The Phases of the Moon

For Grades 3-5

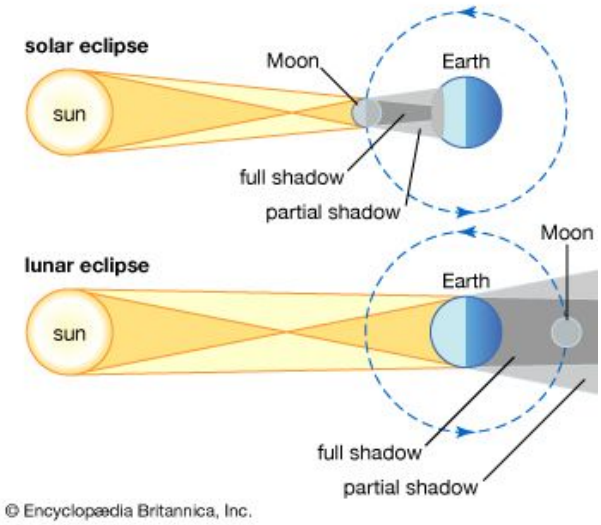
This Pack contains:

3 ARTICLES
3 IMAGES
2 VIDEOS

ARTICLE

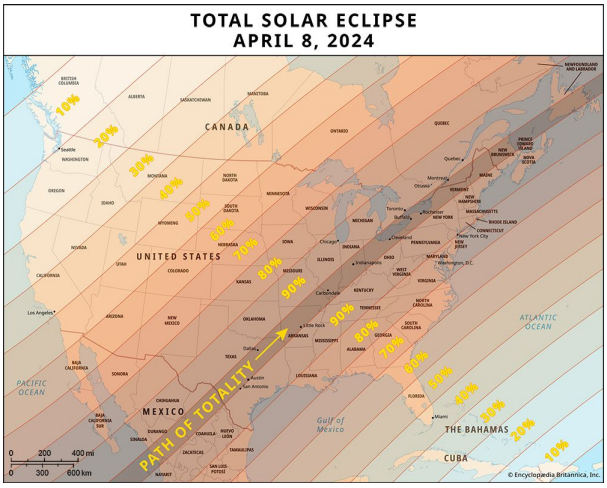
eclipse

An eclipse happens when one object in space blocks another from view. For example, during a solar eclipse the Moon comes between Earth and the Sun. The Moon blocks the Sun for a time so that people on Earth cannot see it.



During a solar eclipse the Moon passes between the Sun and Earth. During a lunar eclipse Earth passes between the Sun and the Moon.

Encyclopædia Britannica, Inc.



A map shows the path of the April 8, 2024, solar eclipse.

Encyclopædia Britannica, Inc./Kenny Chmielewski

In ancient times solar eclipses caused great fear and wonder. People did not understand why the sky sometimes darkened in the middle of the day. Today scientists understand why eclipses happen and can determine when they will occur.

Find out what happens during an eclipse.

Encyclopædia Britannica, Inc.

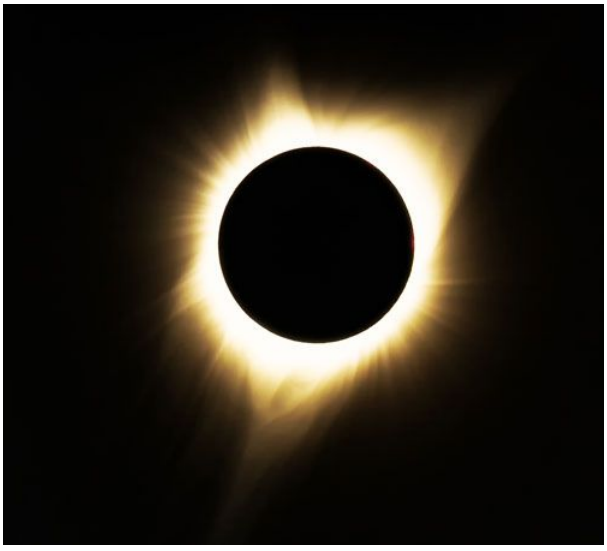
Eclipses happen because planets, moons, and other objects constantly move through space. For instance, Earth travels around the Sun in a path called an orbit. As Earth moves around the Sun, the Moon makes its own orbit around Earth. An eclipse involves three space objects temporarily lining up in a row.

