

The Ever-Changing Sky

by Megan McGibney



Look up at the sky on a clear day. You will see the sun. It is bright and shiny, warming much of what its light touches. Look up at the sky again at night. You may see the stars. They are also bright and shiny, glimmering in the dark sky. You may also see the moon. It looks bright and shiny, reflecting light from the sun. People have always looked up at the sky with wonder. Some have even studied the sun, moon, and stars. These people, called astronomers, have learned that those objects in the sky do not stay in the same place all the time.

The earth revolves around the sun and also rotates on its axis, which is an imaginary line that runs from the North Pole to the South Pole, through the earth's center. It takes just under 24 hours for the earth to complete one rotation on its axis - a day, that's right! And guess how long it takes the earth to revolve around the sun? A little over 365 days. That's a year, with an

extra quarter of a day.

Let's take a closer look at the moon. The earth does not revolve around the moon. Instead, the moon revolves around the earth. It takes the moon about four weeks to complete a revolution around the earth. The portion of the moon we, here on Earth, see changes over this period of about four weeks as the moon's position around the earth changes. The moonlight we see at night is the moon's reflection of sunlight onto Earth. The different ways the moon appears to us are known as the moon's phases. The moon's phases depend on the moon's position in relation to the earth and the sun.

The four-week period starts and ends with the new moon. The new moon cannot be seen because the side of the moon lit by the sun is facing away from the earth. This is because the moon is nearly between the sun and the earth at this time. After that comes the first quarter moon, which is when we see half of the side of the moon lit by the sun. Then comes the full moon, when we can see the entire side of the moon lit up by the sun. This is because the earth is nearly lined up between the sun and the moon, and the sunlit part of the moon is facing the earth. One of the last phases is called the last quarter moon. This is when we see the other half of the lit side of the moon.

Sometimes the way the sun, moon, and earth are positioned causes an event known as an eclipse. There are two types of eclipses. A lunar eclipse happens when the earth passes between the moon and the sun and when the earth blocks the moon from the sun. The earth's shadow may block the entire moon or just part of the moon from view. A solar eclipse happens when the moon passes directly between the earth and the sun. A solar eclipse can block part of the sun or the entire sun from the earth's view.

Because of the regular orbit of the moon around the earth and the regular orbit of the earth around the sun, astronomers can predict when an eclipse will happen even many years into the future.

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Look up at the sky on a clear day. You will see the sun. It is bright and shiny, and it warms much of what its light touches.

Look up at the sky at night. You may see the stars. They are also bright and shiny, twinkling in the dark sky. You may also see the moon. It looks bright and shiny too, as it reflects light from the sun.

People have always looked up at the sky with wonder. Some people have even studied the sun, moon, and stars. These people are called astronomers, and they have learned that those objects in the sky do not stay in the same place all the time.

The earth revolves around the sun. This means it goes all the way around the sun. The path it

takes around the sun is called an orbit. It takes the earth a little over 365 days to complete its orbit. That's a year, with an extra quarter of a day. At the same time, the earth rotates, turning around in a circle. It takes just under 24 hours, or one day, for the earth to turn all the way around.

Now let's talk about the moon. The moon reflects the sun's light. That means the "moonlight" we see at night isn't really the light of the moon. It's sunlight being reflected by the moon onto Earth.

What about the moon's movement? The moon revolves around the earth. It takes about four weeks for this to happen. As the moon moves around the earth, its appearance changes. That's because the amount of the moon that we can see changes. These changes in the moon's appearance are called phases. They depend on the moon's position in relation to the earth and the sun.

Because the moon takes four weeks to go around the earth, it changes phases over four weeks. At the start and end of these four weeks, the moon is called a new moon. We cannot see the new moon. This is because the moon is nearly between the sun and the earth at that time. During a new moon, the side of the moon that is lit by the sun faces away from the earth. Next comes the first quarter moon. This is when we see half of the lit-up side of the moon. After that comes the full moon, which is when the sun, moon, and earth are almost lined up. The lit-up part of the moon is facing the earth, so we can see the whole lit side. After this comes the last quarter moon. This is when we see the other half of the lit side of the moon.

Sometimes the positions of the sun, moon, and earth cause an event called an eclipse. There are two kinds of eclipses. One is called a lunar eclipse. A lunar eclipse happens when the earth passes between the moon and the sun. When this happens, the earth blocks the sun's light from reaching the moon. The earth's shadow may block some or all of the moon from our view.

