The cover art features a silhouette of a person's head in profile, looking towards the right. The background is a vibrant blue space scene filled with stars and nebulae. A bright sun or star is visible in the upper right, casting rays. Various celestial bodies are arranged in a line across the center: a large planet with rings (Saturn), a gas giant (Jupiter), Mars, the Moon, and a smaller rocky planet (Mercury or Venus).

Astronomy

Activity Booklet

Art courtesy of NASA

Civil Air Patrol

For STEM Kits and AEX Participation

as a compendium to AEX Astronomy Module

Activity Four: Creating a Star Finder

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Relationship to A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas:

Objectives: Students will use a star chart to locate objects in the sky.

Practices:

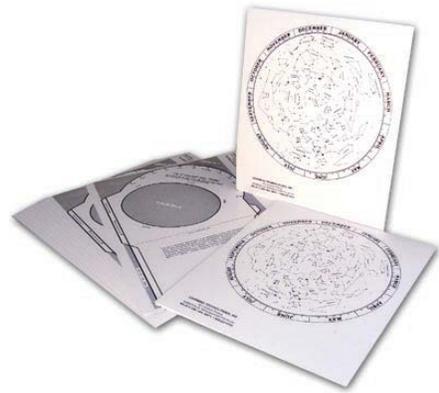
2. Developing and using models
4. Analyzing and interpreting data

Crosscutting Concepts:

4. Systems and system models

Core Ideas:

- ESS1.A: The universe and its stars
- ESS1.B: Earth and the solar system
- PS4.B: Electromagnetic radiation
- PS4.C: Information technologies and instrumentation



Background Information:

When standing on Earth (which is rotating), we see everything in the sky wheeling around us once every 24 hours. Each object in the sky appears to move 15° westward every hour as Earth rotates ($15^\circ/\text{hour} = 360^\circ/24\text{ hours}$). The motion of the stars marks the passage of time during the night. As Earth turns on its axis, the stars appear to rise in the east and set in the west, just as the Sun and Moon do. This means that you'll see different stars overhead at different times of night. Likewise, as Earth makes its annual trek around the Sun, you'll see different stars from month to month. To identify stars and constellations in the night sky, use a Star Finder to help you locate them. These Star Finders can be built such as the one in this activity or they can be purchased from a science store.

Materials:

- Star Finder patterns for each student (print on cardstock and laminate each individual piece before assembling or have students glue each piece to a cut-apart file folder)
- Scissors
- Stapler
- Masking tape to tape items to wall (painter's tape is gentler on painted surfaces)
- Poster or flip chart paper for each group
- Markers
- Set of Cardinal Direction cards (attached)
- Set of Major Constellation cards (attached)

Procedure:

1. Divide the class into groups of three or four.
2. Have all supplies needed ready for each group to pick up (scissors, stapler, markers, paper, templates, and poster board). This can be done with plastic or wooden boxes the size of a piece of paper (have supplies in one box per group).
3. Have cardinal direction cards for practice in the classroom and allow students to make their own for use viewing the night sky. Remind students that the Sun sets approximately in the West and rises approximately in the East. You can also use a compass to locate the cardinal directions (North, South, East, and West).
4. Have students cut out the Star Finder and assemble it by first stapling the front and back together. Place staples exactly on the staple lines shown on the front of the Star Finder Holder.
5. Distribute copies of the star wheels and have students cut them out.
6. Have students insert the simple star field wheel between the stapled pages so the simple star field appears through the oval opening. Once the star wheel is completely inserted, test the movement of the star wheel to be sure it moves freely. Check to see that the black line under the dates on the star wheel approximately lines up with the edge of the Star Finder cover showing the time of day.
7. (Since this activity may take place in the daytime during school, simulate the viewing of the stars and tell students to use it when they get home after dark in a spot that does not have a lot of artificial light.) To use, tell students to turn the star wheel on the Star Finder until the current date lines up with the time you wish to observe. Have them hold the Star Finder over their head so "North" on the Star Finder is facing north. The stars showing in the oval window are those that can be seen overhead. The edge of the oval represents the horizon and the center of the oval is the point directly overhead when they look up in the night sky. This point is called the zenith. Stars near the center of the oval will be high overhead when they observe. *The term azimuth (mentioned on the Cardinal Directions cards) means the angular distance along the horizon to the location of the object*
8. Discuss the constellations that may appear in the northern sky when they use their Starfinder. Such constellations as Ursa Major (Big Dipper) on the Starfinder should be simple to find.
9. Have students answer questions on the Star Finder Student Worksheet about Ursa Major from observing the location on the Star Finder Wheel. Use this information to point at the direction they should look to see the constellation when they go outside at night. If possible, create the constellation formation of Ursa Major on poster paper and attach it to the wall of the classroom in the location it would be in the night sky.
10. The teacher should write the names of the major constellations on pieces of paper and put them in a container. Have each group draw a constellation name out of the container and create a different constellation. Have them display it in the room in the correct location for viewing in the sky. Do not have them put the name of their constellation on the drawings so that other groups have to guess which one they did.

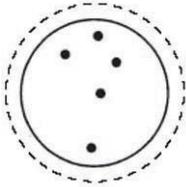
Evaluation: Have students answer the Star Finder Student Worksheet and work in groups to draw and show a constellation. Answers to Star Finder Student Worksheet will vary according to the date used.

Summary: This activity will provide help in identifying the location and names of the major constellations.