Solar Eclipses

In a solar eclipse the Moon passes between the Sun and Earth. This prevents the Sun's light from reaching Earth. As the Moon passes in front of the Sun, the Moon's shadow sweeps across Earth. The sky gradually grows darker.

If the Sun's light is completely blocked, the Moon appears as a black circle. What looks like a ring of fire appears around the circle. This ring is the corona, or the gases that surround the Sun.

Earth and the Moon keep moving. After a few minutes the sky begins to lighten again.



The Sun's corona shines brightly around the Moon during a total solar eclipse.

© Backyard-Photography—iStock/Getty Images

A solar eclipse is called total if the Sun appears totally dark. If only part of the Sun appears dark it is a partial eclipse. During an eclipse some people on Earth will see a total eclipse, others will see a partial eclipse, and many others will not notice any difference in the Sun. Only the people within the small area covered by the center of the Moon's shadow will see a total eclipse. People just outside of that area will see a partial eclipse.

Looking directly at any solar eclipse can seriously hurt one's eyes. It should never be attempted.

Lunar Eclipse

The Moon does not make any light itself. Rather, the Sun shines on the Moon, and the reflected sunlight makes the Moon visible from Earth.

During a lunar eclipse Earth blocks sunlight from reaching the Moon. The Sun, Earth, and the Moon line up, with Earth in the middle. The Moon is then in Earth's shadow. But the Moon does not appear completely dark. Instead, it glows a dim orange or red color. This is because some light reaches the Moon indirectly. This light bounces off the gases surrounding Earth and then hits the Moon.

Lunar eclipses can be total or partial. Unlike a solar eclipse, a lunar eclipse is safe to view directly.

Citation (MLA style):

"Eclipse." *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

ARTICLE

Moon

The Moon is a large natural object that orbits, or travels around, Earth. After the Sun it is the brightest object in the sky.

Astronauts on the International Space Station took this image of the Moon above Earth.

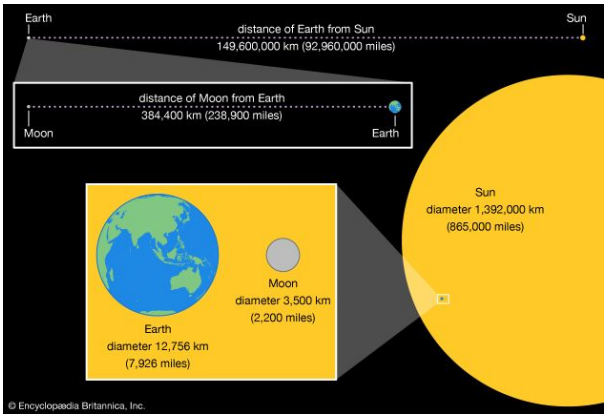
NASA

The Moon is the most prominent feature in the night sky.

© Dmytro Pylypenko/Dreamstime.com

The average distance between the Moon and Earth is about 238,900 miles (384,400 kilometers). Compared to the distance between other planets and Earth, this distance is small. In fact, the Moon is close enough to affect the level of seas on Earth. Every day the seas seem to rise and fall. This is because of a force called gravity. The Moon's gravity pulls on Earth. It is too weak to affect the whole planet, but it does make the water move. This creates tides.

Physical Features



The Sun is the closest star to Earth, but it is still very far away. The distance from Earth to the Moon is much shorter. The Sun is also much bigger than Earth and the Moon.

Encyclopædia Britannica, Inc./Patrick O'Neill Riley

The Moon is slightly more than one quarter the size of Earth. Its diameter, or distance through its center, is about 2,200 miles (3,500 kilometers).

