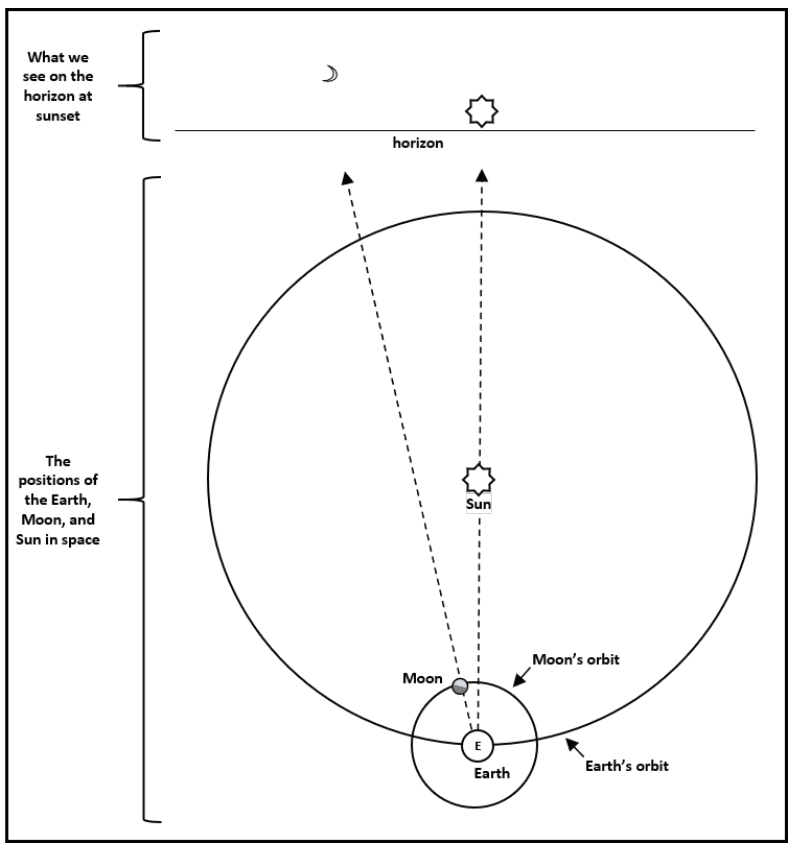
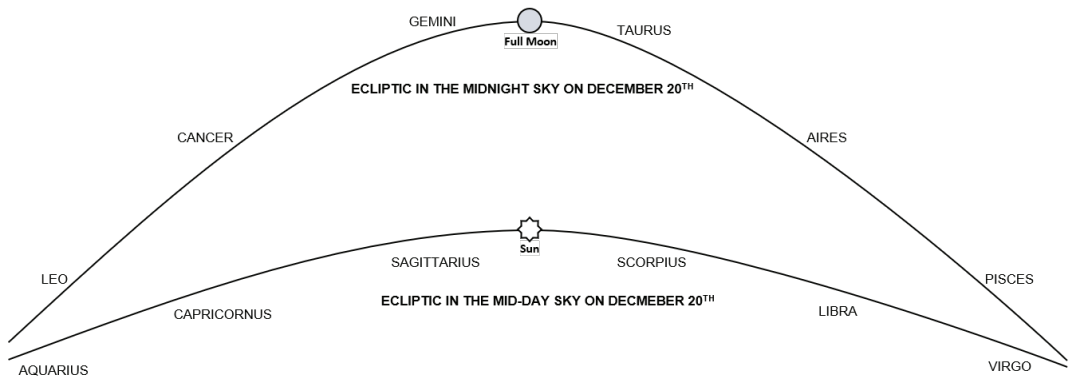
WHAT'S UP?

