OVERNIGHT STAR WATCH

Astronomy requires long term observations in order to establish patterns of celestial motion. Though the celestial bodies are in constant motion at rather large speeds (the velocity of the Earth in its orbit is 66,700 mph!), the distances involved are so large that the apparent motions are small and the objects must be observed over a long time for the motions to be detected.

The purpose of this project is to get you to take note of the apparent motion of the constellations with respect to the horizon. The **diurnal motion** is observed by watching a constellation through one night. Keep in mind that *the "time of day" is the position of the Sun with respect to YOU.*

THE PROJECT

OBSERVATION: On the night you are going to observe, go out as soon as it's dark to a location from which you can see the Big Dipper and the sky surrounding Polaris. **Sketch the horizon, the meridian** (extending past the zenith a bit… but not all the way to the southern horizon!), Polaris (at an altitude of 45°) **and the Big Dipper being careful to accurately draw its size and orientation with respect to the meridian** (Use a template). Then,

EVERY TWO HOURS, REOBSERVE THE BIG DIPPER FROM THE SAME PLACE AND SKETCH IT ON THE SAME DIAGRAM.

Note the times of your observations so that your diagram will show how the position of the Big Dipper changes over the course of a night. Your **three observations should cover at least 4 hours**, one quarter of the 24 hour day. Since the earth turns completely on its axis in one day, through what angle do you expect the Big Dipper to move in 4 hours?

OBSERVING RECORD: The record will simply be a full-page sketch with a summary and analysis attached.

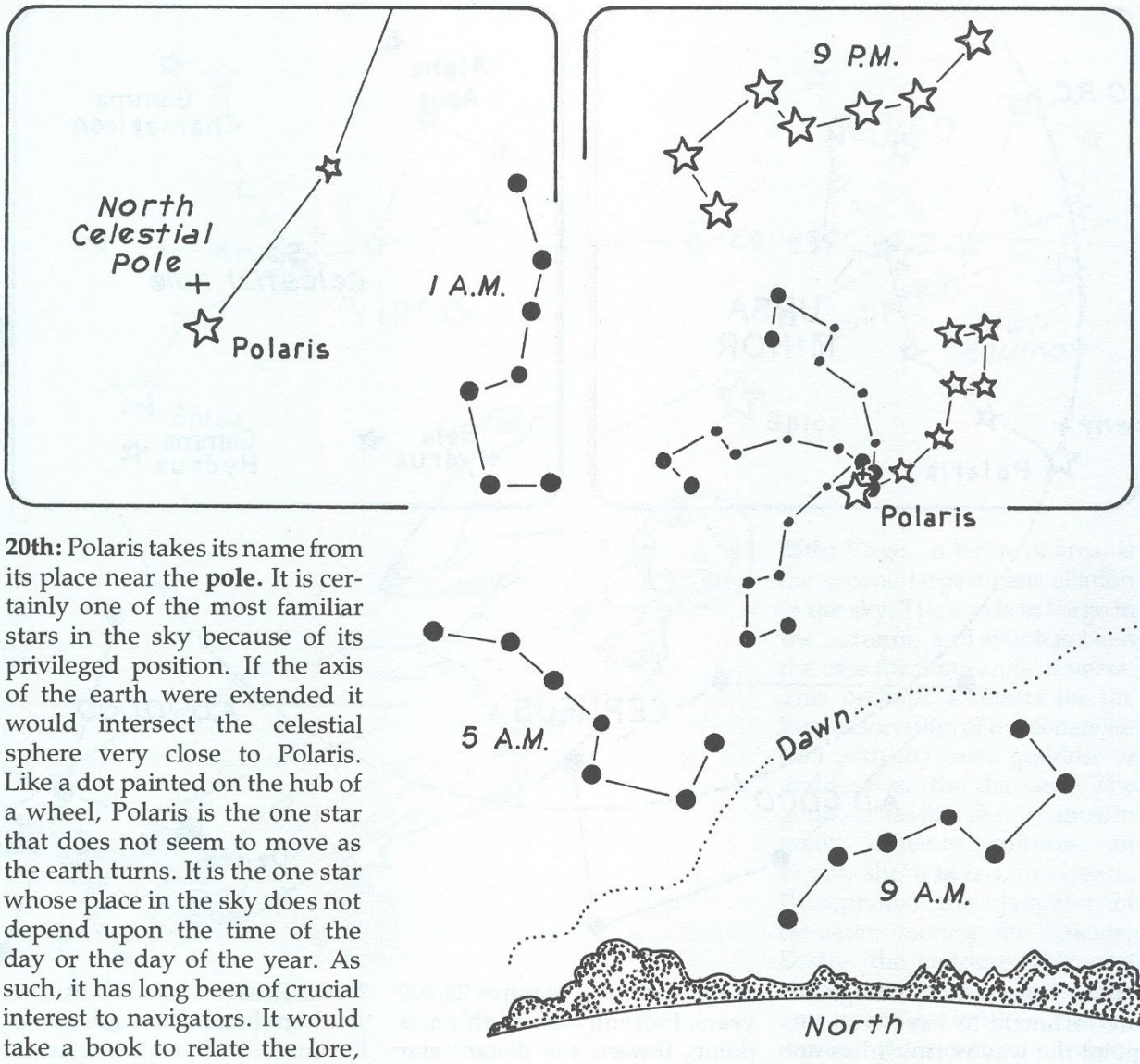
All the observations of the Big Dipper will be on ONE single careful, accurate diagram of the horizon.

