

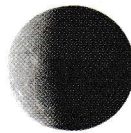
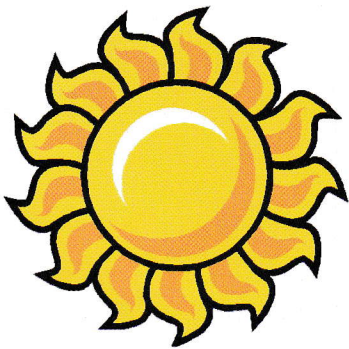
## The Planet Closest to the Sun

Because Mercury is the closest planet to the sun, we will study it next. We actually do not know as much about Mercury as we do about many of the other planets in our solar system, because it is so close to the sun that it is very hard to observe through telescopes. The only spacecraft that has gotten close to Mercury is called “Mariner 10.” Although Mariner 10 collected a lot of information about Mercury, it is still very little compared to what we know about many of the other planets. Of course, we do know *some* things about Mercury, and you will learn many of those things in this lesson.

If you were standing on Mercury, the sun would seem a lot bigger to you. It would seem gigantic because you would be closer to it. And boy, would it be hot and bright!

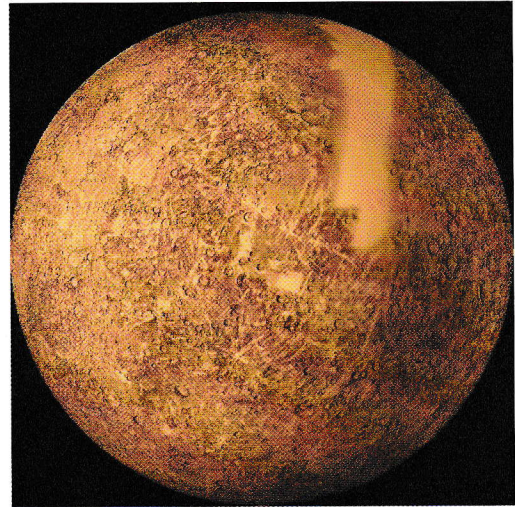
During the day, when the sun is shining on Mercury, it gets sizzling: more than 750 degrees.

That’s hotter than an oven! You might think that since it’s so close to the sun, it would never get cold there. You might think that it’s always hot, but that is not so. Mercury cools down a lot at night, because the sun does not shine then. So, when it is night, Mercury gets colder than a freezer (-300 degrees). The reason this happens is because Mercury does not have much of an atmosphere. As you learned in Lesson 1, the atmosphere is the layer of mist,



The side of Mercury facing the sun is bright, sunny, and warm. The side facing away from the sun is dark, cold, and bleak.

pretty warm at night. Without an atmosphere to hold the heat in during the night, Mercury gets freezing at night. We would never feel very comfortable on Mercury. We would always complain that we were too hot or too cold.



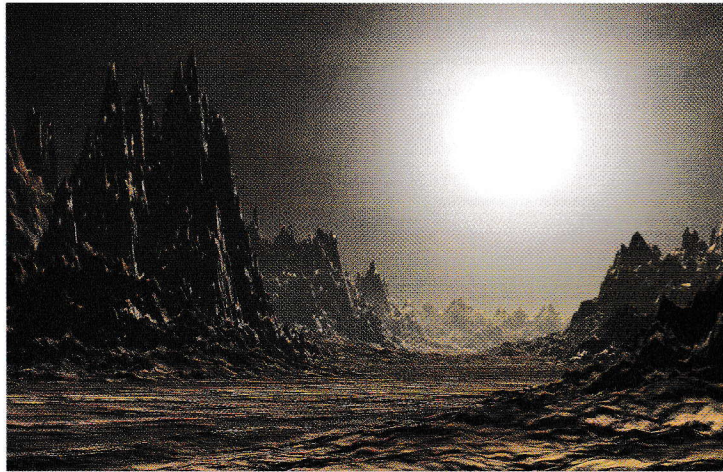
This is a picture of Mercury as taken by Mariner 10. It is actually a composite of several individual pictures. The plain brown patches indicate regions that Mariner 10 could not photograph.

clouds, and gases that covers a planet and holds the heat in. The earth’s atmosphere (we call it “air”) is made up of several gases. You probably know that one of those gases is called “oxygen” and that we breathe it to stay alive. Because Mercury does not have oxygen, we could not breathe on Mercury without a spacesuit.

