Name:_____ Section:_____
Date:_____

Lab#1 - SKYGAZER'S ALMANAC

From time to time, you might need information such as the time of sunrise or sunset, the phase of the moon on a particular night, and so on. Astronomers often need even more specific information so that they can plan observing sessions, note the nights that particular sky phenomena will occur, and become aware of the rhythms found within the motions of the Moon, the planets, and the stars. The graph you are about to work with presents all this information for a given year in graphical form.

The Skygazer's Almanac is a graph that presents times for sunrise and sunset, but also includes information for moonrise and moonset, the risings and settings of planets and other sky objects, and other phenomena of astronomical interest. If you learn how to use this tool, you will find yourself referring to it often during your study of astronomy.

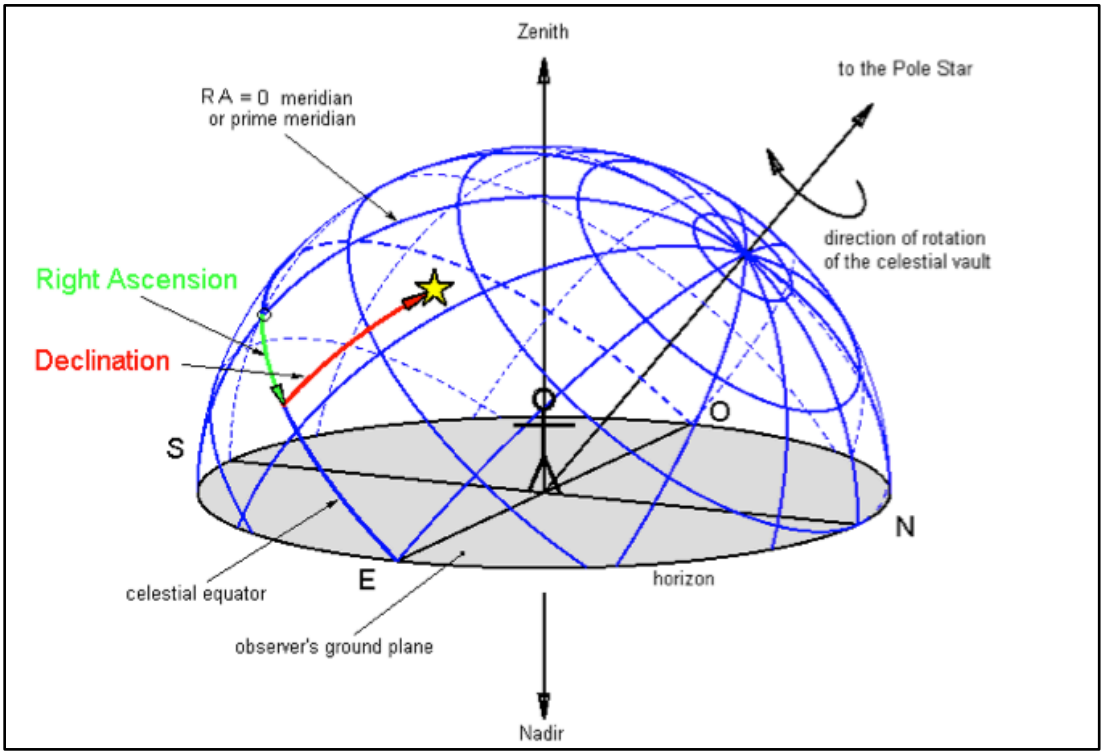

Figure 1 - Illustration of celestial terminology

Some of the terminology used is illustrated in the figure above. The lines that look like latitude on the half globe are the some of the paths astronomical objects can follow across the sky. The Sun and other celestial objects rise in the east and set in the west because the Earth rotates on an axis. The rise and set time are the times when the object reaches the extended horizons toward the east and west, respectively. The meridian is the arc (similar to a ling of longitude on the half globe above) that connects

due south and due north on the horizon through the point directly overhead, also called the *zenith*. When the object reaches its highest point above the horizon on its arc we say it *transits the meridian*. Note that an object transiting is not necessary at zenith!

