

**Our Corner of the Universe**  
**AST 101, Fall 2007**  
**THE SKY AT NIGHT**  
**Week of September 18**

**Objectives:** Learn to locate several major constellations and become familiar with the Star Finder

**Materials:** Sky maps, Star Finder

**Preparation:** Make sure you know the definitions of zenith, meridian, ecliptic, zodiac

**Part One:** The Invisible Highways in the Sky

There are few constellations or asterisms easy to identify in the night sky. An asterism is a group of stars, roughly in the same direction from us that are parts of one or more constellations. For instance, the Big Dipper is an asterism, part of the constellation Ursa Major. In this part of the lab you will learn how to use them in locating other constellations by following some (invisible!) pathways in the night sky.

On the accompanying sky maps, trace out those pathways according to the following descriptions:

- A. In the northern part of the sky, you should easily find the **Big Dipper**. The last two stars of the bowl are called the *Pointers*. Now let us travel a little bit.
  - a) Follow the *Pointers* towards the top of the bowl, about five times their separation. You will end up on (or very near to) *Polaris*, or the *North Star*. *Polaris* sits at the end of the **Little Dipper's** handle. Little Dipper is an asterism, part of the constellation **Ursa Minor**.
  - b) Continue in the same direction, beyond *Polaris* and you will pass **Cassiopeia** (the lazy W) in the right and **Cepheus** in the left. Keep on going straight and you will find yourself in the **Great Square of Pegasus**. Leave the Square, in the same direction and you will hit immediately Pisces, one of the zodiacal constellations.
  - c) Now, let's return to the **Big Dipper** in the winter sky. Locate the other two stars of the bowl. Follow their direction, away from *Polaris*, and you will end up on a bright star, *Regulus*. It is in the constellation **Leo**, yet another zodiacal constellation.
- B. Let us face the southern part of the sky. Late in the night, in the fall and late in the evening in the winter, you can easily recognize **Orion**, or **The Hunter**. (You cannot miss his belt!). Note the two bright stars, *Betelgeuse* (up left) and *Rigel* (low right) on the opposite sides of the belt. Check out their different color! Now, let's move:
  - a) Follow the belt downwards and you will find *Sirius*, the brightest star in the sky, except of course, our own Sun. *Sirius* is part of the constellation **Canis Major**.

- b) Back to the belt and follow its direction upwards and the first bright star you will pass by very close is *Aldebaran*, in **Taurus**. Note the V-shaped group of stars making the **Bull's** face, of which *Aldebaran* is the right eye. Right above the **Bull's** face, in the same direction, you will see the **Pleiades** (the **Seven Sisters**), a beautiful bluish open cluster of stars.
- c) Let's use now Betelgeuse and Rigel. Follow a line from Rigel to Betelgeuse and here they are, *Castor* and *Pollux*, the two bright stars in the constellation **Gemini** (or the **Twins**).
- C. Now, a little bit of imagination from you. In the above style as the previous descriptions, design a couple of heavenly routes that will help you identify easily some other constellations in the sky. For instance, how would you find **Cygnus** (or the **Swan**) starting from the **Big Dipper**? How about **Perseus**?

## **Part Two:                   What can you do with the Star Finder?**

The (movable) disk of the Star Finder shows the entire sky as seen from mid-northern latitudes on Earth. That means you can find out what's up in the sky at any time of the year. How do you do that? Match the calendar date with the time of the night you are planning to look at the sky. The oval opening of the Star Finder will show visible constellations.

(N.B. The Star Finder is designed such that only Standard Time should be used. If Daylight Saving Time (DST) is in effect, you should subtract one hour before using the Star Finder).

As practice, set the Star Finder for tonight at 11 p.m. Identify the N,S,E,W directions on the horizon (the edge of the oval). Find the North direction in the sky, as well as the *zenith* point (what is the definition of the zenith point?). Now you should be able to trace out (but don't write or draw on the Star Finder, please!) the local *meridian*. Which constellations are along the meridian? Which one is the highest in the sky? Check your answers with your T.A.

The Star Finder allows you to predict the rising or setting times of stars or constellations over the year. If you rotate the disk East-South-West you will notice some constellations rising in the eastern horizon while others are setting in the west. Find out when Orion rises and sets today and check your answer with the T.A.

### **Questions:**

1. On December 18<sup>th</sup>, midnight, which constellation is near the zenith? What is the name of its brightest star?
2. What time does the constellation Gemini rise on October 15<sup>th</sup>? What time does it set? What are the rising/setting times one month later? Can you predict when Gemini will rise 6 months later? Explain.
3. Set your Star Finder on October 1<sup>st</sup>, midnight
  - a) Which zodiacal constellations are visible?
  - b) Which one is the highest in the sky and which is rising/setting at this time?
  - c) Now, a tough question. Where is the Sun at this time (that is, in which constellation does the Sun sit?)
4. Now set the Star Finder on January 1<sup>st</sup>, 11 p.m. and answer the same questions as in #3.
5. Compare your answers to questions 3 and 4. Explain the reasons for the difference in your answers.

### **Answers:**