The diagram will include the horizon (around due north) with **landmarks** (buildings, distinctive trees, lamp posts, etc.), **Polaris**, and **the meridian**. The observations will be recorded as sketches of the Big Dipper that **accurately show its size, orientation and altitude** (with respect to the horizon and zenith). Use walls, roofs and trees to determine the Big Dipper's orientation to the horizon and the meridian ... use Polaris to find due north from your observing position. The sketches must be carefully drawn to scale (use your hand or a ruler at arm's length to scale the diagram and use your protractor to measure angles). See page 85 in Raymo's 365 Starry Nights (on the back of this page) for an example of observations over a single night recorded on one diagram.

SUMMARY AND ANALYSIS: write a paragraph describing 1) how (finding north & same spot), 2) where and with whom you observed, 3) what you saw and 4) how your observations fit the theory of Earth's motion you have learned in class. Include in this any reflections you have on the assignment and "having watched the Earth move".

DUE ON MONDAY, FEBRUARY 17, 2025

Do this on the FIRST CLEAR NIGHT!! It can cloud up for weeks & weeks!!!



20th: Polaris takes its name from its place near the **pole.** It is certainly one of the most familiar stars in the sky because of its privileged position. If the axis of the earth were extended it would intersect the celestial sphere very close to Polaris. Like a dot painted on the hub of a wheel, Polaris is the one star that does not seem to move as the earth turns. It is the one star whose place in the sky does not depend upon the time of the day or the day of the year. As such, it has long been of crucial interest to navigators. It would take a book to relate the lore, legends, and symbolism that are associated with this otherwise unnoteworthy star, which just happened to be "in the right place at the right time." In brightness Polaris ranks 49th among stars. It is hundreds of light years away, and must be very luminous to appear so bright at such a distance. Polaris is a yellow giant star, perhaps even now in its death throes.

21st: Watch the Big and Little Dippers throughout the night and you will see them rotate about the **pole.** Of course, it is actually we who are turning, not the stars. But the impression that we are at rest is a powerful one, and it is easy to understand why our knowledge of a spinning earth is only 400 years old. The earth at our feet seems huge and immobile. The stars appear as tiny pinpricks of moving light. It took a bold and courageous act of the imagination to reverse these impressions. We know now that Polaris, a typical star, has a diameter several thousand times greater than our planet! The earth is but a speck of dust whirling in the cathedral of the stars. To be a citizen of a dust fleck requires self-confidence and courage—and the boldness to aspire to become worthy citizens of the cathedral.