

Dark Skies Rangers Program

Constellation at Your Fingertips: Leo

(Leo version adapted from Orion at Your Fingertips www.globeatnight.org)

Grades: 3 – 6

Overview: Constellation at Your Fingertips introduces the novice constellation hunter to a method for spotting the main stars in the constellation, Leo, the lion. Students will make an outline of the constellation used to locate the stars in Leo. This activity will engage children and first-time night sky viewers in observations of the night sky. The lesson links history, Greek mythology, literature, and astronomy. The simplicity of Leo makes learning to locate a constellation and observing exciting for young learners. All materials for GLOBE at Night are available at <http://www.globeatnight.org>.

Purpose: This activity helps students visualize the constellation they are to use in the GLOBE at Night campaign. In the GLOBE at Night campaign, students will match what they see toward the constellation of Leo with charts at <http://www.globeatnight.org>. The chart that most closely resembles their observation is recorded on the website. It is a measure of sky brightness and therefore light pollution level. The less stars seen, the more light pollution. This data is taken annually across the world. Why is this important to astronomers? What causes the variation from year to year? The focus is on light pollution and the options we have as consumers when purchasing outdoor lighting. The impact to our environment is an important issue in a child's world.

Leo is an excellent constellation to observe with young children. The simplicity of a backward question mark for the lion's mane (also known as the Sickle), and a right triangle for its back end, comprise the major stars, and the mythology is intriguing. The constellation of Leo was known as a lion in many cultures, albeit with many other names. The brightest star, Regulus, is at the breast of the lion and is also known as the King Star.

Standards: Constellation at Your Fingertips has been developed and tested based on the National and Arizona Standards. Science Inquiry standards are multi-faceted and correlate well with many other standards. Integration of science content, mathematics and research/language arts standards will enhance student achievement. Included are sample standards.

U.S. National Science Education Standards: Science Inquiry (selected standards not limited to the following)

1. Understanding of scientific concepts
2. An appreciation of "how we know" what we know in science
3. Understanding of the nature of science
4. Skills necessary to become independent inquirers about the natural world

Arizona Science Standards:

ADE Grade 1 Earth and Space

PO 2. Compare celestial objects (e.g., Sun, Moon, stars) and transient objects in the sky (e.g., clouds, birds, airplanes, contrails).

PO 3. Describe observable changes that occur in the sky, (e.g., clouds forming and moving, the position of the Moon).

ADE Grade 5 Life Science

PO 3. Describe various objects in the sky (e.g., asteroids, comets, stars, meteors/shooting stars).

ADE Grades K-5

Process skill of observation is essential and designated at all grade levels



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Objectives:

- Work individually and report in a collaborative group.
- Locate and observe the major stars in Leo to understand how stellar magnitude is affected by light pollution.
- Communicate results of their investigation to an audience of peers.
- Use latitude and longitude coordinates to report the location from which they took their observation.
- Locate the constellation Leo using stellar map.
- Determine the magnitude of the faintest visible stars in their location.
- Analyze the spatial data collected.
- Draw conclusions from studying the mapped observations.

Time to Do Activity:

2 sessions (one for the constellation design page and lesson introduction) (one for visualizing Leo with the completed transparency and collecting GLOBE at Night data)

Teacher set up time required to gather materials (one hour)

Materials needed:

fabric paint- 2 colored tubes of GLOW Tulip brand fabric paint (or other glow in the dark paint) per student group, a Leo constellation pattern per student (attached) , transparencies (one per student), UV light or LED flashlight, a Q-tip per student, book and/or print out from the web of the mythology

Preparation/Prerequisites: The first lesson (tracing the pattern on the transparency and perhaps discussing the mythology) is completed in school with all materials needed. The second lesson can only be completed in a nighttime observation. It is recommended that you contact the local astronomers group for volunteers that can assist with laser lights to guide the observations. As long as this is arranged, ask them to bring telescopes to share the wonders of the sky with the class/children. Ignite the awe and wonderment!

