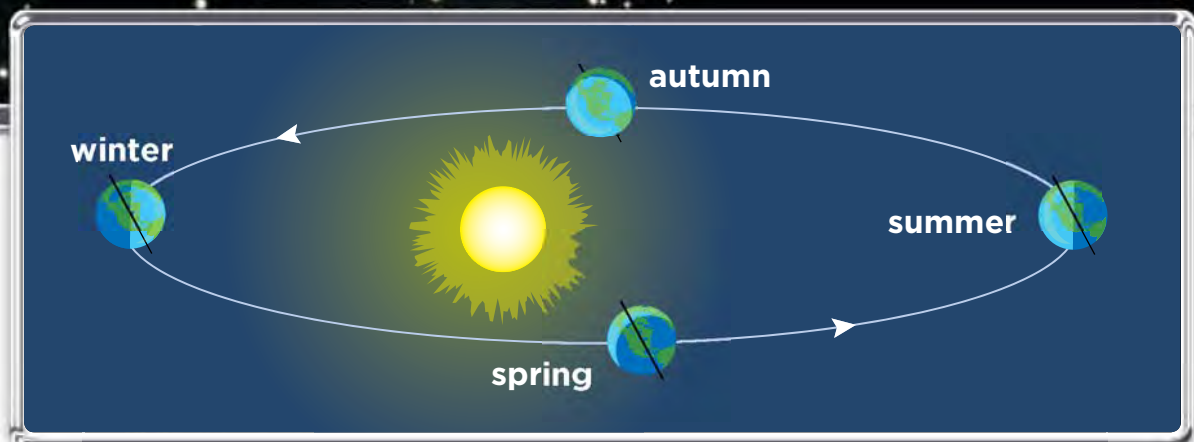


A line graph uses one or more line segments to show changes in data. This line graph shows the number of hours of daylight for three latitudes during a year.

Length of Day at Various Latitudes

— 49° N, Winnipeg, Canada
— 29° N, Houston, Texas
— 0°, equator, Quito, Ecuador





The seasons in the Northern Hemisphere

The Reason for Seasons

In many parts of the United States, as you switch from a bathing suit to a sweater to a winter coat to a T-shirt, you have certainly noticed that seasons change every year. The two biggest signs of change are temperature and length of day. Do you know what causes these changes?

Earth takes $365 \frac{1}{4}$ days to revolve, or travel in its orbit, once around the sun. One complete trip around the sun is called a **revolution**. Remember that while Earth is revolving, it is also rotating on its axis. However, the axis is not vertical. It is tilted at an angle of $23 \frac{1}{2}^\circ$ and always points in the same general direction. This means that as Earth goes around its orbit, the Northern Hemisphere (places north of the equator such as the United States,

Europe, and China) is at times leaning more toward or more away from the sun.

When it is summer in the United States, the Northern Hemisphere is tilted more toward the sun. As spring turns into summer, the sun climbs higher in the sky, it is above the horizon longer, and its rays strike the ground more directly. As fall turns into winter, the Northern Hemisphere tilts away from the sun. The sun is lower in the sky, it is above the horizon for a shorter period, and the rays of the sun strike the ground less directly.

The summer solstice, which happens around June 21, is the longest day of the year in the Northern Hemisphere. The sun appears to be at its highest in the sky and stays above the horizon

for more than 12 hours, causing more hours of daylight and fewer hours of darkness. The summer solstice marks the first day of summer.

In contrast, the winter solstice, which occurs around December 21, is the shortest day of the year north of the equator. The sun doesn't appear to get very high in the sky and is

above the horizon for fewer than 12 hours. This results in less daylight and more darkness. The winter solstice marks the first day of winter.

In the Southern Hemisphere, the winter and summer solstices are reversed. This means that when it is summer in North America, it is winter in parts of South America.

Connect and Compare



1. Look at the graph on page 173. When are days in Houston, Texas, longest? Why? When are they shortest? Why? **Reading a Graph**
2. How does Earth's rotation cause day and night? **Analyze**
3. Think about what you learned in this science article. If you were a character in "The Night of the Pomegranate," what information could you add to Kevin's and Harriet's presentations? **Reading/Writing Across Texts**



Science Activity

Research the number of moons each of the eight planets has. Then draw a graph to display the data.



Find out more about the solar system at www.macmillanmh.com

Write an Editorial

Writer's Craft

A Good Topic

A **good topic** is one that you enjoy writing about and that is narrow in focus. Near the beginning of your editorial write a thesis statement that summarizes the topic.

My topic is my opinion on space exploration.



I put my thesis statement in the first paragraph.

Understand Our Earth First

by Pang C.

Some countries' leaders spend millions of dollars to help scientists explore the solar system. Is this money spent wisely? I do not think so. Most of the money spent on space exploration should instead be spent to help people here on Earth.

Scientists have helped humans live better lives in many ways. However, I believe that there is still more to do. Scientists should focus more on answering questions about humans and Earth. Then maybe we wouldn't have diseases, disasters, or endangered animals.

And think about the millions (or billions!) of dollars spent on space exploration. Governments should use that money to feed the hungry. Wouldn't that be a wonderful experiment to try?

Your Turn

Write an editorial on whether or not space exploration is important. Be sure to include your topic in a clearly written thesis statement. Then use facts and examples to support your main idea. Use the Writer's Checklist to check your writing.



Writer's Checklist

- Ideas and Content:** Did I explain my opinion clearly?
- Organization:** Did I include a thesis statement that clearly explains my **topic**? Did the ideas, facts, and examples I included support my main idea?
- Voice:** Did I successfully share my opinion on the subject? Did I share my opinion in a way that only I can?
- Word Choice:** Did I use interesting language to express my opinion?
- Sentence Fluency:** Did I read my editorial aloud to check the flow of language? Did I include sentences of different lengths?
- Conventions:** Did I properly use commas with words in a series? Did I check my spelling, including all plural nouns?