Earth’s atmosphere holds in the heat from the sun so that the earth stays



Because Mercury doesn't have an atmosphere, the sky always looks dark. There are no air particles to scatter the light waves all over the sky. Remember, the reason the sky looks blue on earth is because particles scatter the sun's blue light across the sky. Can you guess what color the sun would be to someone standing on Mercury? The sun would appear white all the time! Can you explain why? Can you explain why Mercury is so cold at night even though it is right next to the sun?



This is an artist's idea of what Mercury might look like. Notice that although the sun is shining, the sky is dark.

*Digital artwork by Dr. David Heatley*

## Rotation and Revolution

Remember how I explained that a planet spins around in place while at the same time moves in a circle around the sun? The spinning in place is called rotating, and moving in a circle around the sun is called revolving. Planets rotate as they revolve. Of course, one part of the planet is always facing the sun, and the other part is always facing away from the sun. The earth takes 24 hours to rotate once. This means that if you are on the side of the earth that is facing the sun, you will be in the same position (facing the sun again) in 24 hours. We call this an "earth day," because it is the length of time that a day lasts on earth. Compared to the earth, Mercury doesn't spin fast at all. It spins very slowly. Mercury takes 59 earth days to rotate one time. A full day on Mercury would be just under 30 earth days of bright, hot sunshine and just under 30 earth days of cold darkness.

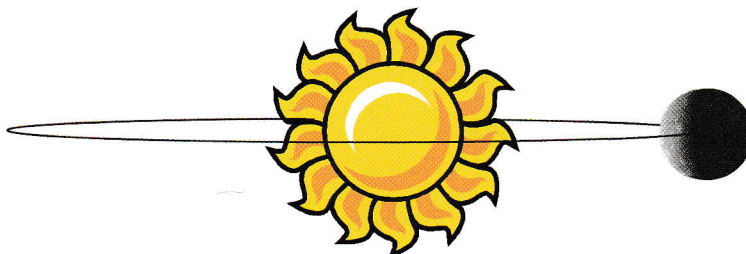
I think we would miss the nighttime if we had to live a full day on Mercury, and we would miss the daylight if we had to spend a full night on Mercury. Imagine going to bed at night with that bright, hot sun still shining through your window and waking up with that bright, hot sun still shining on and on for almost 30 earth days. Imagine it the other way, waking up in pitch dark and spending the day in freezing cold darkness, going to bed, only to wake up to freezing cold darkness again for almost 30 earth days! We can see that God did not intend for people to live on Mercury. There is only one planet just perfectly made for humans- earth! Earth gets dark just about the time we feel tired, and about the time the sun is coming up, we are ready to wake up! It's not by accident that the earth is perfectly suited for our sleep cycle. God made the earth's spin just for us.

Even though Mercury is rotating very slowly, it's revolving around the sun very quickly. It's practically racing around the sun. It only takes 88 earth days for Mercury to make one full trip around the sun. That's pretty fast. Mercury is the fastest planet in the solar system. It takes earth a whole



year, 365 earth days, to revolve all the way around the sun. Strangely, one day on Mercury is only a little shorter than a year on Mercury. After all, a day on Mercury is 59 earth days, while a year is only 88 earth days. If you lived on Mercury, you would be 33 years old on Mercury when you were only eight years old on earth!

Mercury revolves around the sun in an oval pattern, not in a circle. We call it an **elliptical** (ee lip' tik uhl) orbit. If it traveled in a perfect circle around the sun it would always be the same distance away from the sun. An elliptical orbit makes it sometimes closer to the sun and sometimes farther away. How do you think it affects Mercury to be closer to the sun? How do you think it affects Mercury to be farther away?



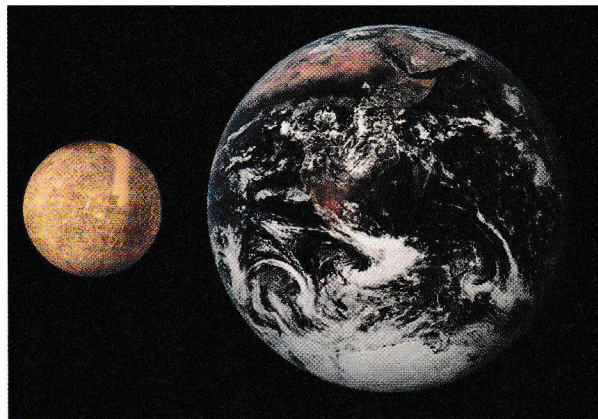
Because Mercury's orbit is elliptical, it is sometimes closer to the sun and sometimes farther away from the sun. In this drawing, it is closer to the sun when it is on the right (where it is drawn), and it is farther from the sun when it is on the left.