Additional Resources and Enrichment:

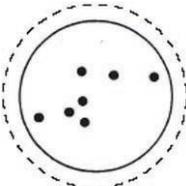
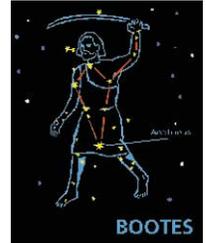
- **Locator for Astronomy Clubs from Night Sky Network is found at <https://nightsky.jpl.nasa.gov/club-map.cfm>.**
- **Interactive Sky Chart from Sky & Telescope magazine is found at <http://www.skyandtelescope.com/observing/skychart>.**
- **Youtube video called: “Amateur Astronomy for Beginners: START HERE!! is found at <http://www.youtube.com/watch?v=B1UJ2sAyPPo>.**

Major Constellations Cards



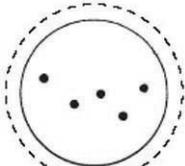
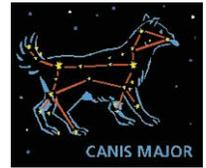
BOOTES,
the Herdsman

Bootes, the Herdsman



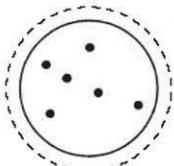
CANIS MAJOR,
the Big Dog

**Canis Major,
the Big Dog**



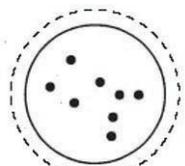
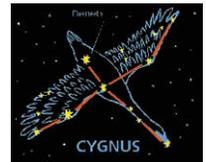
CASSIOPEIA,
the Queen