ON THE BACK OF THE ALMANAC

Carefully review the section **"The Events of a Single Night"** for instructions in how to read the almanac using the provided example. Define the following astronomical terms *in your own words*:

1. Twilight

2. Transit

3. Conjunction

4. Opposition

5. Julian day

COMPONENTS OF THE GRAPH

6. Vertical lines correspond to the scale at the top and bottom of the almanac. What does one vertical dotted line represent?

7. How much time does each dot on the vertical lines represent?

8. Horizontal lines correspond to the scales on the left and right of the hourglass shaped almanac. What does one horizontal dotted line represent?

9. How much time does each dot on the horizontal lines represent?

10. What is the day of the week is each **numbered** horizontal line before midnight?

11. Compare the dates along the left and right sides of the almanac. Is it the same day when you follow one line from the left past midnight to the right side?

12. Take note of the following lines and curves in the almanac. These lines refer to important events that occur throughout the night.

    - Sunset line
    - End of evening twilight
    - Midnight line
    - Beginning of morning twilight
    - Sunrise line

13. There are many other diagonal lines plotted on the almanac. In the space below, name five of these lines, and for each line give its color.

    a.

    b.

    c.

    d.

    e.

SYMBOLS FOUND ON THE GRAPH

The graph contains special symbols in addition to a moon phase symbol for each night. Look at the symbol table on the bottom of the front of the Almanac. Draw each symbol to the right of its description.

- New Moon
- First Quarter Moon
- Last Quarter Moon
- Full Moon
- Conjunction (close approach) of two or more objects
- “Maximum Brilliancy” or greatest illuminated extent of a planet
- Greatest elongation (angular distance from the Sun to the object)
- Meteor shower

USING THE MOON SYMBOLS

There is a moon symbol on the graph for every calendar date. It is easy to figure out which symbol applies to the date you are checking by referring to the moon symbol that is plotted exactly along a horizontal date line. That is, if you use a ruler to go from sunset on the left to sunrise on the right, the ruler will exactly bisect the moon for that night.

Note: the word *rise* or *set* is placed along the sequence of moon symbols.

SKY MOTIONS

Celestial objects rise, transit (cross the meridian), and then set. An object will always be highest in altitude (angular distance above the horizon) at the time of transit. Venus and Mercury can often appear far enough from the Sun so that we see them easily against a darker sky background. The angle between a planet and the Sun is the object’s elongation.

QUESTIONS

Your accuracy must be to the exact date of an event, or to the time of an event within 10 minutes. All times must include either AM or PM, as appropriate. Phases of the moon are either waxing or waning, with the exception of new, full, first, or third quarter, for which exact symbols are provided.

1. What is the time of sunset on April 6?

2. What day of the week is July 4 this year?

3. On what date does Jupiter transit at midnight?

4. On what date does Deneb transit at the end of evening twilight?

5. At what time does Betelgeuse rise on August 28?

6. What is the Moon phase on Halloween (Oct.31)?

7. On what date is Venus at maximum brilliancy (greatest illuminated extent) in the evening sky?

8. On what date is Venus at maximum brilliancy in the morning sky?

9. What is the date of the full moon in May?

10. What is the date of the new moon in September?

11. On what date does M42 (Orion Nebula) transit at the end of evening twilight?

12. Will Venus and Mars rise together in the predawn sky, if so when?

13. What date is the peak of the Perseid meteor shower?

14. What is the phase of the Moon on that date? Will it be above the horizon during the meteor shower?

15. What date has the longest daylight of the year?

16. What is the date of the earliest sunrise?

17. What is the date of the latest sunset?

18. What date has the shortest daylight of the year?

19. What is the date of the earliest sunset?

20. What is the date of the latest sunrise?

Based on your answers above why does the almanac have an hourglass shape?

EVENTS OF A SINGLE NIGHT

Imagine you've decided to spend the night of your birthday making observations with the telescope at CSI. What dates will you be observing?

Evening of _____ to morning of _____.

What phase is the Moon that night?

Will it rise or set during the night?

In the space below, list the astronomical events you can observe starting on the evening of your birthday and continuing through sunrise the next day.

TIME	EVENT