

Using a Planisphere

- You Will Need:**
- Planisphere
 - Red flashlight
 - One clear night for observations

Purpose: To gain familiarity with the use of a planisphere (also called a star and planet finder)

Background:

A planisphere (literally, a flattened sphere) is a convenient way of representing the constellations visible from a particular latitude at any time of night for any night of the year. The planisphere is an aid to learning the night sky.

About two-thirds of the 88 established constellations will be visible during the year to a Northern Hemisphere observer, and these are shown on the planisphere by lines connecting the brighter stars; the very brightest stars also are named (for example, *Sirius*, *Vega*, *Arcturus*).

A planisphere does have limitations. One is that it is designed for use at locations not very far north or south of a particular latitude (typically, 40 degrees North); if you want to see the sky from another latitude, you must buy a planisphere designed specifically for it. (These are available from some manufacturers.)

Another limitation is that the positions of the Moon and planets cannot be printed on the planisphere; they are too changeable. (On the other hand, if you know in what constellation a planet is located, you can use the planisphere to tell whether, and when, that constellation will be visible; if it is, you should be able to see the planet, too.)

Figure 1 shows the design of a typical planisphere. The large dark oval is the "dome" of the sky above the observer at any time; its center is the point straight overhead (the **zenith**). The pivot point of the planisphere wheel (usually a rivet) is the north celestial pole, an extension of Earth's rotation axis through the planet's north pole and onto the sky.

An object AT the north celestial pole will not appear to change position at all on any night, being directly "above" Earth's rotation axis; very close to this point (the pivot point) is the moderately-bright star *Polaris*, often called the North Star or the Pole Star because of its always being found at the same location while other stars are rising and setting.

Exercise 1: Using a Planisphere

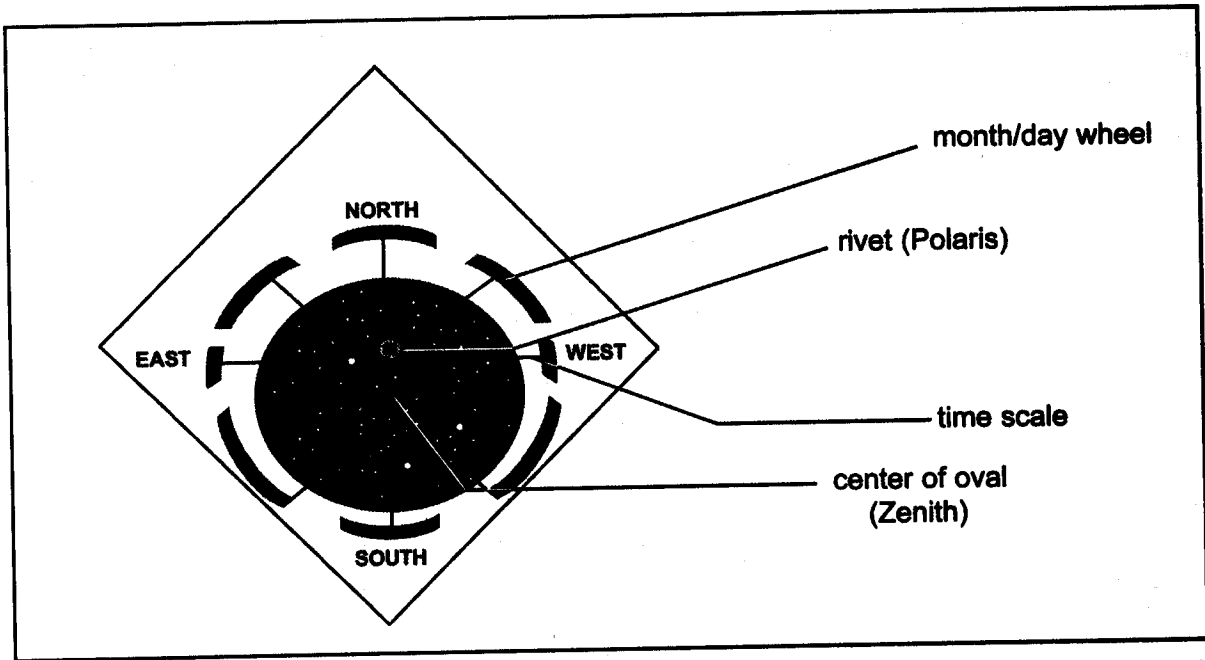


Figure 1

Also shown on planispheres are two curves, labeled EQUATOR and ECLIPTIC. The first curve is the **celestial equator**, the projection of Earth's equator onto the sky; it is the dividing curve between constellations easily visible in the Northern Hemisphere and those more easily seen from the Southern Hemisphere (some southern constellations, such as SAGITTARIUS, are visible from the Northern Hemisphere, but they are low in our skies).