A view of the near side of the Moon shows some of its many craters.

NASA/JPL/Caltech (NASA photo # PIA00405)

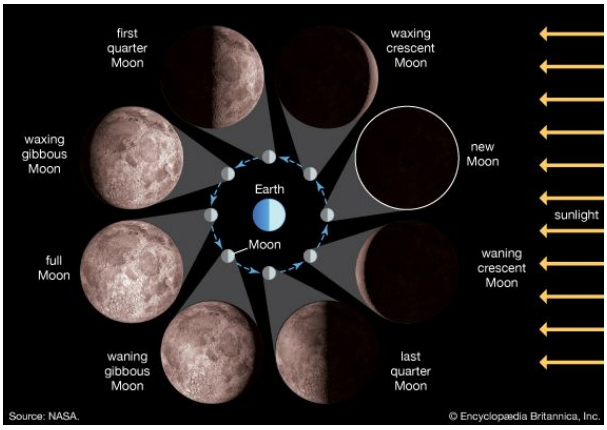
The Moon is made mostly of rock. The surface has thousands of pits called craters. The craters form when chunks of rock and metal called meteorites crash into the Moon. These crashes have covered the Moon's surface with rocks and dust. The Moon also has plains made of lava that erupted from volcanoes billions of years ago.

During the daytime, when the Moon faces the Sun, its surface temperature averages about 225° F (107° C). However, at night the temperature drops to about −243° F (−153° C).

Orbit and Spin

Like the planets, the Moon has two types of movement: orbit and spin. The Moon orbits, or travels around, Earth. It takes the Moon about 27 days to make one trip around Earth. The Moon also spins about its center. It completes one rotation in about 27 days—the same time it takes to complete one orbit. For this reason, the same side of the Moon always faces Earth.

Phases and Eclipses



The diagram shows the position of the Moon at each of its phases. The enlarged pictures of each phase are photographs taken from Earth.

Encyclopædia Britannica, Inc. Photos Yerkes Observatory, University of Chicago

When viewed from Earth, the Moon looks different at different times. These varying appearances are called phases. Sometimes the Moon looks like a full circle. At other times it appears as only a thin slice or looks completely dark. However, the Moon’s shape does not change—it just looks that way from Earth. The Moon reflects light from the Sun. As the Moon orbits Earth, the Sun shines on different parts of the Moon. This causes different parts to be visible from Earth.

Find out what happens during an eclipse.

Encyclopædia Britannica, Inc.

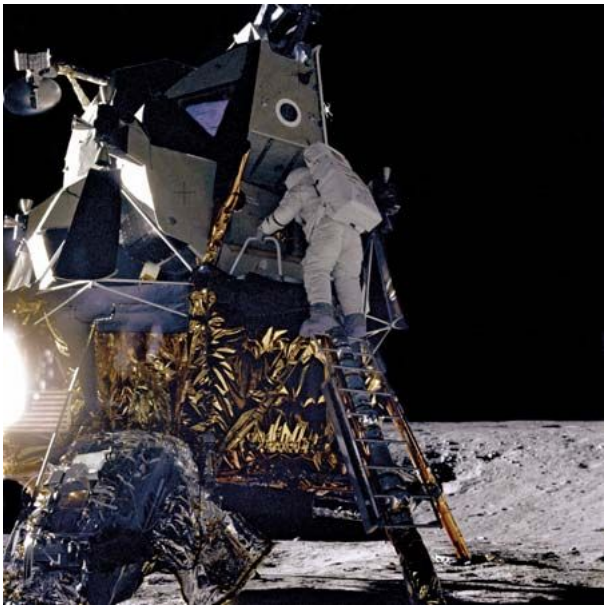
Sometimes the way the Moon, the Sun, and Earth are positioned causes an event called an eclipse. During an eclipse of the Sun, the Moon blocks the view of the Sun for a short time. During an eclipse of the Moon, Earth prevents the Sun from shining on the Moon.

