What’s in the sky tonight?

When does the Sun set, and when does twilight end? Which planets are visible? What time does the Moon rise? Welcome to the Skygazer’s Almanac 2019, a handy chart that answers these and many other questions for every night of the year. It is plotted for skywatchers at latitude 40° north — in the United States, the Mediterranean countries, Japan, and much of China.

For any date, the chart tells the times when astronomical events occur during the night. Dates on the chart run vertically from top to bottom. The time of night runs horizontally, from sunset at left to sunrise at right. Find the date you want on the left side of the chart, and read across toward the right to find the times of events. Times are labeled along the chart’s top and bottom.

In exploring the chart you’ll find its day-to-night patterns offer many insights into the rhythms of the heavens.

The Events of a Single Night

To learn how to use the chart, consider some of the events of one night. We’ll pick January 6, 2019.

First find “January” and “6” at the left edge. This is one of the dates for which a string of fine dots crosses the chart horizontally. Each horizontal dotted line represents a night from a Sunday evening to Monday morning. The individual dots are minutes apart.

Every half hour (six dots), there is a vertical line dot through it parallel to the white event line. See where your line intersects the sidereal-time scale at midnight. (A star’s event line enters the top of the chart at the same time of night it leaves the bottom. Sometimes one of these segments is left out to avoid crowding.)

Near the midnight line is a white curve labeled Equation of time wording narrowly right and left down the chart. If you regard the midnight line as noon, for a moment, this curve shows when the Sun crosses the meridian and is due south. On January 6th the Sun runs slow, transiting at 12:06 p.m. This variation is important for reading a sundial. It is caused by the tilt of Earth’s axis and the ellipticity of its orbit.

Polux transits at 12:40 a.m., as does Regulus at 3:03. Then brilliant Venus rises at 4:33, followed by Jupiter at 4:55. Four minutes later a star we usually associate with a much later season, Antares, pops up in the southeast.

The first hint of dawn — start of morning twilight — comes at 5:45 a.m. And this morning elusiv Mercury rises at 6:33, well before the Sun. The Sun finally peaks above the horizon at 7:22 a.m. on January 7th.

Other Charted Information

Many of the year’s chief astronomical events are listed in the chart’s evening and morning margins. Some are marked on the chart itself.

Conjunctions (close pairings) of two planets are indicated by a ♐ or ♐ symbol on the planet’s event lines. Here, conjunctions are considered to occur when the planets actually appear closer in the sky (at appulse), not merely when they share the same ecliptic longitude or right ascension.

Opposition of a planet, the date when it is opposite the Sun in the sky and thus visible all night, occurs roughly when its transits are 180 degrees apart (at appulse) to the white line (not the line for midnight). Opposition is marked there by a ♐ symbol, as for Saturn on the night of July 8–9.

Moonrise and moment can be told apart on the chart. Month — the Moon’s phase — is on the right (waxing Moon sets) or left (waning Moon rises). Or follow the nearly horizontal row of symbols across the chart to find the word Rise or Set. Quarter Moons are indicated by a large symbol. It informs how large a bright disk whether rising or setting; the circle for new Moon is open. A and M dates marks when the Moon is at perigee and apogee (nearest and farthest from Earth, respectively).

Mercury and Venus never stay far from the twilight bands. Their dates of greatest elongation from the Sun are marked by symbols on their rising or setting curves. Asterisks mark their dates of greatest illuminated extent in square arcseconds. For instance, this occurs for Mercury on the evenings of February 20th and June 18th, but not at all for Venus this year.

The Sun’s transit across the meridian is marked with a starburst symbol on the date of peak activity and at the time when the sun’s radiant is highest in the night sky. This is often right runs Mars, a thin sliver of a line, begins. Julian dates can be found from the numbers just after the month names on the chart’s left. The Julian day, a seven-digit number, is a running count of days beginning with January 1, 4713 BC. Its first four digits this year are 2458, as indicated on the chart. And it shows the Sun is at the Winter solstice, or at the bottom. Sometimes one of these segments is left out to avoid crowding.)

To convert the charted time of an event to your civil (clock) time, the following corrections must be made. They are mentioned in order of decreasing importance.

Daylight-saving time. When this is in effect, add one hour to any time obtained from the chart.

Your longitude. The chart gives the Local Mean Time (LMT) of events, which differs from ordinary clock time by a number of minutes at most locations. Our civil time zones are standardized on particular longitudes. Examples in North America are Eastern Time, 75° W; Central Time, 90° W; Mountain Time, 100° W; Pacific, 120°. If your longitude is very close to one of these (as is true for New Orleans and Denver), luck is with you and this correction is zero. Otherwise, to get standard time add 4 minutes to the chart’s time for each degree of longitude that you are west of your time-zone meridian. Subtract 4 minutes for each degree you are east of it.

For longitudes more than 180°, markers are obtained from the chart. The result is Eastern Standard Time.

Find your time adjustment and memo it. The table below at left shows the corrections from local to standard time, in minutes, for some major cities.

Skygazer’s Almanac 2019 is a supplement to Sky & Telescope magazine. ©2019 F+W Media, Inc. All rights reserved.

For reprints (item SGA19, 14 9 x 15 postcard) or to order a similar chart for latitude 50° north or 40° south, contact Sky & Telescope, 90 Sherman St., Cambridge, MA 02140, USA; phone 888-253-0220, fax 617-864-7222; e-mail to sky行政执法office@skyandtelescope.com, or you can order online at skyandtelescope.com.