**Cassiopeia,
the Queen**



CYGNUS,
the Swan

**Cygnus,
the Swan**

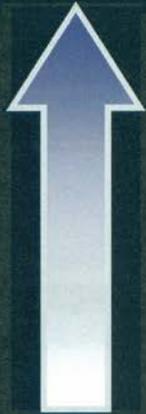


GEMINI,
the Twins

**Gemini,
the Twins**



WEST

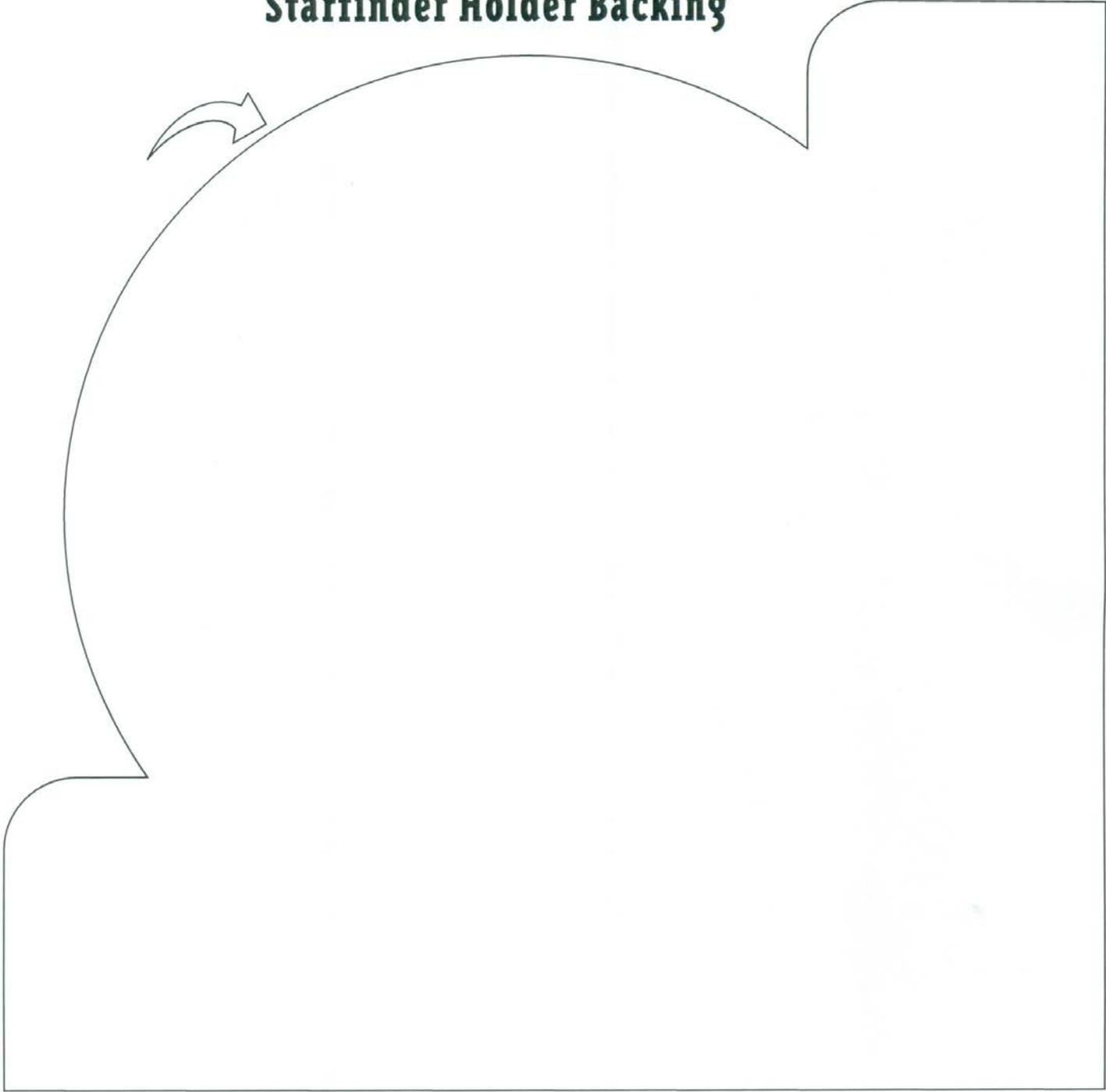


Is to your left.....
270° Azimuth

STARFINDER HOLDER

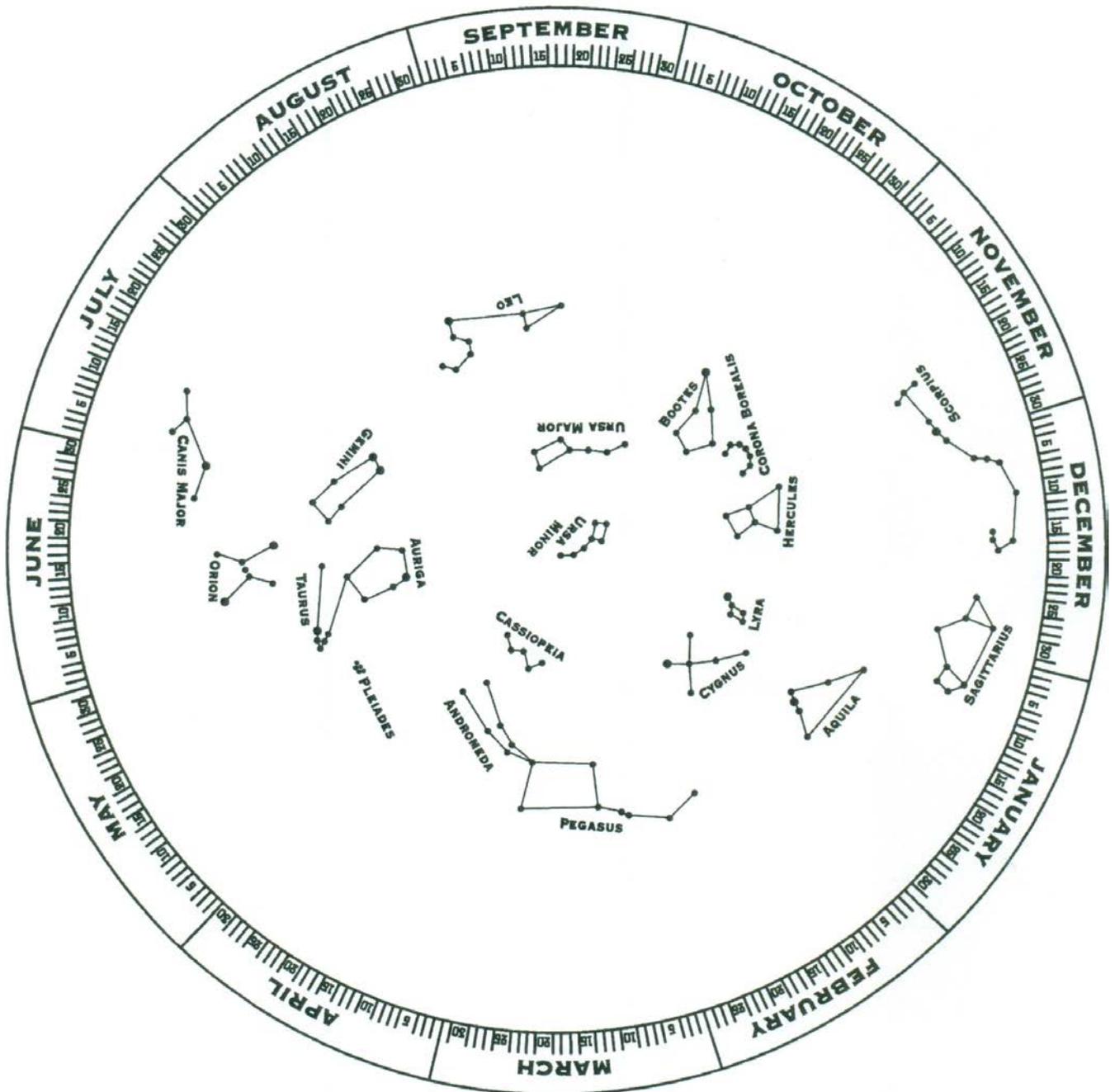


Starfinder Holder Backing



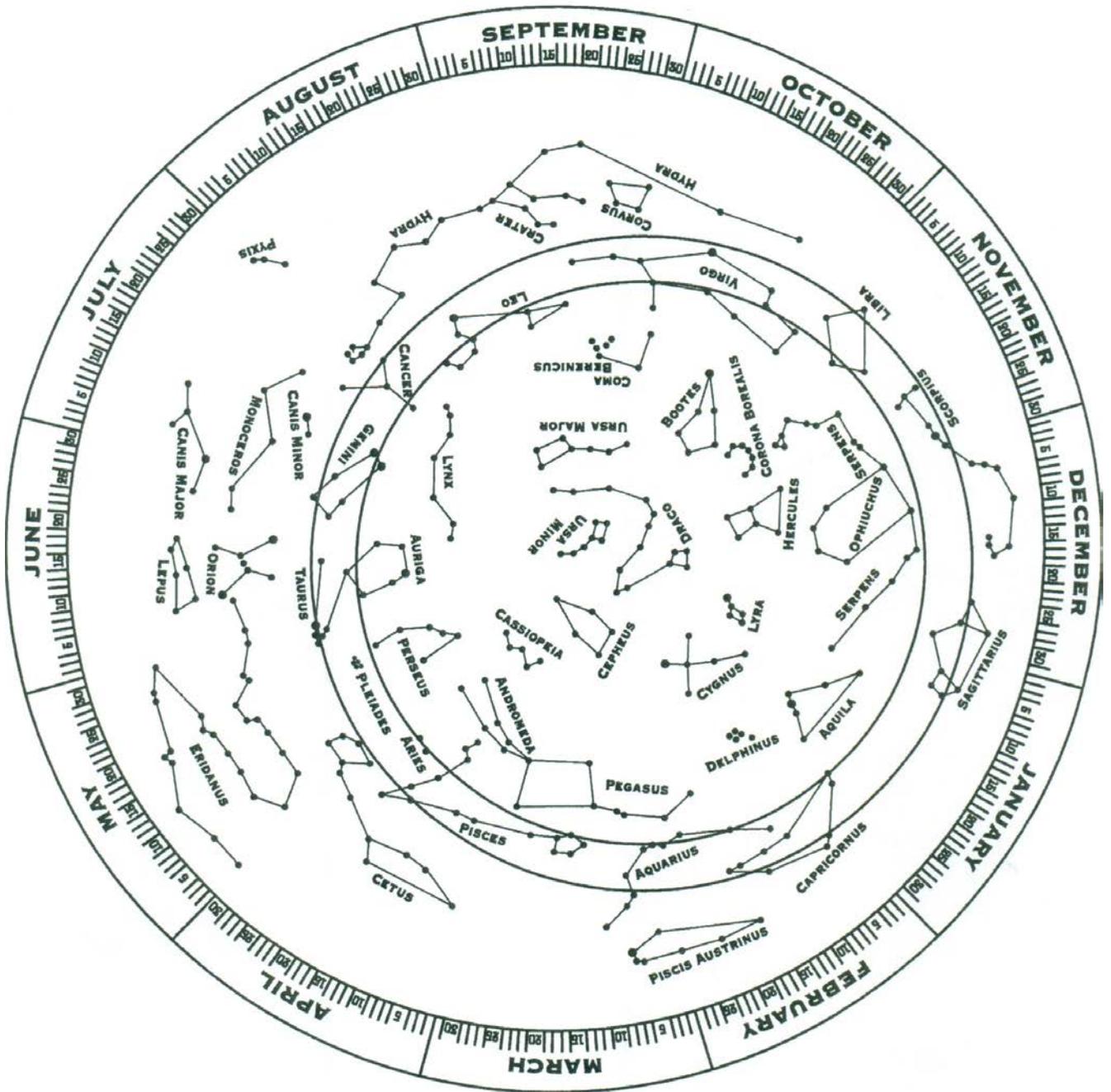
STAR WHEEL

SIMPLE STAR FIELD



STAR WHEEL

COMPLEX STAR FIELD

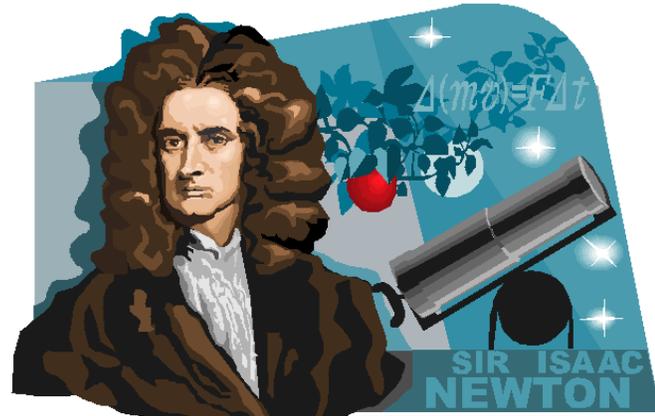


Activity Four: Star Finder Student Worksheet

Name: _____

Using the completed Star finder, practice using it by answering the following questions:

1. Set the Star finder to show the sky for 9 p.m. today. Today's date should be next to 9:00 p.m. What constellations are visible?



Sir Isaac Newton invented the Newtonian telescope which is a reflecting telescope.

2. Turn the dial until it is set for 11:00 p.m. tonight:

- a. What constellations are visible? _____

- b. Which constellations were visible at 9 p.m., but are no longer visible at 11 p.m.? _____