Background Information -- teacher/students (online/offline)

- Contact your local International Dark-Sky Association or Amateur Astronomers Organization for support/class visits on the impact of lighting on astronomical observations: <http://www.darksky.org>.
- Check out from your school library “Constellations” by Gregory L. Vogt. Describes several of the major constellations and mythology for the Big Dipper and several constellations in the Zodiac.
- <http://coldwater.k12.mi.us/lms/planetarium/myth/Leo.html>
- <http://en.wikipedia.org/wiki/Leo>



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Lesson Sequence

Activator: read the mythology of Leo, the lion

Formative Assessment: Brainstorm/respond to “Why do we see more stars on some nights?”

Activity: craft and mythology reading (and/or content reading lesson)

Observation (submit to Constellation at Your Fingertips or collect multiple nights)

Summative Assessment: Students locate Leo in the night sky and draw the bright stars

Session A

- 1) First, place the Leo tracing pattern with the transparency on top, so the transparency covers the constellation in its entirety.
- 2) After placing these on the flat surface, trace the inner constellation pattern with the first color tube of glow-in-the-dark fabric paint, and follow the pattern by creating lines and circles on the transparency where indicated. The inner pattern is the constellation of stars connected by straight lines and circles. Do not fill in the circle – just outline them.
- 3) When you’re finished with the inner constellation, it is time to trace the outer more imaginative outline of the constellation with the second, different-colored tube of glow-in-the-dark fabric paint.
- 4) If you blur some lines or make a minor mess while tracing, try using Q-tips to fix them.
- 5) When you are finished - DO NOT SKIP THIS - allow the transparency to dry for AT LEAST 4 hours in a brightly lit area before attempting to do the activity.

Session B

- 1) After the glow-in-the-dark fabric paint on the transparency has completely dried for at least 4 hours and been under strong light for at least 30 minutes, or under a UV or LED light for less than 1 minute, take the transparency outside to find Leo.
- 2) During the Leo observation time, observe the major stars and match the pattern before you compare for data collection.
- 3) The Leo Finder Charts from the GLOBE at Night Web site will also help locate the general area in which to find Leo. (http://www.globeatnight.org/observe_finder.html)
- 4) When you have found the general area, hold up the transparency with the constellation pattern on it at arm’s length (for children). Match the pattern you have traced with the stars in the constellation Leo. You may have to tilt or turn the transparency to align the pattern correctly with the stars.
- 5) The constellation pattern has been drawn so the stars in the constellation will be visible within the circles drawn on the transparency itself, allowing the constellation pattern to be recognizable to even the most novice night-sky observers.
- 6) The transparency with the glow-in-the-dark constellation pattern should glow for at least 5 minutes. Be sure to take an LED flashlight with you so that you can “recharge” the transparency for continuous use. However, be careful not to lose your eyes’ adaptation to the dark sky.

Session C

- Using the data collected and the data online from around the world, students will be able to compare the similarities of magnitudes in big cities and rural areas. Big cities produce more light and make fewer stars visible.
- Students will discuss “Why do we see more stars on some nights or from some locations and not others?”
- Students will locate independently Leo and recognize the difference in magnitude of the stars.