Observation and Exploration

People have observed the Moon since ancient times. In the 1600s the invention of the telescope allowed people to study the Moon more closely.

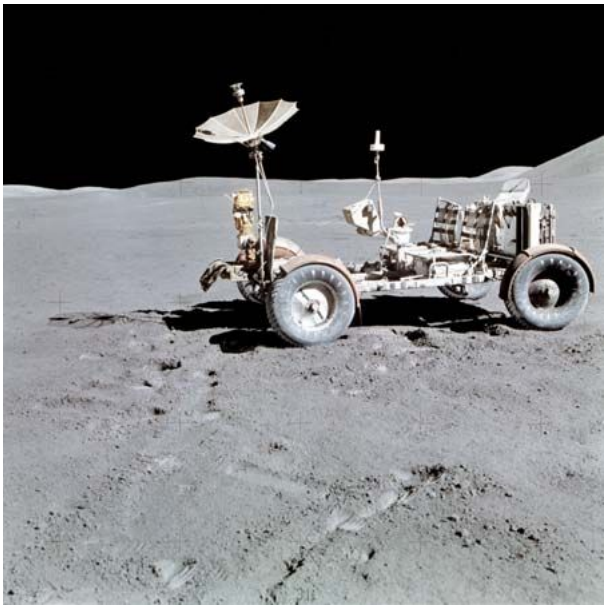
Buzz Aldrin walks on the Moon on July 20, 1969. Reflected in his faceplate are the Lunar Module and astronaut Neil Armstrong, who took the picture.

NASA



Astronaut Alan Bean walks down the ladder of the lunar module. He and Charles Conrad, Jr., walked on the Moon during the Apollo 12 mission.

NASA Great Images in Nasa Collection



Astronauts on the Apollo 15 mission used a Lunar Roving Vehicle to explore the Moon.

NASA

Even greater advances in knowledge have come from the many spacecraft sent to the Moon since 1959. In 1966 Luna 9, a spacecraft from the Soviet Union, became the first craft to successfully land on the Moon. It did not have any crew. In 1969 the U.S. Apollo 11 craft carried the first people—Neil Armstrong and Edwin (Buzz) Aldrin, Jr.—to walk on the Moon. Ten other astronauts have walked on the Moon since then.

Citation (MLA style):

"Moon." *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

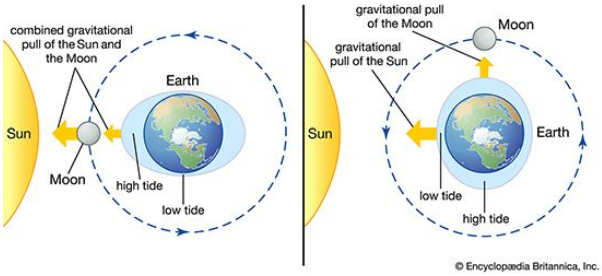
While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

ARTICLE

tide

Along the coasts of every ocean on Earth the water level changes on a regular basis. This movement is known as the tide. The greatest height reached as the water rises is known as high tide. The lowest level reached as the water falls is known as low tide.

Tides take place in all bodies of water. In some waters, however, the change is so slight that tides go unnoticed. Tides are easier to see where an ocean meets land along seacoasts and in bays. There are usually two high and two low tides per day at any given place. The times at which they happen, however, change from day to day. The average amount of time between two high tides is 12 hours and 25 minutes.



Both the Sun and the Moon pull on Earth's water with a natural force called gravity. This pull creates tides. As the Sun, Moon, and Earth move in space, they sometimes form a straight line, shown at left. This arrangement creates high tides that are higher than usual. It also creates low tides that are lower than usual. At other times the Sun, Earth, and Moon are positioned like the corner of a square, shown at right. This arrangement evens out the tides more. It creates high tides that are less high than usual and low tides that are less low than usual.

Encyclopædia Britannica, Inc.

