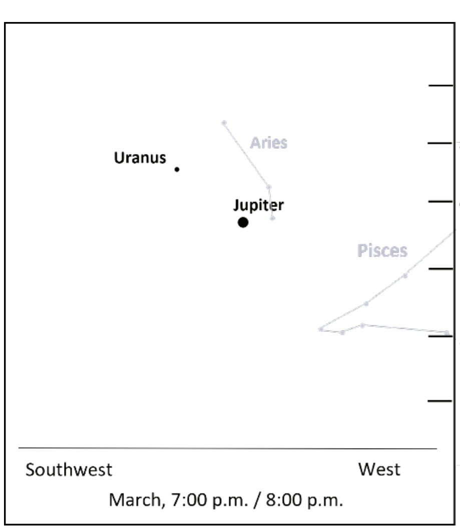
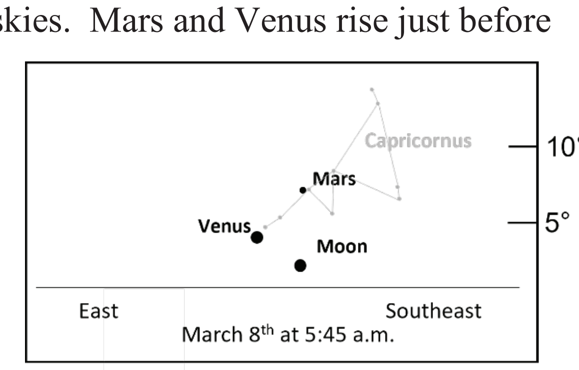
WHAT'S UP?

Hello! Time keeps on slippin', slippin', slippin' into the future. Truer words were never sung! We humans like things to be kept nice and tidy. We have devised calendars to keep track of the risings and settings of the Sun as the Earth spins on its axis. One spin on our axis is one day. Our calendars also keep track of how far along we are in our orbit around the Sun. Once around the Sun is one year. We count off 365 days in each year. Nice and tidy. Our universe works under other constraints. The force of gravity between the Sun and the Earth causes the Earth to circle the Sun instead of moving straight away on a tangent to our orbit. The time it takes the Earth to orbit the Sun is affected by the mass of the Sun, the mass of the Earth, and the distance between the Sun and the Earth. When these are all factored in, it turns out that it takes the Earth just under 365¼ days to orbit the Sun, not 365. So, after 365 days, the Earth as seen from the Sun is not in the exact same position against the background stars as it was when the year started. It is a wee bit short of making one full orbit. This isn't a big deal after a year, but if we let it go on, we would wind up with snow on the Fourth of July and we would be sweltering on New Year's Day. This would not do! We can see that after one year, we've gone ¼ day less than one full orbit. After two years, we are a total of ½ day short of where we should be. After three years, we are ¾ day short, and after 4 years, we're a full day short. Enter – the Leap Day – to tidy this up a bit. By adding an extra day once every 4 years, we get our calendar back in sync with the stars. Whew! Right? Well, only kinda sorta. Remember that I said it takes the Earth just *under* 365¼ days to orbit the Sun? Because it takes just *under* 365¼ days, it means that by adding a full day every four years, we are *overcorrecting* for the discrepancy between our actual orbital period and our position among the stars! By the late 16th century, the calendar was out of whack by 10 days. What do we do? Simple – after instantaneously adding 10 days to the calendar (in 1582, we went from Thursday October 4th to Friday October 15th), every 100 years, we skip a Leap Day. For example, if you check old calendars, you'll find that the years 1800 and 1900 don't have Leap Days in them. But wait – many of us were alive in 2000 and we remember having a Leap Day. It turns out that skipping a Leap Day every 100 years is a bit of an *under-correction* to our calendar, so once every 400 years, we keep the Leap Day in! Oh, how nice and tidy it all is. You got it? The rule is that we have a Leap Day in every year that is evenly divisible by 4 (e.g., 1980, 1984, 1988, etc.) *except* we skip the years that are also evenly divisible by 100 (e.g., 1800 and 1900) *except* if those years are also evenly divisible by 400 (e.g., 2000). For those of you with your calculators or slide rules at the ready, the orbital period of the Earth around the Sun is 365.2422 days. Check out how this all comes together. It's still not exact, though. When we add the Leap Day every 400th year, we are overcorrecting again. Oh, I almost forgot…our Leap Day happens at the end of February. So, this year we had a February 29th in between February 28th and March 1st. I hope you all used the extra day well!

A more frequent tweaking to our time reckoning, is the switching to and from Daylight Savings Time. This has no origins in astronomy. This month we turn our clocks ahead one hour in the early morning hours of Sunday, March 10. We jump from 1:59:59 a.m. straight to 3:00 a.m. This means our sunsets will come later than in the days before the 10th. It is also why in the chart showing the positions of Jupiter and Uranus, I list two times. The first is our sky before the 10th and the second is our sky from the 10th onward into the month.



Planet Roundup: At sunset, Neptune is a mere 8º above the western horizon and will be a challenge to see. Jupiter is still high in the sky and shines brightly in the southwest, about a third of the way up from the horizon. Uranus can be found about 7 degrees above and to the left of Jupiter. That's it for planets in our evening skies. Mars and Venus rise just before the Sun and at dawn on the morning of Marth 8, in the glow of the dawn, the pair will form a compact triangle with an ever-so-slim waning crescent Moon. Get your cameras ready! The 3Q Moon is on March 3rd, the New Moon is on the 10th, 1Q Moon is on the 17th, and the next Full Moon is on the 25th. Regarding the dates of the Moon's phases that I give in this section, remember that the Moon is in constant motion around the Earth and that these points (New, 1st Quarter, Full, and 3rd Quarter) occur at an instance in time. For example, one second before, and the Moon is not precisely Full and one second after it is past being Full. Of course, to our eyes, we can't tell the difference over so short a time and for all intents and purposes, the Moon is "Full" for many hours. That said, the dates that I give in this section are the dates that the *instant* of the phase occurs. So, yes, the next Full Moon is on the 25th, but starting in the evening of the 24th – and all that night long – the Moon will look like a "Full Moon".



You can email me at astroblog@comcast.net with any questions and comments. This is *What's Up?* installment #81.

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