Actually, not one of the planets orbits the sun in a perfect circle. They all have elliptical orbits. However, most of the other planets (including earth) have orbits that are almost circular. In other words, even though earth is sometimes a little closer to the sun and sometimes a little farther away from the sun, the difference is very, very small. Because of this, we usually call the orbits of most of the other planets circles, even though they are all actually elliptical. Mercury and Pluto have the two most elliptical orbits in our solar system.

*Can you explain in your own words all that you have learned about Mercury so far?*

## Features of the Planet Mercury

Mercury is small. It is much smaller than the earth. If the earth were the size of a baseball, Mercury would be the size of a golf ball. It's about the same size as our moon. In fact, there is only one planet in the solar system that is smaller than Mercury, and that's the planet Pluto. Later on in this course, you will find out that Pluto is so small that there are those who think it should not even be considered a planet. In the minds of those people, Mercury is really the smallest planet in the solar system.



This is a size comparison of the earth and Mercury.

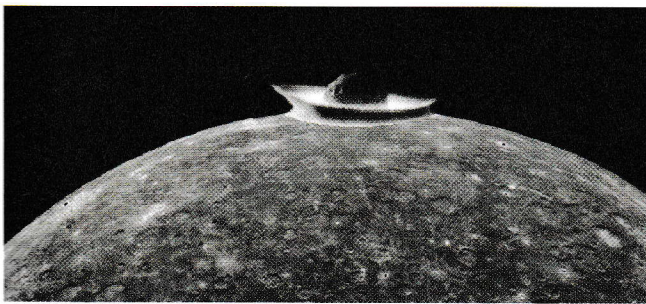


What is Mercury like? It's kind of empty and lonely, like our moon. If you stepped on Mercury you would get dust all over you, because it's very dusty and dry. Mercury has many craters on its surface. A crater is a large dent on the surface of the planet. It is a place where space rocks, called **asteroids** (as' tuh roids), crashed into Mercury, leaving big gigantic dents. If you have ever had a sandbox, it would be like dropping rocks into the sand and then picking them up to see the dents they left. We will make craters in flour at the end of this lesson. Craters are kind of like a scar on the surface of a planet. Do you have any scars? If so, they are not as big as the craters on Mercury, because Mercury's largest crater is as big as the state of Texas! If you stood on the edge and looked down into the crater, it would be a long, long way down to the bottom.



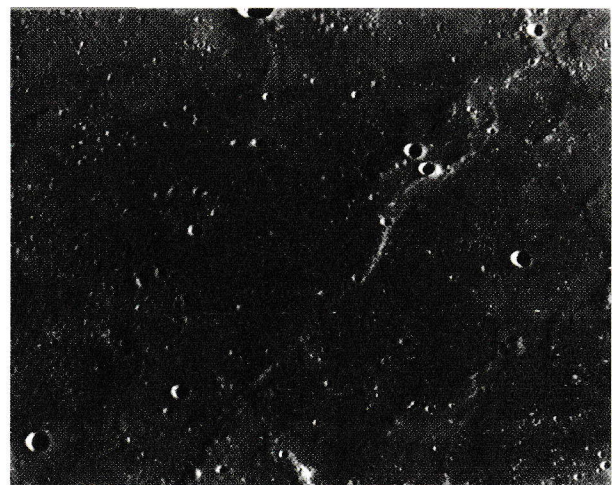
This is a picture of Mercury's surface.

Astronomers believe that asteroids fell out of the sky and crashed into Mercury, leaving all these craters on the surface. The asteroids could have come from a planet that exploded at one point in time. Many believe that there was once a planet between Mars and Jupiter that exploded and sent pieces of it flying into space. The planets and moons that did not have strong atmospheres to protect them would have received a lot scarring if such a thing actually happened. The earth's atmosphere burns asteroids up in the air before they reach our planet. Mercury doesn't have this protection, so if thousands of monstrous-sized rocks flew into Mercury, they would have caused huge pits on its surface.



This is an artist's idea of what it might have looked like when a large asteroid crashed into Mercury.