- c. Which horizon is closest to the disappearing constellations? _____

- d. Which constellations are visible at 11 p.m. but not at 9 p.m.? _____

3. Turn the dial until it is set for 6 a.m., just around sunrise.

- a. Which constellations are still visible that were up at 9 a.m.? _____

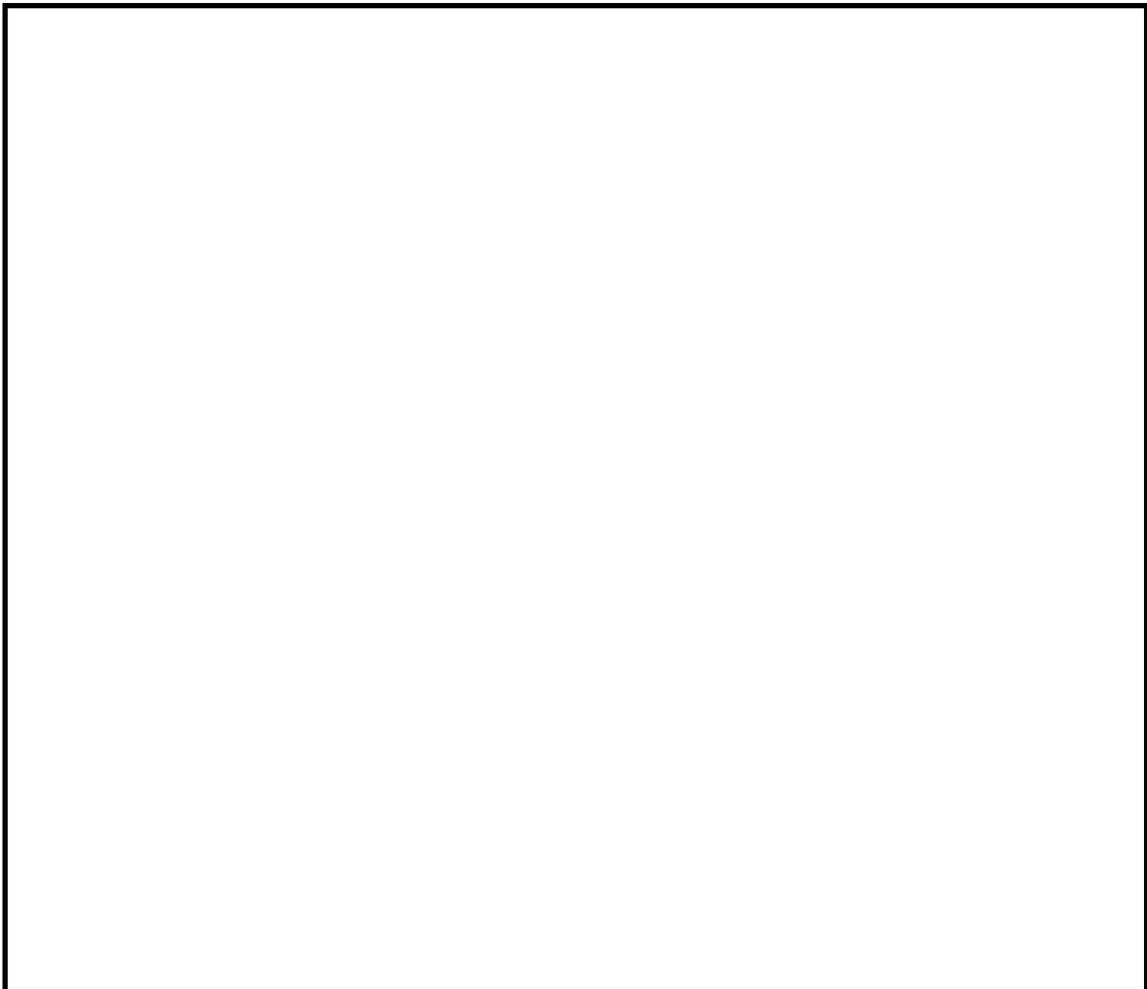
- b. Describe the motion the constellations follow from 9 p.m. to 6 a.m. _____

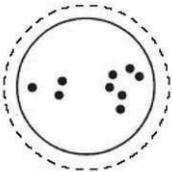
4. Adjust the Star Finder so it is again set for 9:00 p.m. tonight. Remember that the Star Finder is based on standard time. Subtract one hour from the clock time to

get standard time if Daylight Saving Time is in effect. Hold the Star Finder over your head so the the “north” designation on the Star Finder is pointing north. The stars showing in the oval opening are those that can be seen overhead at the time and date set on the Star Finder. The edge represents the horizon, so stars near the edge of the oval are low on the horizon. The center of the oval is the point directly overhead when you look up in the night sky. This point is called the zenith. Stars near the center of the oval will be high overhead when you are observing.

5. Now you are ready to go star finding in the night sky. A small flashlight or penlight will help you read the Star Finder at night. A red balloon or red plastic over the front of the flashlight will allow you to read your sky chart by the red light, but will not reduce your ability to see faint stars in the sky.

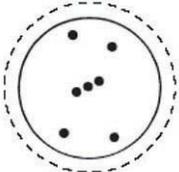
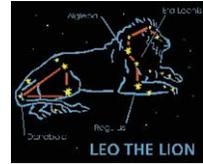
Draw your constellation and tell which time of year it will be visible closest to the zenith.