Tides are caused by a natural force called gravity. Because of gravity, all bodies in the universe pull on each other. The Sun and the Moon both pull on Earth, but the Moon has a greater influence because it is closer to Earth than the Sun. As the Moon pulls on Earth it makes the water move. On the side of Earth near the Moon, the water builds up in a wave. Another wave forms on the other side of Earth. This is because the Moon is pulling Earth away from the water on that side. These waves result in high tide. As Earth rotates and the Moon moves around Earth, the tides change as well. Because the Moon moves around Earth in a regular path, the cycle of the tides follows a regular pattern.

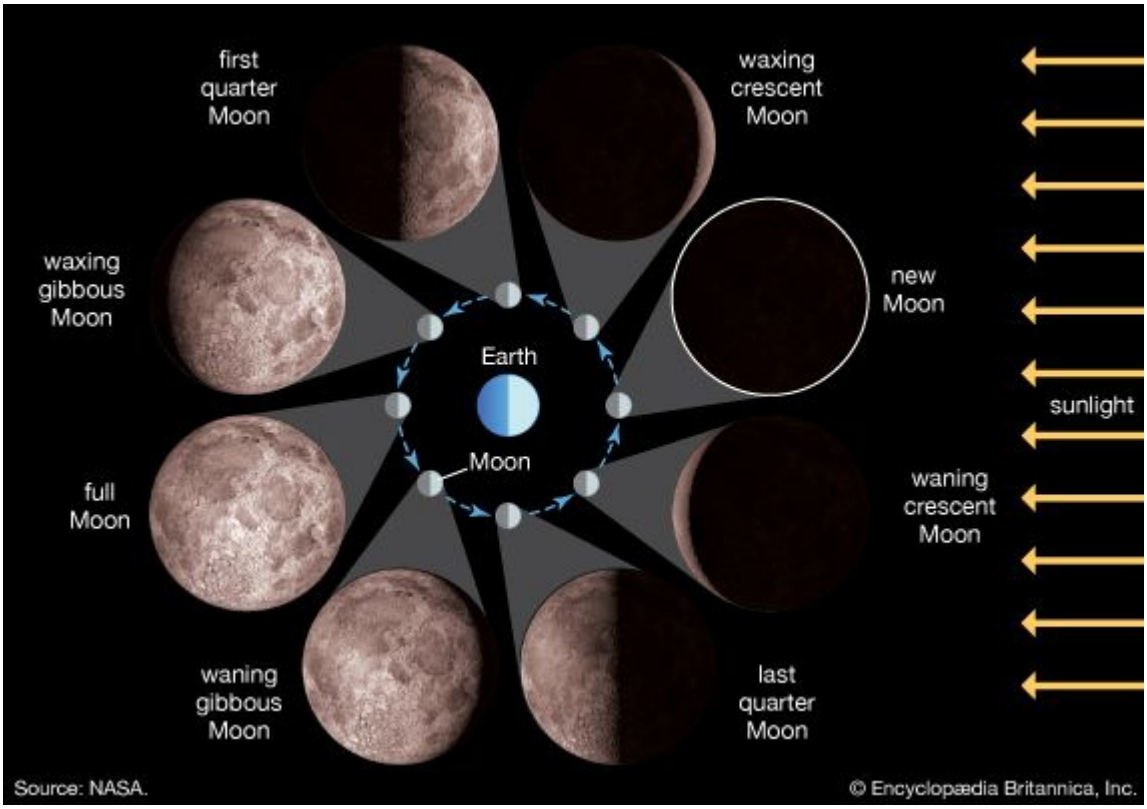
Citation (MLA style):

"Tide." *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

IMAGE

Phases of the Moon



The diagram shows the position of the Moon at each of its phases. The enlarged pictures of each phase are photographs taken from Earth.

Encyclopædia Britannica, Inc. Photos Yerkes Observatory, University of Chicago

---

Citation (MLA style):

Phases of the Moon. Image. *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

IMAGE

Moon phases

Phases of the Moon.