Amazingly, parts of Mercury have no craters. The fact that parts of Mercury are craterless is difficult to understand for those who believe that the solar system is millions or billions of years old. You see, over millions or billions of years, every part of the planet would have gotten hit many, many times by falling asteroids. Scientists know that the chances of some parts of Mercury never getting craters over billions of years is next to impossible. The best explanation for why Mercury has sections with no craters is that the solar system is not millions or billions of years old. However, scientists who want to believe that the solar system is that old have come up with another explanation. They say that the



Although most of its surface is pitted with craters, parts of Mercury are almost craterless. Note how few craters there are in this photo.



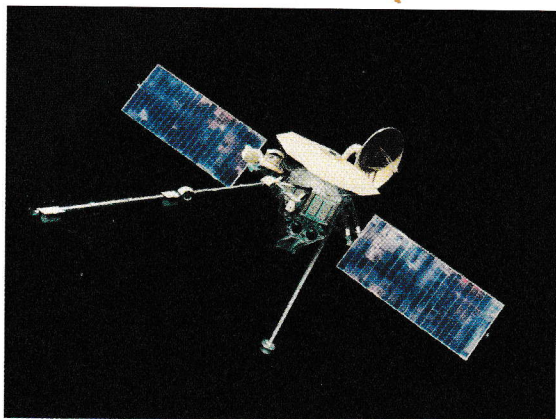
craterless sections are the “new” parts of Mercury. According to these scientists, the “new” parts of Mercury were formed recently by volcanic eruptions. Since these sections are not very old, they have not had time to be struck by asteroids yet, so they have no craters. Of course, we know that God created the whole planet of Mercury instantly, with only a Word. I also believe that the *whole planet* is not nearly that old, because I think the Bible tells us that God spoke it into existence only a few thousand years ago.

Mercury is a rocky planet. We call it a **terrestrial** (tuh res’ tree uhl) planet. Terrestrial means “earth like.” Now of course, this doesn’t mean that a terrestrial planet is *a lot* like the earth. It just means that the planet is solid. In other words, you can stand on its surface. There are five terrestrial planets in our solar system. The other four planets are (believe it or not) **gaseous** (gas’ ee us) planets. This means they are made of gas. In other words, they are not solid; they don’t have ground to stand on. You cannot land on a gaseous planet, because you would sink into it.

Scientists believe the inside of Mercury has the same material as the inside of the earth. This would mean that Mercury has an iron and nickel core. The core is the very center of the planet, just like the core of an apple is the center of the apple.

## Spacecraft to Mercury

No man has ever gone to Mercury, but we have sent a spacecraft to Mercury to get information for us. Only one spaceship has ever been to Mercury. As I told you at the beginning of the lesson, it



This is an artist’s idea of what Mariner 10 looked like as it traveled through space.

was called “Mariner 10.” No person was on Mariner 10. We call it an **unmanned spacecraft** because there were no people on it. Even though there were no people on the spacecraft, there were many, many scientific instruments onboard. These instruments allowed the spacecraft to collect all kinds of interesting information about the planets it visited.

Mariner 10 was launched in November of 1973, and its mission was to take pictures of and collect information about Venus and Mercury as it flew past them. Mariner 10 reached Venus in February of 1974.

After scientists used Mariner 10’s instruments to study Venus, they sent the spacecraft signals that caused it to head to Mercury. It reached Mercury in March of 1974, and it was able to fly past Mercury again in September of 1974 and again in March of 1975. Most of the information we have about Mercury came from Mariner 10.



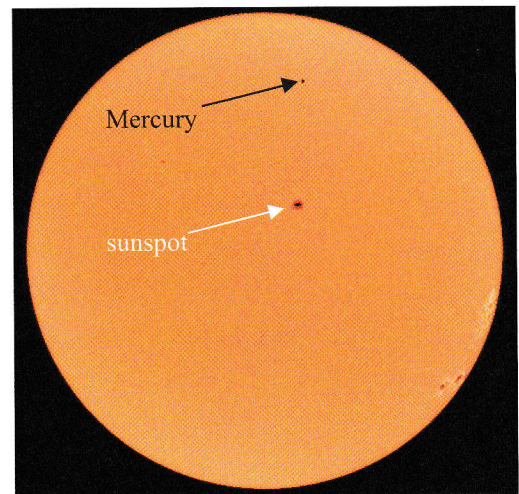
How old was your mother in 1974? Ask your mom what year she was born, then do a subtraction problem. Take the year your mother was born and subtract it from 1974. That will tell you how old she was when Mariner 10 first visited Mercury. For example, if your mom was born in 1968, you would do the problem like this:

$$\begin{array}{r} 1974 \\ -1968 \\ \hline 6 \text{ years old!} \end{array}$$

Although no spacecraft has visited Mercury since 1975, NASA plans for another spacecraft (called MESSENGER) to visit Mercury in 2009. You can learn more about this new NASA mission to Mercury by going to the course website I told you about in the introduction.