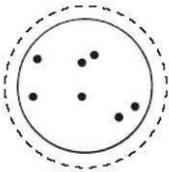
LEO,
the Lion

Leo, the Lion



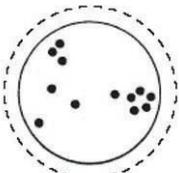
ORION,
the Hunter

**Orion,
the Hunter**



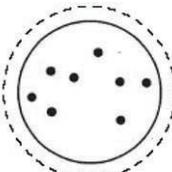
PEGASUS,
the Flying Horse

**Pegasus,
the Flying Horse**



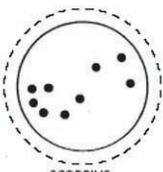
PISCES,
the Fishes

**Pisces,
the Fishes**



SAGITTARIUS,
the Archer

**Sagittarius,
the Archer**

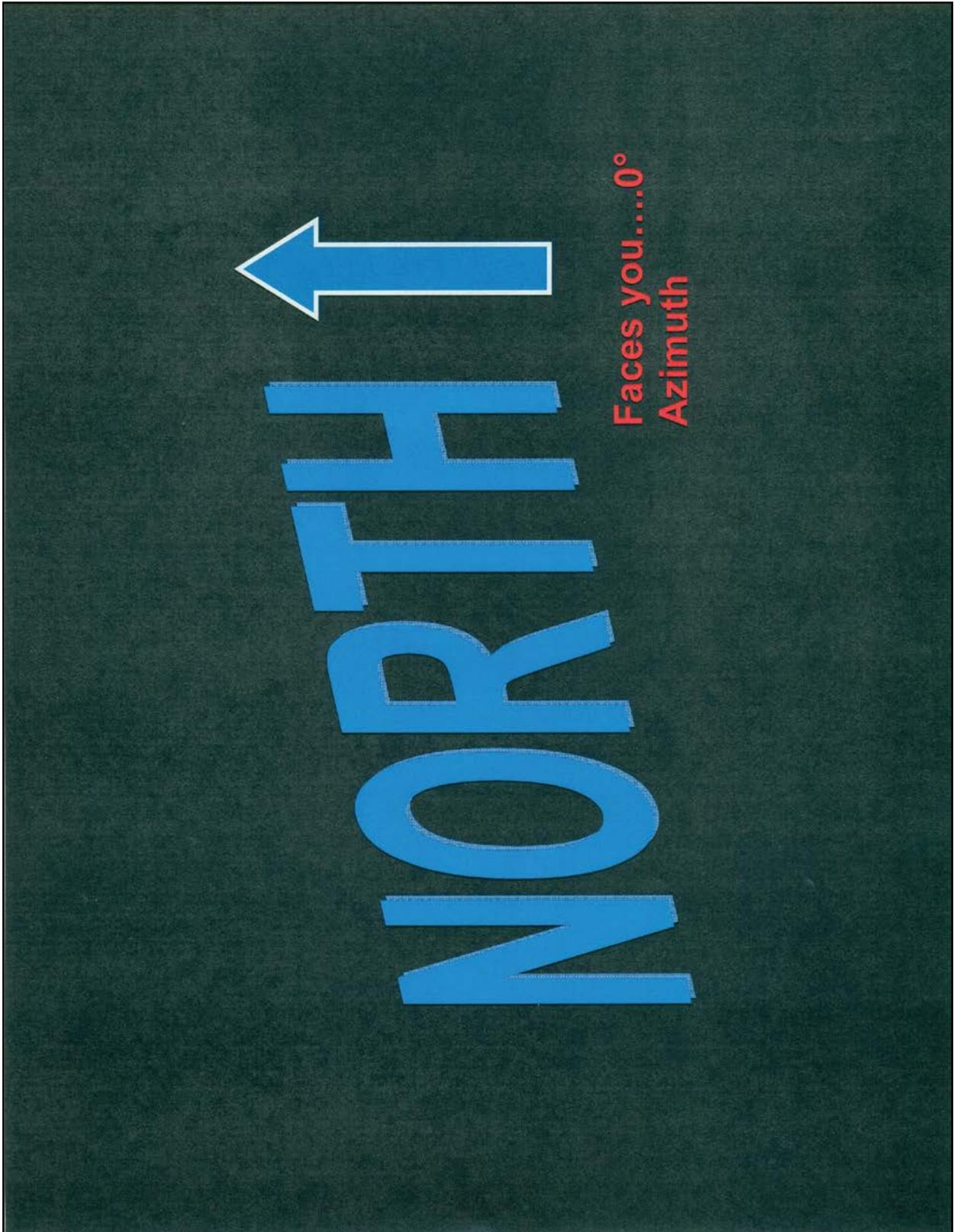


SCORPIUS,
the Scorpion

**Scorpius,
the Scorpion**



Cardinal Directions Cards



SOUTH ↑

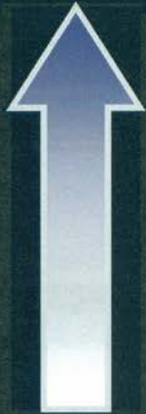
Is behind you.....
180° Azimuth

EAST



Is to your right.....
90° Azimuth

WEST

