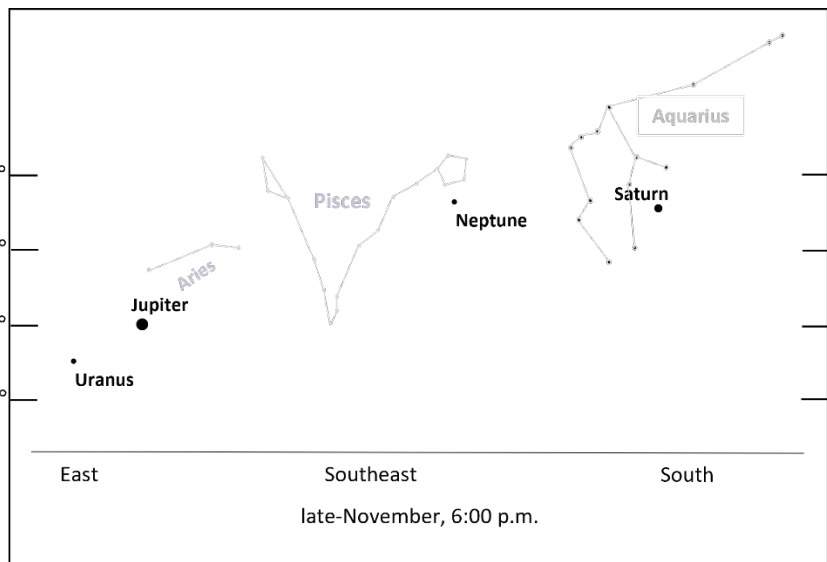


WHAT'S UP?

Hello! It's been a while, so I'd like to catch you up on what's where in our night skies these days. First and probably most notable, is that we've turned our clocks back an hour. That means we can go outside with our eyes, binoculars, telescopes or all of the above and enjoy the sights earlier! The four outer planets are with us all evening now. By the time it gets dark, Uranus, Jupiter, Neptune, and Saturn are arrayed from east to south. Details are described in the Planet Roundup at the end of this



article, and the diagram shows you where to find them. Saturn and Jupiter are easy to spot, but you'll need (at least) binoculars to see Uranus (a greenish disk) and Neptune (a blue disk). Don't be put off by that though – try it! When looking at these four planets remember that they are very far away. Also, think about the fact that we are seeing these planets not as they are at the moment we are looking, but as they *were*. Look at the table of distances to these worlds. They range from one-half of a *billion* to almost *three billion* miles away! At these distances, light – the fastest thing in the universe – takes from ½-hour to more than 4 hours to reach us. Speaking of this light, remember that we are not seeing “planet light”.

We are seeing sunlight. It's the Sun's light that has traveled out to the planet and has been reflected back to our eyes by the planets' atmospheres. We are truly part of a solar system! These four outer planets used to be called the *Gas Giants* because they are mostly gas with only tiny cores. More recently, Jupiter and Saturn are still called gas giants, but Uranus and Neptune are referred to as *Ice Giants*. They are still “gas”, but we now know enough about the temperatures and motion of the gasses to think of them more as “slushes” of gas, hence the term “ice giant”. Oh – and as to the

	distance from Earth (billions of miles)	light time to Earth (hours and minutes)
Jupiter	0.60	33m
Saturn	1.42	1h 19m
Uranus	1.82	2h 35m
Neptune	2.78	4h 4m

“giant” moniker, compared to Earth, they are definitely giants. Neptune is the smallest of the four and is still close to 4 times the diameter (64 times the volume) of Earth. At the extreme end, Jupiter's diameter is a bit over 10 times the size of the Earth's diameter. That is 1000 times the volume of Earth! If you are using a telescope to view Jupiter and Saturn, you are likely to spot one or more small white dots about in the same line as the planets' equators. These are (most likely) moons. While the Earth has just one moon, Jupiter is known to have at least 95 and Saturn, at least 84! To know the positions of these planets' brightest moons when you are viewing them, I recommend using one of the apps published by *Sky & Telescope* magazine. For Jupiter's moons, go to <https://skyandtelescope.org/observing/jupiters-moons-javascript-utility/>. For Saturn's go to <https://skyandtelescope.org/observing/interactive-sky-watching-tools/saturns-moons-javascript-utility/>.

Did you see any meteors from the annual *Leonids* meteor shower? Each year, the peak of this shower falls around the 18th to 20th of November (before the date of this writing). While some past occurrences have been spectacular, the best ones happen in 33-year intervals and we are not due for another big one until the early 2030s. The 33-year cycle is the result of the orbital period of the periodic comet 55P/Tempel-Tuttle. It is bits of dust from this comet that create the bright streaks of light in our skies. This year, the best nights to look of these meteors will be the 17th and 18th. This shower is called the Leonids because the meteor trails seem to originate from a point located in the constellation *Leo the Lion*. Next time, I'll give you a report on how things went this year.

Planet Roundup: By 6:00 p.m., Saturn is about 35 degrees above the south-southeastern horizon. At magnitude 0.8, it easily stands out this part of the sky. Neptune is just as high up as Saturn and about 25 degrees (two and a half fists-width, held at arm's length) to the left (east). The brilliant ‘star’ about 20 degrees above the eastern horizon is Jupiter. At magnitude -2.8, it outshines everything in the sky at sunset. Uranus is next in line, about 12 degrees to the left and below Jupiter, and about 15 degrees above the horizon. For you early risers out there, Venus peeks above the eastern horizon at 3:30 a.m. At magnitude -4.2, it is about 3½ times as bright as Jupiter. What about Mercury? The innermost planet is low in the southwest as the Sun sets, but is too close to the Sun to be seen now. The Full Moon occurs on the 27th, the 3Q Moon is on December 4th, the next New Moon is on the 12th, and the 1Q Moon is on the 19th. You can reach me at astroblog@comcast.net with any questions and comments. This is *What's Up?* installment #77.

Barry