The **ecliptic** is where the Sun, Moon and bright planets are found. The twelve constellations found along the ecliptic are collectively called the **zodiac**: figures of people and animals.

Procedure:

To set the planisphere for a certain date and time, choose the time of night at which you will be observing.

NOTE: All times are in Standard Time. If you are on Daylight Saving Time, *subtract 1 hour* from your chosen time to convert it to the Standard Time used by the planisphere.

Locate that time on the "time" scale which runs along the inner edge of the planisphere. Now turn the month/day wheel until the current month and date line up with the time mark you chose.

The planisphere now will be displaying those stars which are above the horizon on the particular month, date, and viewing time you chose. However, exactly where in

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the sky these will be seen depends, of course, upon the direction toward which you are looking.

If you want to view the sky while facing **south**, HOLD THE PLANISPHERE OVER YOUR HEAD (gaze upwards at it) *with the word "South" at the bottom*. To use the planisphere while facing east, again hold the device over your head, but ROTATE it *until the word "West" is at the bottom*. See Figure 2. Remember: if you change the direction you are facing, rotate the planisphere until the new direction is at the bottom of your view.



Figure 2

For Example:

Set the planisphere for *10 p.m. Standard Time on July 25*. Now hold the planisphere over your head with the word "South" at the bottom (I will assume that if you were outside, you would really be facing south at this time, too!). Very near the center of the viewing oval (that is, at the zenith) is the bright star *Vega* in the constellation LYRA (the harp). Low in the southern sky is the constellation SAGITTARIUS.

Now turn yourself so that you are facing 90 degrees to the right (clockwise) of where you started; also, rotate the planisphere (still above your head) so that the word "West" is at the bottom. Prominent high in the western sky at this time is the bright star *Arcturus* in the constellation BOOTES (the shepherd), while much lower (near the horizon, a bit south of west) is another bright star, *Spica*, in the constellation VIRGO (the maiden).

Finally, if you turned the planisphere (and yourself) for the view facing north, you would notice the BIG DIPPER pattern in the northwestern sky, the constellation CASSIOPEIA to the northeast, and the Pole Star ("rivet") straight ahead of you and not quite halfway up to the zenith (center of the oval).

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Observations:

Consult a local newspaper, an almanac like the *Old Farmer's Almanac*, a periodical like *Astronomy* or *Sky & Telescope*, a Web site or your instructor to determine in what constellations the planets Venus, Mars, Jupiter and Saturn can currently be found.

Take the planisphere outside with you on a clear night without too much moonlight (i.e., avoid nights near a Full Moon). Find a fairly dark location (away from direct lighting) with a clear view of the southern and eastern horizons at least. Bring along a red flashlight (see the Reference Guide) for ease in comparing the planisphere map to your actual view of the night sky.

Set your planisphere for the current month, date, and the time you start observing (remember to express the time as Standard Time). After adapting your eyes to darkness for a few minutes, face South and hold the planisphere above your head, viewing it with the red flashlight.

→ **What constellation or constellations are low in the south at this time?** Make a sketch of the southern horizon, including any prominent landmarks (such as lighted towers, church steeples, or smokestacks) along the horizon and any conspicuous star patterns that are visible above it.

DO NOT just sketch the patterns shown on the PLANISPHERE but stars that you actually see in the night sky, including fainter stars; the planisphere is only a guide for identification.

Given the information from your instructor about the bright planets' locations: **Are any of those planets currently visible?** If so, sketch their locations relative to the horizon and include some of the stars right around them. Also: estimate the direction and altitude of each planet*.

Now turn around, facing North. Again, sketch the view, including the northern horizon and any prominent landmarks, the star *Polaris*, and the locations of the BIG DIPPER and CASSIOPEIA.

Again: DO NOT just sketch the patterns shown on the PLANISPHERE but stars that you actually see in the night sky, including fainter stars; the planisphere is only a guide for identification.)

The hazy band running across the planisphere's oval section is the *Milky Way*, the band of light which is due to the glow of millions of distant stars in our galaxy. See whether you can glimpse the Milky Way from your location**, and describe what you see.

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Does it have an overall color?

Is its brightness constant all along its length?

Is it stronger in any particular directions or altitudes?

Locate as many of the following stars as you can (some will not be visible when you observe). For each one you **do** find, comment on its location (direction and altitude), any noticeable **COLOR**, and how noticeably its light **FLICKERS** (twinkles):

Capella

Fomalhaut

Vega

Regulus

Arcturus

Spica

Sirius

Betelgeuse

Aldebaran

* *See the exercise "Altitude and Azimuth."*

** *This will be difficult from an urban area unless the air is especially clear (such as after a rainstorm) and your location is well away from concentrations of bright lights.*



See the LAB REPORT CHECKLIST for guidelines in preparing your report. p 23