The other kind of eclipse is a solar eclipse. This happens when the moon passes between the earth and the sun. The moon can block part of the sun or the whole sun from our view.

The moon and the earth both have steady orbits. As a result, astronomers can predict when an eclipse will happen many years ahead of time.

orbit or bit

Advanced Definition

noun

1. the curved path in which a planet, satellite, or spacecraft revolves about another body.

Earth's orbit around the sun is elliptical.

2. one complete revolution along such a path.

A little more than 365 days is the amount of time that the earth takes to complete one orbit around the sun.

3. a sphere or area of experience, knowledge, control, or power.

Such questions are really outside of my orbit.

4. one of the two bony sockets that encase the eyeballs.

transitive verb

1. to revolve about (another body) in a curved path.

Several moons orbit Jupiter.

2. to send into an orbit.

intransitive verb

1. to travel in an orbit.

The space station is now orbiting.

Spanish cognate

órbita: The Spanish word *órbita* means orbit.

These are some examples of how the word or forms of the word are used:

1. Fearing the worst, scientists kept their eyes on NT7. They plotted its **orbit**, or path, around the sun.
2. He took out a high-powered telescope, through which Emine could see Saturn and its rings. She was amazed at how rapidly it moved out of focus, because it was **orbiting** the sun so quickly.
3. The GPS is a network of 31 satellites **orbiting** the globe that monitors Earth's surface, including its tiniest movements.
4. The German astronomer and mathematician Johannes Kepler discovered the laws of planetary motion in the 17th century. (Kepler was the first person to calculate the **orbit** of Mars.)

rotate

ro · tate

Definition

verb

1. to turn on or around a central point.

A wheel rotates on an axle.

Advanced Definition

transitive verb

1. to cause to revolve around an axis.
2. to cause to be planted in cycles.

Farmers rotate their crops on a three-year schedule.

3. to cause (persons) to be replaced according to cycles.

intransitive verb

1. to turn on or around a fixed point.
2. to progress according to a cycle of succeeding events; alternate.

Spanish cognate

rotar: The Spanish word *rotar* means rotate.

These are some examples of how the word or forms of the word are used:

1. Haumea also has a distinctive spin and shape. It **rotates** once every four hours-six times faster than Earth does. That's the fastest spin rate of any major object in the solar system.
2. While Europeans were in the midst of the Dark Ages, Mayans never stopped learning. They tried out new farming methods. They **rotated** their crops so the soil would last longer. They only farmed crops on the same field once every three years or so.
3. The planet Earth is a gigantic magnet. So are all of the planets in our solar system, as well as their moons and the sun. Because of their magnetism, the planets **rotate** around the sun (the strongest magnet). The moons (the weakest magnets) orbit around the planets.
4. Participating in a zero-waste lunch is just one of many ways students at the school in Harrisburg, North Carolina, work to better the environment. Each April, the school organizes an Earth Day event. Students **rotate** through stations set up across the school's 36-acre campus, which includes forests and wetlands.
5. Venus has a retrograde rotation. It spins in the opposite direction as most of the other planets **rotate**. (Earth turns counterclockwise; Venus turns clockwise.) A huge collision might have sent it spinning backward.
6. The Earth's axis of rotation is the path our planet takes as it moves around the sun. The Earth **rotates** around its own axis 365.26 times per each orbit around the sun, which gives us 365 days in each year. In turn, the moon orbits the earth, affecting the ocean tides, and slowing the Earth's rotation with its gravity.

Name: _____ Date: _____

1. What does the earth revolve around?

- A. the moon
- B. the sun
- C. the stars
- D. meteors

2. What does the author describe in the passage?

- A. how long it takes the sun to revolve around the earth
- B. when the next solar eclipse will occur
- C. how long it takes the earth to revolve around the sun
- D. the movement of other planets in our solar system

3. The phases of the moon are caused by the moon's orbit around the earth. Which details from the text support this conclusion?

- A. It takes 24 hours for the earth to complete one rotation on its axis.
- B. A lunar eclipse occurs when the earth passes between the moon and the sun and the earth blocks the moon from the sun.
- C. The direction the sunlit side of the moon facing the earth changes as the moon revolves around the earth.
- D. The moon changes from a new moon to a half moon to a full moon.

4. What blocks the sun during a solar eclipse?

- A. the moon
- B. the earth
- C. the earth's shadow
- D. a nearby meteor

5. What is this passage mostly about?

- A. solar and lunar eclipses
- B. the solar calendar
- C. phases of the moon
- D. the movement of the earth and the moon

6. Read the following sentences: "It takes just under 24 hours for the earth to complete one rotation on its axis - a day, **that's right!** And guess how long it takes the earth to revolve around the sun?"