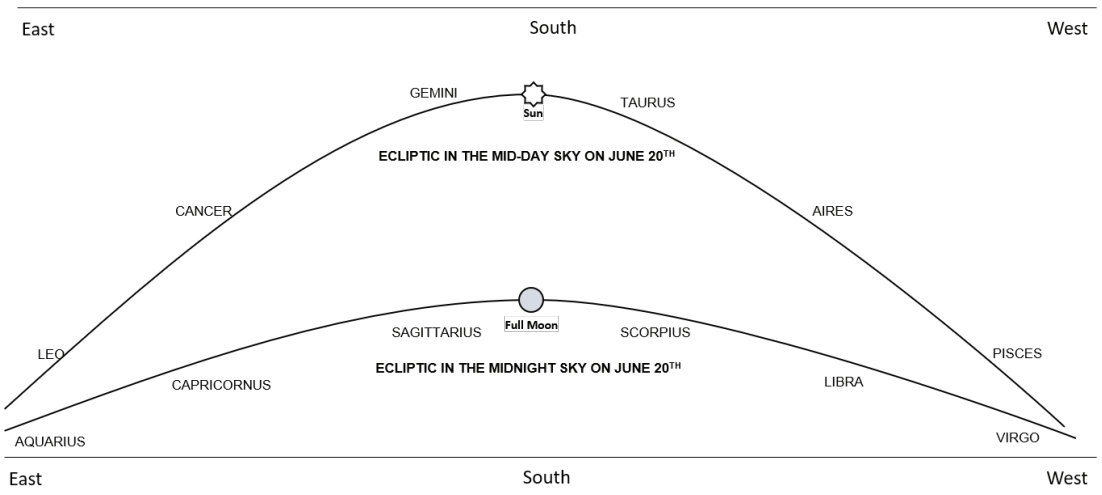
Hello. A reader asked me why they were seeing the Moon "way over there" when before, they had noticed it "way over here". So, I thought others might like to hear the answer, and that's the topic of this installment. The answer is because of a combination of two motions – the Moon's monthly motion around the Earth and the Earth's yearly motion around the Sun. Let's start with where we'll find the Moon a few days into each lunar cycle. Last June and July, when we looked at what to see on the Moon's surface and when to see it, we used a diagram similar to this to depict the positions of the Earth, Moon, and Sun at the time of a New Moon.



A couple of days *past* the New Moon phase, we see the Moon as a crescent to the left of the Sun at sunset. Here is a diagram of what we see and how the Earth, Moon, and Sun are positioned relative to each other in space. We can see that when the Moon is just past New, we see a waxing crescent Moon near the Sun at sunset. In the past, we have also discussed how, because the Earth's rotational axis is tilted 23-½ degrees with respect to the plane that the Earth orbits the Sun in, the Sun appears north of the celestial equator in the summer and south of the celestial equator in the winter. So, just as the Sun sets "over there" in the summer and "over here" in the winter, we'll see a waxing crescent Moon "over there" and "over here" at different times of the year, too.

Now, let's think about where we see the Full Moon. When we see a Full Moon, the Earth, Moon, and Sun are aligned as in this diagram. The Earth is in between the Moon and the Sun. Since the Moon and the Sun are on opposite sides of the Earth, they will appear opposite each other in our skies. In the winter, when the Sun is low in the southern sky at mid-day, the Full Moon will be high in the sky at midnight. In the summer when the Sun is high in the sky at mid-day, the Full Moon will be low in the sky at midnight. I've shown these positions in these two drawings. At other phases of the Moon, these effects occur too. It would take too many diagrams to show all of it. If you can remember these positions at the extreme points (at the just-past-New Moon and at the Full Moon), the other positions will fall in between.





I hope this all makes sense to you. If it doesn't at first, don't worry. I think that if you keep a watchful eye on the positions of the Sun and the Moon during the year (and note them in the notebook), over time you'll come to understand and then predict(!) these positions and relationships. I'll all a part of connecting ourselves with the universe.

One more thing before I conclude this installment. On Thursday, June 10th, when the Sun rises (a bit after 5:00 a.m.), it won't be quite as bright as usual! On that morning, we'll be treated to a partial annular solar eclipse. By the time it rises for us, the midway point will be past and the Sun will be about 80% eclipsed. The event will end about 6:30 a.m. Do not look directly at the Sun. As with a total solar eclipse, or with the transit of Mercury we witnessed in 2019, you must use a solar filter or project an image of the Sun onto another surface. You can look at *What's Up?* Installment #8 from November 1st, 2019 for more information. These are the only safe ways to view this. An annular solar eclipse differs from a total solar eclipse in that at maximum eclipse, the Sun is not completely covered by the Moon – a little ring of the Sun can still be seen around the darkness of the New Moon. This happens when the New Moon is at or near its furthest distance from the Earth and appears a bit smaller than when it is closer. Appearing smaller, it doesn't quite cover the entire disk of the Sun.

As always, you can reach me at astroblog@comcast.net with any questions and comments you have. This is What's Up? Installment #45. Keep looking up!

Barry