DEFINITIONS

ZENITH A point in the sky that is directly above the observer. The radius from the center of the earth to the observer's position points out toward the Zenith.

MERIDIAN The vertical plane that runs from due south of the observer up through the zenith to the north celestial pole.

CELESTIAL POLE A point straight above the north pole of the earth. The North Star, Polaris, is located very near this point.

HORIZON COORDINATES Location of an object in the sky as seen by an observer according to its **AZIMUTH AND ALTITUDE**.

AZIMUTH The compass direction one faces to see the object.

ALTITUDE The angular distance measured perpendicularly from the horizon up to an object in the sky. The altitude of an object at the zenith is____.

LATITUDE Location of an object upon the surface of the earth according to its angular position north or south of the equator. WITT has a latitude of about 40 degrees North.

LONGITUDE Location of an object upon the surface of the earth according to its angular position measured east or west from a great circle from the north pole through Greenwich, England straight down to the south pole. WITT has a longitude of about 84 degrees west.

DECLINATION The equivalent of latitude for celestial objects. This is the angular position north (or +) or south (or -) measured from the celestial equator. Polaris has a declination of very nearly _____while an object at the WITT zenith will have a declination of_____.

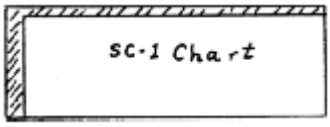
RIGHT ASCENSION The equivalent of longitude for celestial objects. This is the angular distance along a circle of constant declination measured eastward from the Vernal Equinox. This is usually specified in hours, minutes, and seconds (the time that elapses between the passage of the vernal equinox across the meridian and the transit of the other object).

VERNAL EQUINOX The point in the sky where the sun appears to be in the spring around March 22 when it is directly above the earth's equator.

CELESTIAL CYLINDER ASSEMBLY & INTRODUCTORY ACTIVITY

1. Trim the right margin, numbers and all, off the SC-l Chart so the end of the paper is at the end of the star fields. Save the trimmed margin strip as well as the star chart.

2. Tape/glue the star chart so that it is in the lower right corner of the rectangular backing strip.

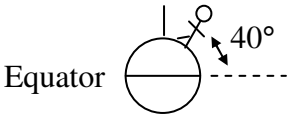


Then roll the chart into a cylinder until the constellations like Ursa Major at the top and Hydra near the bottom are aligned across the chart ends.
Glue/tape the chart into this cylindrical shape.

3. Cut out one of the "Horizon Templates" as shown below. Fit this around the cylinder so the bottom edge of the template is on the -60° line. Then tape the ends of this template mask to each other so that it is:

a)loose enough to slide freely around the cylinder when you turn it, and
b) snug enough to stay on the cylinder without holding it.

4. This template is constructed for WITT. We are located_____degrees north of the equator. This means that an object that is at the ZENITH or straight overhead, here at WITT, will also be_____degrees above the equator. Write "Z" for zenith straight up over our WITT observer in this sketch. It is_____degrees from straight overhead down to the horizon. Now draw and label a line through the center of the Earth representing our "horizon. " .
From this sketch it can be seen that an object on the southern horizon here at WITT will be_____ degrees below the equator.



5. Label the lowest point on the horizon template "S" for SOUTH. Assume that you are facing south; at this time, your right arm is on the east/west (circle one) side of your body and your left arm is on the east/west (circle one).

The same reasoning applies to the star chart's horizon template: one quarter on the way around to the right from due South is West. East will be one quarter of the way around the cylinder template to the left of due south and opposite west. North will be at the highest point of the template since objects on our North Horizon are further above the equator (as shown in the sketch in part 4). Label the East, West and North positions.

Check your template: are objects that are just at the due south point on the WITT "horizon" the appropriate number of degrees below the equator?

6. The **MERIDIAN** is an imaginary plane from due south on the horizon up through our zenith.

Dates at about 15 day intervals are printed at the bottom edge of the chart. Each of these represents the date when the observer's meridian will be in front on that point of their sky at 8:00 p.m. local standard time. As an example, consider July 4:

The horizon template should be turned around the cylinder until the labeled due South point is just a little to the right of the July 6 date printed on the chart (actually 2/15 of the way over to the June 21 labeled position from July 6).

At this time the constellation nearest the WITT zenith will be BOOTES since the WITT zenith is _____.degrees above our south horizon and_____ degrees above the equator along the meridian plane.

Hold the template in this position (for 8 PM on July 4) and look in the East to see what is rising. At this time, the ZODIAC constellation that is rising would be SCORPIUS (although SAGITTARIUS should also be accepted as an answer since a few of its stars are visible).

Still holding the template in the same position, Zodiac constellations that can be described as setting at 8 PM on July 4 would be LEO, CANCER and even GEMINI.

Ask for help if you cannot see this on your chart.

7. Today's date:_____.
Set your cylinder's horizon corresponding to 8 PM tonight. For 8 PM (EST) tonight at WITT:

A. What constellation is at our **ZENITH**?_____.

B. List a Zodiac constellation that is rising:_____.

C. List a Zodiac constellation that is setting:_____.

8. Observations of the sky are not made only at 8 PM. To set other times we take advantage of the fact that the stars, like the sun, appear to go around us once a day, once every_____hours. Consequently in a six-hour period the stars will have shifted to the west by one-quarter of their cycle, i.e., by 90 degrees. In one hour the stars will appear to shift:_____degrees westward. Note that the printed dates/hours at the bottom are separated by this many degrees.

For observations made at midnight on July 4, this will be hours after 8 PM, so the stars will appear to have shifted westward_____degrees.

How can we use this to know what stars are up at times other than 8pm?

As an example consider this:
At 8 PM on July, our meridian was just before the "15 hour" mark, about at "14.9 hours." Midnight on July 4 will be 4 hours later, so our meridian will be at 14.9 + 4 hours or 18.9 hours. (This is the same portion of the sky visible to us at 8 PM in September.) At midnight on July 4, LYRA is the constellation near our zenith, PISCES would be the Zodiac constellation rising, while VIRGO would be the zodiac constellation that is setting.

Now, back to today at WITT:
At midnight tonight here at WITT:

A. What constellation is at our ZENITH?_____.

B. List a Zodiac constellation that is rising._____.

C. List a Zodiac constellation that is setting:_____.