Citation (MLA style):

Moon phases. Image. *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

IMAGE

time: phases of the Moon

The phases of the Moon are used to determine the timing of many religious celebrations.

© chrisharvey/Fotolia

Citation (MLA style):

Time: phases of the Moon. Image. *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

VIDEO

phases of the Moon

Video Transcript

The changing position of the Moon during its monthly orbit around Earth determines how much of the Moon’s near side is lit by the Sun. An observer on Earth’s surface sees different fractions of the sunlit side on different nights. These sunlit fractions are called phases. They occur in succession over the course of a month, forming a sequence called the lunar cycle. The changing appearance of the Moon during the lunar cycle depends on how

the Moon is positioned in relation to the Sun. The first lunar phase is the new moon. In this phase, the Moon is between Earth and the Sun, so the entire lit portion of the Moon faces away from Earth. Because the near side is unlit, an observer on Earth cannot see the Moon. Therefore, at the new moon, there appears to be no Moon in the sky. As the Moon moves in its orbit, the lit portion slowly grows, or waxes, forming a crescent shape. This phase is called waxing crescent. At first quarter, the Moon is half lit. This phase is called first quarter because the Moon has completed one-quarter of its cycle. At first quarter, the Moon lies at a 90-degree angle to the Sun. As the Moon continues on its path, the lit portion continues to grow, forming a humped shape. This is the waxing gibbous phase. About two weeks into its cycle, the near side of the Moon is fully lit. This marks the full moon. In this phase the Moon and the Sun are opposite each other, with Earth between them. Because the entire lit portion of the Moon faces Earth, the Moon appears as a full, bright circle in the sky. As the Moon continues in its orbit, the sunlit portion now slowly shrinks, or wanes, as less of the near side is lit by the Sun. This phase is called waning gibbous. About three weeks into the cycle, the Moon enters the last quarter phase. As with first quarter, the Moon is half lit and positioned at a 90-degree angle to the Sun. During the last nights of the cycle, the lit fraction of the Moon continues to wane, slowly shrinking into a crescent shape. This is the waning crescent phase. The lit portion of the Moon wanes completely as the Moon finishes its orbit, about 29.5 days after the cycle began. As the Moon moves between the Sun and Earth, the near side becomes unlit, forming a new moon as a new cycle begins again.

The changing appearance of the Moon during the lunar cycle depends on how the Moon is positioned in relation to the Sun. An observer on Earth's surface sees different fractions of the sunlit side on different nights. These sunlit fractions are called phases.

Encyclopædia Britannica, Inc.

Citation (MLA style):

Phases of the Moon. Video. *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.

VIDEO

Why does the Moon always face Earth the same way?

Video Transcript

Ancient people rarely considered the Moon as anything more than a disc in the sky. The Moon itself always faced Earth the same way. So people came to regard the Moon as something flat, much like they thought of the Earth at that time, too. If they did think the Moon was spherical, they often spoke of the side that faced away from the Earth as "the Dark Side of the Moon." Neither view is true, of course. We know that the Moon is round like a ball, and we know that the Sun may shine on all sides of the Moon. So the only part of the Moon that is truly dark, is the side that’s aimed away from the Sun at any given time. But the Moon "faces" the Earth more or less the same way all the time. How is that so? The period of the Moon’s rotation is the same as the period of its revolution about the Earth. At the time of the full moon, the Sun is shining full on the face we always see. And at new moon, the Moon is on the opposite side of its orbit from when it was full. The Moon has advanced halfway through its orbit, but it has also made one-half turn, so it has kept the same side toward the Earth.

Explanation of why only one side of the Moon faces Earth.

Encyclopædia Britannica, Inc.

Citation (MLA style):

Why does the Moon always face Earth the same way?. Video. *Britannica LaunchPacks: The Phases of the Moon*, Encyclopædia Britannica, 23 Mar. 2025. packs.eb.com. Accessed 4 May. 2025.

While every effort has been made to follow citation style rules, there may be some discrepancies. Please refer to the appropriate style manual or other sources if you have any questions.