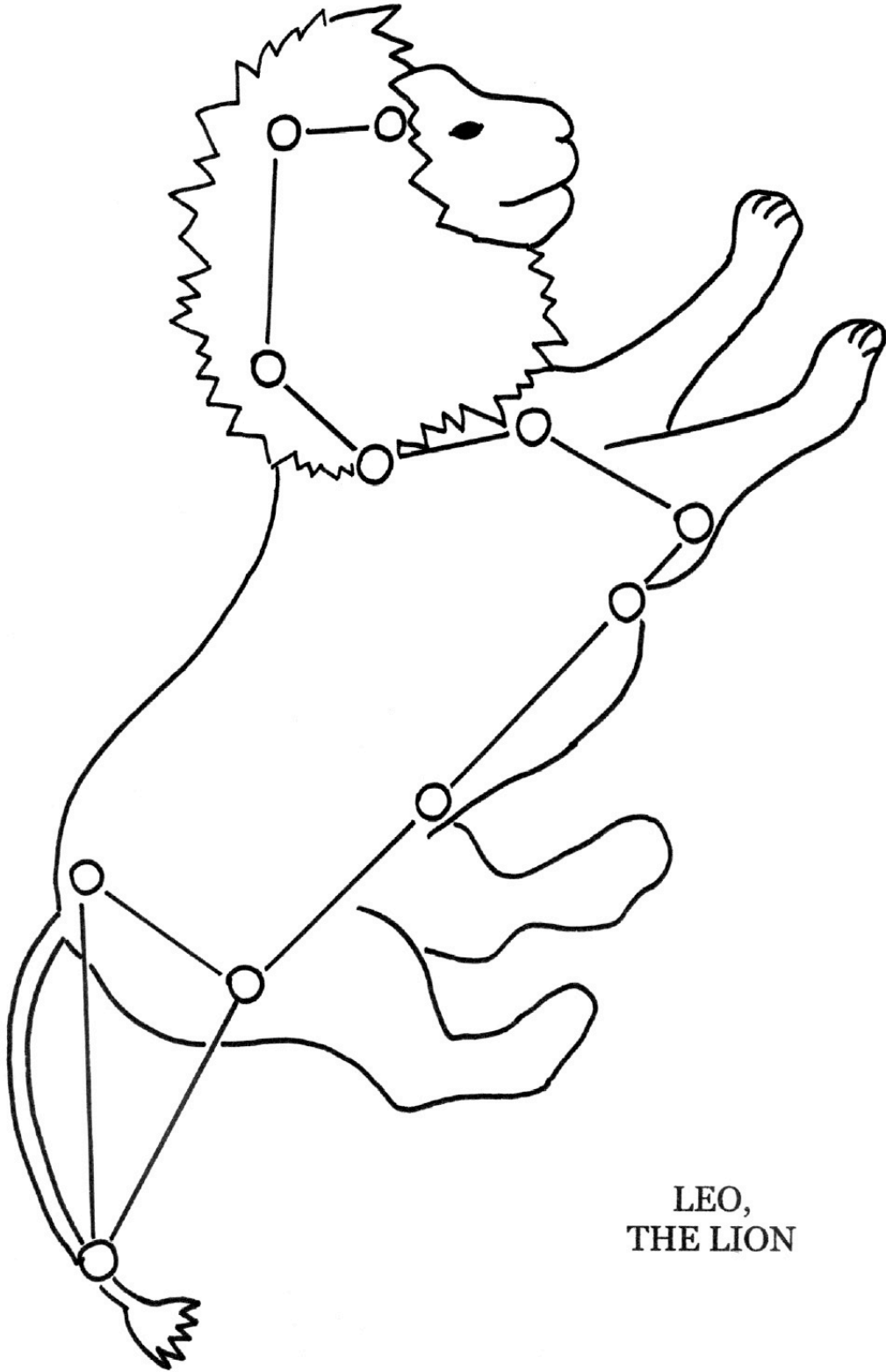
Credits: The original activity was created by Natasha Kopsie and Connie Walker at the National Optical Astronomy Observatory (NOAO) for the GLOBE at Night program. NOAO is operated by the Association of Universities for Research in Astronomy Inc. (AURA), under a cooperative agreement with the National Science Foundation.

GLOBE at Night is a collaboration between The GLOBE Program; the National Optical Astronomy Observatory (NOAO); the International Dark-Sky Association (IDA), Centro de Apoyo a la Didáctica de la Astronomía (CADIAS), and Environmental Systems Research Institute, Inc. (ESRI).

Attached on the next page is the template for Leo.



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**LEO,
THE LION**