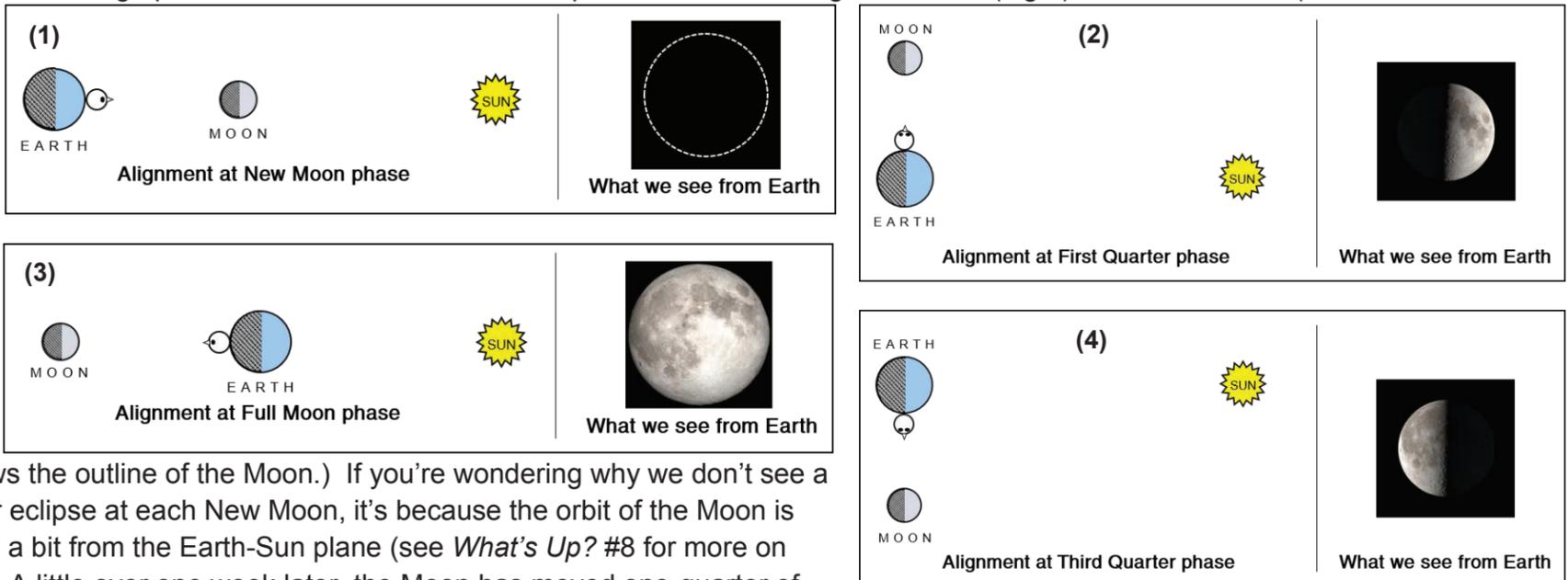


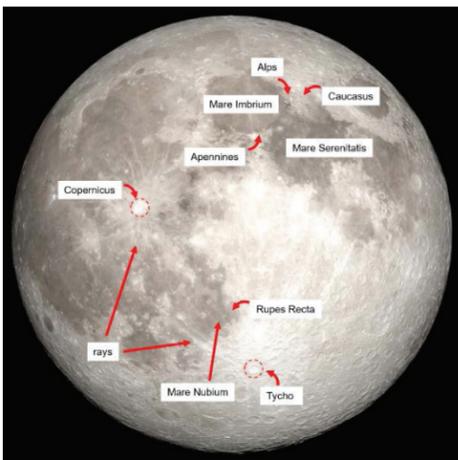
# WHAT'S UP?

Hi. Have you gotten outside in the evening and looked at the Moon? I hope the mini-guide I wrote to support your observations was useful. This coming week we can watch the Moon move through its First Quarter phase (the night of the 27<sup>th</sup>/28<sup>th</sup>) to an almost Full Moon. Before considering features to look for, let's take a quick look at why the Moon's appearance changes as we see it from Earth, with the help of Figures 1-4, below. The phases repeat every 29½ days.

