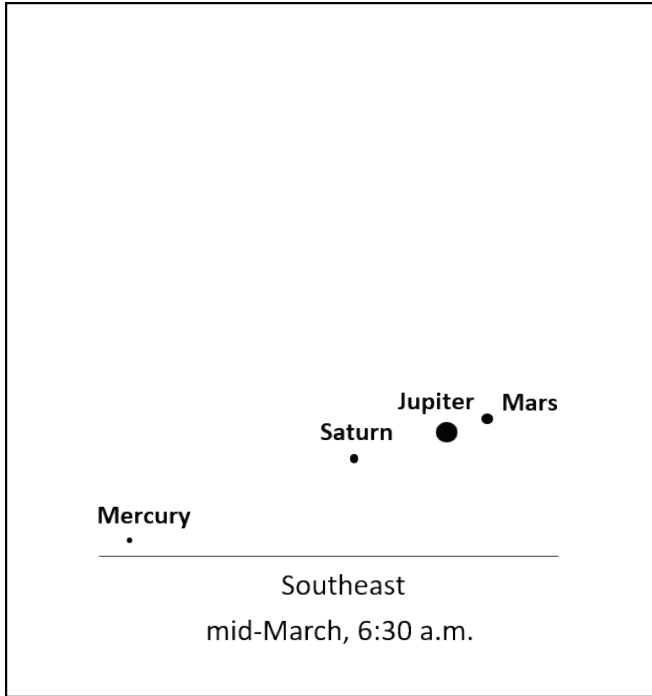
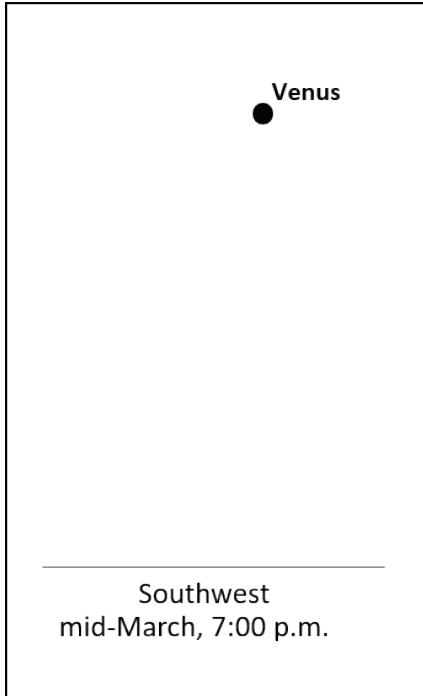


What's Up?



BY BARRY DECRISTOFANO

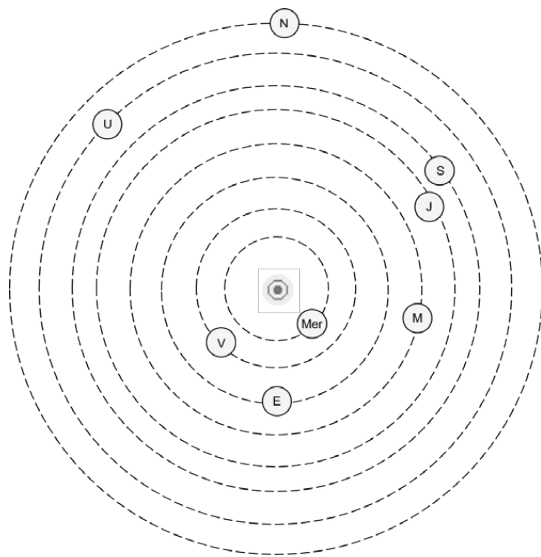


Hi. Sorry for the hiatus, but I'm back with another What's Up?. I hope that everyone has been enjoying seeing brilliant Venus in our evening sky and that the early risers have been watching Mars, Jupiter, and Saturn creep up before the Sun. And now, just before the Sun breaks the eastern horizon, tiny Mercury can be seen, too.

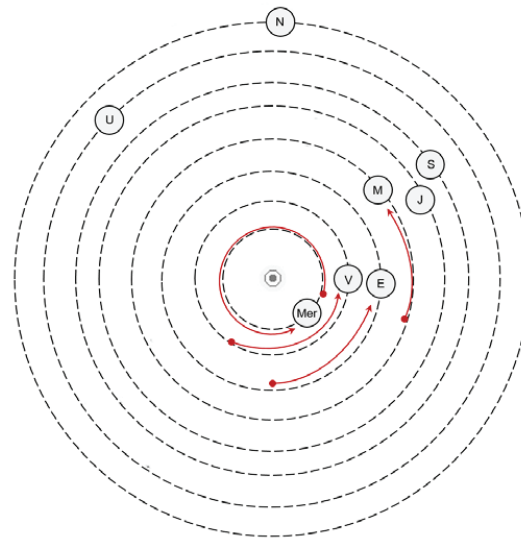
Why do we see the planets where we see them and when we do? The answer is geometry, my dear Watson(s). With the Sun fixed at the center of our Solar System, the Earth and the other planets are constantly in motion around the Sun, and move at different speeds. The closer a planet is to the Sun, the less time it takes for it to go once around in its orbit. This relationship was worked out by Johannes Kepler in 1619. Kepler, with the help of precise data on the positions of Mars at different times worked out the size and shape of Mars' orbit (where he got that data from may be the subject of a future article!). From there, he went on to those of the other planets. Putting it all together, he developed what are now known as Kepler's Laws of Planetary Motion. There are three of them:

- the planets move in elliptical orbits with the Sun at one of the foci
- a planet sweeps out equal areas of its orbit in equal times
- the time it takes for a planet to orbit the sun is related to its distance from the Sun raised to the 3/2 power

It's the Third Law that comes into play here. So, for instance, if we were looking down on our Solar System from above the plane of the Earth's orbit now (in March 2020) and again in June 2020, we'd see the two different views below.



The Planets, March 2020



The Planets, June 2020

Look at how the position of the Earth (E) has changed from March to June. It's been three months, or 1/4 of a year, and the Earth has moved 1/4 of the way around its orbit. Venus (V), closer to the Sun, has move 3/8 of the way around its orbit. Mercury (Mer), closer still to the Sun, has gone entirely around once and is back to where it was in March. Mars (M), further from the Sun than the Earth, has moved 1/8 of the way around its orbit. The outer planets (Jupiter (J), Saturn (S), Uranus (U), and Neptune (N)) have move only a little bit over these three months. In fact, their movement is barely noticeable, if at all.

Now, how do these motions of the Earth and the other planets relate to what we see in the sky? Let's start with the two planets between us and the Sun, Mercury and Venus. Again, looking down from above...

Starting with the evening horizon, we can see Venus about 40 degrees up above the horizon. In the mornings, looking at the horizon, first we see Mercury, then Saturn, then Jupiter, then Mars. Each a little higher up in the sky. I hope that with these words and diagrams, and with you going outside regularly to observe, the positions and motions of the planets in our skies will begin to make sense. It may not at first, but it will. Keep at it! And, as always, write me with questions, comments, and suggestions.

You can reach me at astroblog@comcast.net. This is What's Up? Installment #14.

Keep looking up!

Barry