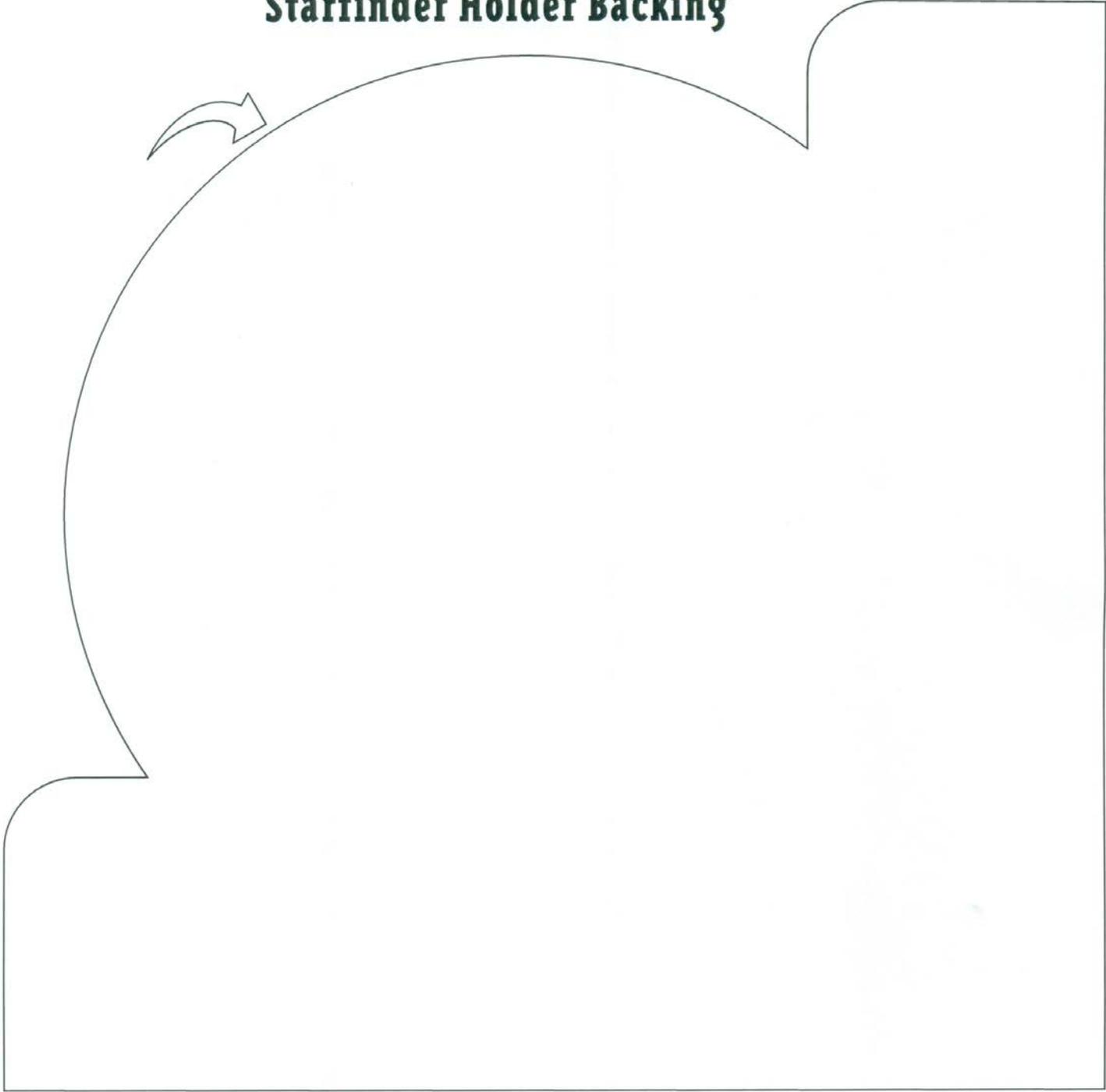


Is to your left.....
270° Azimuth

STARFINDER HOLDER

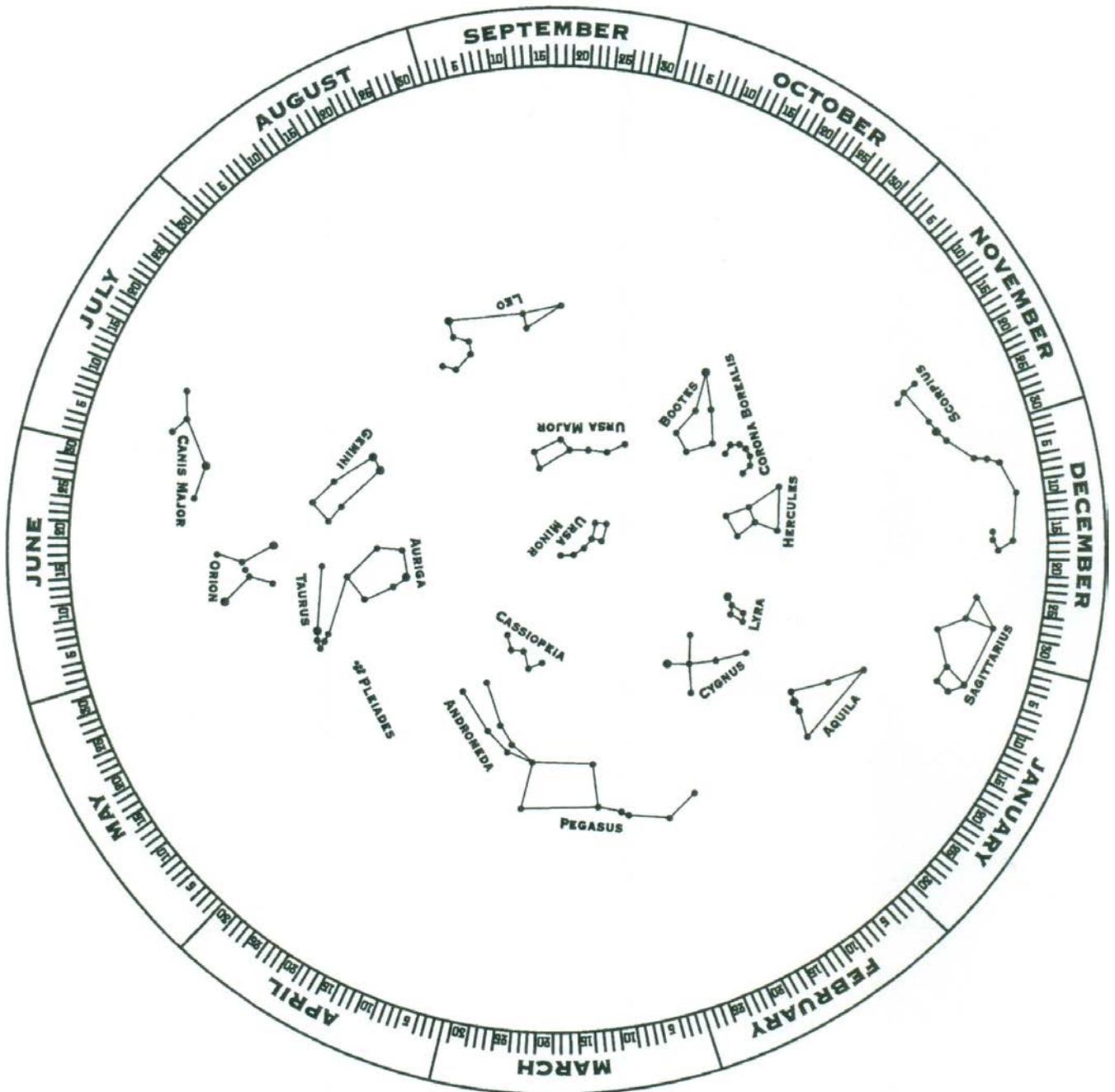


Starfinder Holder Backing



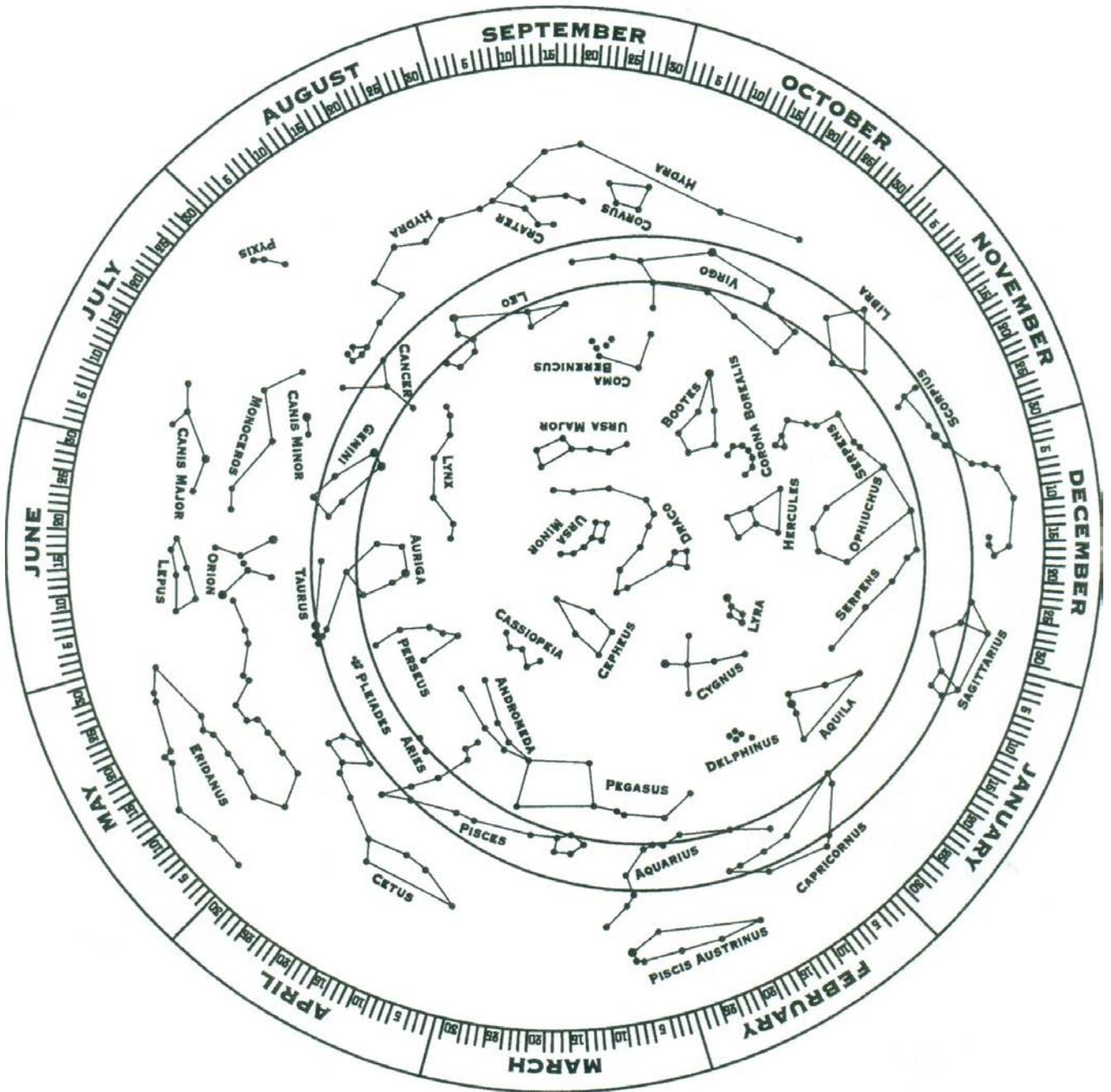
STAR WHEEL

SIMPLE STAR FIELD



STAR WHEEL

COMPLEX STAR FIELD



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