Why does the author say "**that's right!**"?

- A. because the author thinks the reader has made the connection between the rotation of the earth around its axis and the length of a day
- B. because the author was talking to someone while writing the passage
- C. because the author wants to reassure the reader
- D. because the author is waiting for an answer from the reader

7. Choose the answer that best completes the sentence below.

The moon goes through different phases in a month, _____ full moon, half moon, and new moon.

- A. but
- B. including
- C. first
- D. as a result

8. When does a full moon occur?

9. Why can astronomers predict eclipses?

10. Give two examples of how the sky is ever-changing.

Name: _____ Date: _____

1. What is a meaning of the word **revolve**?

- A. give to, and receive from, one another
- B. make a high-pitched, screeching noise
- C. turn on or around an axis or a center

2. What is another meaning of the word **revolve**?

- A. hold back within
- B. move in an orbit
- C. to cause pain to

Please use each answer choice only once. Choose the one word that best completes the sentence.

3. The _____ doors were the only way into the building.

- A. revolve
- B. revolving

4. Now we know that the planets _____ around the Sun, not the Earth.

- A. revolve
- B. revolving

5. Please write your own sentence using the word **revolve**.

6. What would you like to remember about the meaning of the word **revolve** so that you can use it when you write or speak?

Name: _____ Date: _____

1. What is a meaning of the word **rotate**?

- A. cause to suffer a blight
- B. to draw back or away from
- C. to spin, turn, or revolve

2. What is another meaning of the word **rotate**?

- A. examine in order to test suitability
- B. cover completely or make imperceptible
- C. turn on or around an axis or a center

Please use each answer choice only once. Choose the one word that best completes the sentence.

3. It is the _____ of the Earth that in part keeps it stable.

- A. rotate
- B. rotation

4. The shifts _____ three times a day: at 7, at 3, and at 11.

- A. rotate
- B. rotation

5. Please write your own sentence using the word **rotate**.

6. What would you like to remember about the meaning of the word **rotate** so that you can use it when you write or speak?

Name: _____ Date: _____

1. What is a meaning of the word **orbit**?

- A. a substance dangerous to living things
- B. the bony cavity containing the eyeball
- C. signal going into an electronic system

2. What is another meaning of the word **orbit**?

- A. a person who contributes to the fulfillment of a need or furtherance of an effort or purpose
- B. part of an organism consisting of an aggregate of cells having a similar structure and function
- C. the (usually elliptical) path described by one celestial body in its revolution about another

Please use each answer choice only once. Choose the one word that best completes the sentence.

3. When they saw these _____ motions, they proved that Newton's law of gravitation operates outside our own solar system.

- A. orbits
- B. orbital
- C. suborbital
- D. orbited
- E. orbiting
- F. orbit
- G. orbiter

4. The _____ itself looked like a stubby airplane.

- A. orbits
- B. orbital
- C. suborbital
- D. orbited
- E. orbiting
- F. orbit
- G. orbiter

5. Many thought that the Sun and all the planets _____, or move around, Earth.

- A. orbits
- B. orbital
- C. suborbital
- D. orbited
- E. orbiting
- F. orbit
- G. orbiter

6. As more and more astronomers discovered other planets orbiting the Sun, people began to believe that the Earth _____ the Sun as well.

- A. orbits
- B. orbital
- C. suborbital
- D. orbited
- E. orbiting
- F. orbit
- G. orbiter

7. This discovery made people begin to wonder if the sun and stars also _____ Earth.
- A. orbits
 - B. orbital
 - C. suborbital
 - D. orbited
 - E. orbiting
 - F. orbit
 - G. orbiter
8. America's Mercury project began in 1961 with the _____ flight of Alan Shepherd and ended with the two-day orbital flight of Leroy Gordon Cooper in 1963.
- A. orbits
 - B. orbital
 - C. suborbital
 - D. orbited
 - E. orbiting
 - F. orbit
 - G. orbiter
9. This may explain mysterious water signals picked up by satellites _____ Mars.
- A. orbits
 - B. orbital
 - C. suborbital
 - D. orbited
 - E. orbiting
 - F. orbit
 - G. orbiter

10. Please write your own sentence using the word **orbit**.

11. What would you like to remember about the meaning of the word **orbit** so that you can use it when you write or speak?