Let's start with the New Moon phase (1). As the Moon orbits Earth, once each trip it lines up with the Earth and the Sun so that, looking down from above the plane of our Solar System, the lineup is Earth-Moon-Sun. Imagine that the face in the diagram is you and that you are looking up at the Moon. At the New Moon phase, we are looking at the dark (night) side of the Moon (the dotted circle



shows the outline of the Moon.) If you're wondering why we don't see a solar eclipse at each New Moon, it's because the orbit of the Moon is tilted a bit from the Earth-Sun plane (see *What's Up?* #8 for more on this.) A little over one week later, the Moon has moved one-quarter of the way through its cycle. We call this the First Quarter Moon (2). One quarter of a cycle later, the Moon has finished two quarters, or half, of its journey; Earth, Moon, and Sun again line up. This time the Earth is in the middle, and we see a Full Moon (3). From here, the Moon moves to the Third Quarter phase (4). We can abbreviate the quarter phases as 1Q and 3Q. When can we see the Moon at each of these phases? People often remark at seeing the Moon during the daytime, and wonder why. Well, the fact is for fully one-half of each lunar cycle, it's usually quite easy to see the Moon in the daytime. Let's walk through the cycle of the Moon's rising and setting times. When New, we can't see it at all. But, if we could, since it lies in the same direction as the Sun, we would see it rise at dawn and set at sunset. At 1Q, the Moon rises at noon and sets at midnight. It is now far enough away from the glare of the Sun that we can see it in the afternoon. The Full Moon, being opposite the Sun, rises at sunset and sets at dawn. At 3Q, the Moon, rises at midnight and sets at noon. During the half-cycle from 1Q to 3Q we can easily see the Moon in the daytime. Now on to what to see on the Moon's surface this week.



On Saturday night, the Moon is near 1Q. We see the Moon in the shape of a semicircle. If the Moon is a half-circle, why call it the First Quarter? Well, now that you've seen diagrams of one full lunar cycle, you know the answer. This phase is ¼ of the way from one New Moon to the next. On Sunday or Monday, telescope and binocular users should direct their sights to the right side of the dark patch on the terminator in the southern half of the Moon. The dark area is *Mare Nubium* (Sea of Clouds). In the sea is a straight line running northwest-southeast. This feature is *Rupes Recta*, Straight Wall – a 60-mile-long cliff located along a fault line in the Moon's crust. The dark line you see is the shadow of the cliff. If you're not using any viewing equipment except your eyes, look towards the northern portion of the Moon. By now, you'll see all of *Mare Serenitatis* and about half of another sea coming into the light – *Mare Imbrium* (Sea of Showers or, Sea of Rain.) Almost all of Imbrium will be visible by Tuesday evening. Note how almost perfectly round it is. Like all of the maria, Mare Imbrium is a smooth area of lava that flowed to the surface after the Moon was impacted by a large meteor. The meteor impact formed a crater (one that was 760 miles wide!) and molten rock oozed to the surface and solidified. Associated with these maria, are the mountain ranges along their borders. Along the southeastern rim of Mare Imbrium is a curving mountain range – *Montes Apenninus* (Apennines). About 370 miles long, it has peaks over 16,000 feet high. Near the northern end of this range is Mount Hadley, near where the lunar module *Falcon* (Apollo 15) landed 49 years ago. The northeastern border of Imbrium is marked by *Montes Alpes* (Alps) and the northwestern corner of Serenitatis is bounded by *Montes Caucasus*.

July 1<sup>st</sup>, the Moon is 11 days old and we can see over 85% of the Earth-facing surface. Two prominent craters are visible, *Tycho* and *Copernicus*. Tycho is in the south and is a 52-mile-wide, 3-mile-deep circular crater with peaks in the center reaching a mile in height. Rays from Tycho can be seen stretching out over the lunar surface for up to 900 miles! These are streams of rock that were ejected when the meteor that formed the crater struck. A bit to the west of the center of the Moon is a very bright crater – *Copernicus*. It is 58 miles wide and it too, has rays. The Apollo 12 mission landed near one of the rays in the hopes of sampling material from the impact that formed Copernicus. The craters are named after astronomers Tycho Brahe and Nicolaus Copernicus. Enjoy the Moon this week!

You can reach me at [astroblog@comcast.net](mailto:astroblog@comcast.net) with any questions and comments you have. This is *What's Up?* Installment #23.

Until next time, Keep looking up!

*Barry*