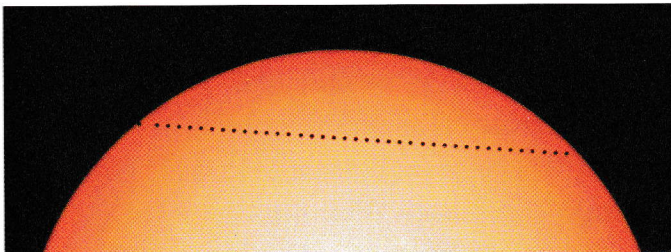
## A Trip Across the Sun

Because Mercury is closer to the sun than we are, it can sometimes come between the earth and the sun. As you learned in Lesson 2, when the moon comes between the earth and the sun, we call it a solar eclipse, and the moon can actually block out the sun. Well, since Mercury is much farther away from us than the moon, it cannot block out the sun. However, it can block out a tiny portion of the sun, forming a small, black dot. That's what the picture on the right shows. The tiny black dot pointed out by the black arrow in the picture is there because Mercury is between the earth and the sun, blocking out that portion of the sun's light. When astronomers see this, they say that Mercury is "transiting the sun," because "transit" means "to pass over."



This is a photograph of the sun during the Mercury transit of May 7, 2003.

Because Mercury is traveling around the sun, if you were to watch a transit of Mercury, you would see the black dot move across the sun. Scientists took several photographs of the sun during a recent Mercury transit, and then they compiled them into a composite (kahm pahz' it) picture that shows the position of Mercury at different times during the transit. The word "composite" means "made up of many parts." A composite picture, then, is made up of many pictures. Look at the "trail" of black dots in the picture. It shows you the path Mercury took as it traveled across the sun.



This is a composite photograph of the upper portion of the sun during the May 7, 2003 Mercury transit. It shows you how Mercury traveled in front of the sun during the transit.

## Who Named Mercury?

Sadly, the Romans who first named Mercury did not know God. Jesus had not come to save the people of the world from their sins yet. The Romans worshipped idols and named the stars in the sky after these idols. The Romans noticed that Mercury moved in the sky very quickly as compared to the other planets. After all, Mercury's orbit is so fast that it travels around the sun four times in just one earth year! Because of this, the Romans named Mercury after the god of travel. You will be happy to know that when Jesus came, many Romans gave up their false gods and became Christians. Eventually many of the people in the city of Rome became followers of Christ, and Christianity became the major religion there. It's too late to rename the planet something else, but we can be happy that Christianity is still the major religion in that part of the world today.

## How to Find Mercury in the Sky

Did you know you can see Mercury without a telescope? You can see it either just before the sun comes up in the morning or just after the sun goes down in the evening, but not in the middle of the night. It's so close to the sun that we can't see it at night, when we are facing away from the sun. If you look carefully in the sky, toward the rising or setting sun, you may just spot this special planet very close to the horizon. It looks like a star because the sun's light shines upon it and makes it light up. Even though it shines like a star, there is really no light coming from Mercury. The light that we see is just the sunlight reflected off Mercury's surface. Mercury is hard to find because it is often hidden from our view by the glare (bright rays of light) from the sun.

Even though Mercury is very hard to find the sky, you might want to try. You can get some help finding Mercury by going to the course website that I told you about in the introduction. The website will have links to places that will show you where Mercury can be found if it is visible when you are looking for it.

## What Do You Remember?

Let's see what you remember about Mercury. How long is a day on Mercury? How long is a year on Mercury? Which is longer, a day or a year? Does Mercury orbit in a circle or in an oval around the sun? What is the shape of Mercury's orbit called? Is it hot or cold on Mercury? Why is it so cold at night? What kind of planet is Mercury: terrestrial or gaseous? What does the surface of Mercury look like? What are some reasons it might look like this? What would the sky look like if you were on Mercury? Why? When is the best time to see Mercury? Why?