



# OUTDOOR **NATURE** AWARD



## PROJECT: **ASTRONOMY**

### GOALS

**A. ASTRONOMY FACTS:** Identify key facts about constellations, stars, and galaxies.

**B. ASTRONOMY CHALLENGE:** Complete one of four.

---

### **A. ASTRONOMY FACTS**

There are more than 50 constellations in the North American skies, and most people have met only a third of those. Many of the unfamiliar ones are small and hard to see.

#### **How Far?**

A star's distance from earth is not measure in miles or meters, but in light years. A light year is not time, but a measure of distance. It equals *6 trillion miles*.

#### **Sample Star Distances**

- Arcturus* is 32 light years away
- Regulus* is 70 light years away
- Pollox* is 31 light years away
- Betelgeuse* is 300 light years away
- Sirius* is 8 ½ light years away

#### **How Bright?**

You will notice some stars are brighter than the others. The brightest are called "First Magnitude" stars and the weakest are "Fifth Magnitude" stars.

#### **What Can I See?**

With the naked eye, you may see stars, a faint Milky Way and some bright "stars" that are actually planets. With a telescope or set of binoculars, you can see a clearer Milky Way, star clusters of various sizes, nebulae, galaxies and double stars.

#### **Changing Skies**

Unlike the weather, star patterns are predictable. Stars have a schedule that is more reliable than a train schedule. Any star rises and sets about *4 minutes earlier* every day than it did the day before. This means in 1 month, the star will rise about 2 full hours earlier. In 6 months it will rise 12 hours earlier and 1 full year, it will rise 24 hours earlier...meaning it will appear at the same time again! So each year, at the same time, you will see the same skies.

#### **Seasonal Skies** (North America)

- Fall:* Look for the Great Andromeda galaxy
- Winter:* Look for Hyades and Pliedes star clusters and Great Orion Nebula in Orion's "sword"
- Spring:* Look for Beehive star cluster in the constellation Cancer
- Summer:* Look for Mizar and Alcor; famous paired stars in the bend of the Big Dipper's handle; look at Milky Way for clusters and look for shooting stars.

## B. ASTRONOMY CHALLENGE

Complete all of the following steps to stargaze.

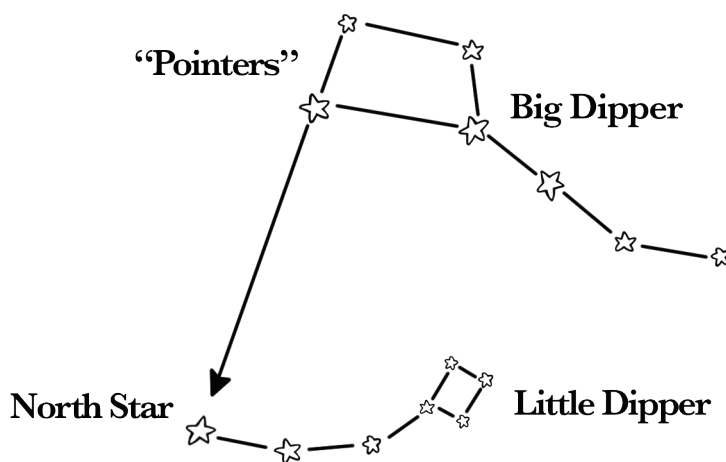
### Step 1—Preparation

1. Find a star map. You can purchase a constellation dial, or search online for “Print a Free Star map” Many online resources will also allow you to specify the time and month before printing. Check out [kidsastronomy.com](http://kidsastronomy.com) for “The Sky Tonight” for resources.
2. Bring a set of binoculars or a small telescope. If you feel ambitious, look up “How to Make a Newtonian Telescope” or “How to Make a Reflecting Telescope.”

### Step 2—Go Stargazing

#### Supplies Checklist

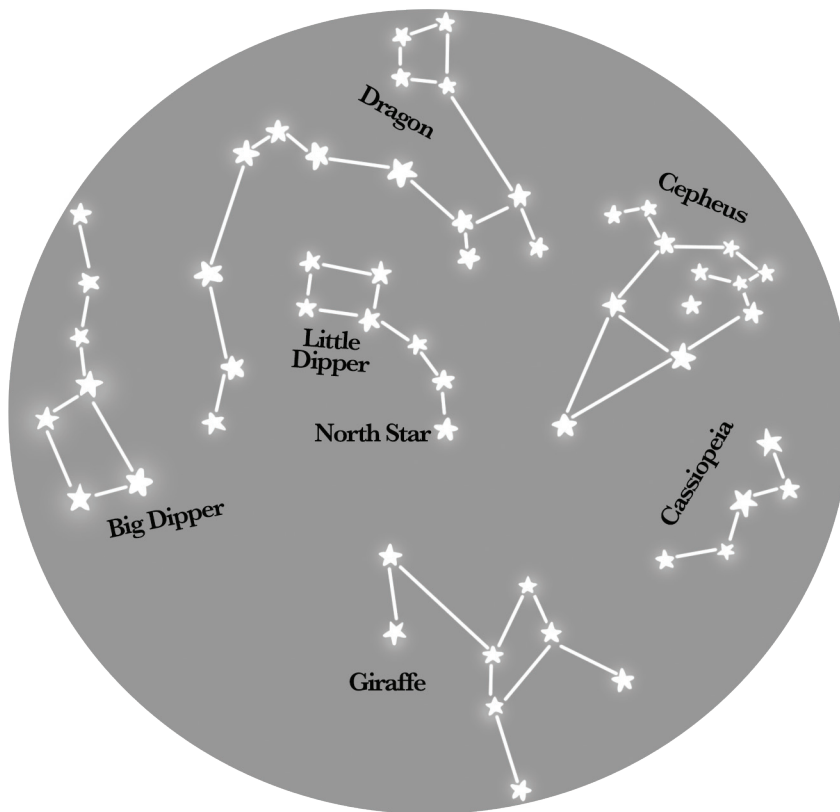
- Star map (bought or printed) set to current time of year
  - Binoculars or telescope
  - Flashlight (covered with red lens)
  - Paper and pencil
1. Bring a flashlight with a red cover so it won't blind you and inhibit your night vision. Make sure your star map is set to the current month of the year.
  2. Find a place where trees, buildings, or streetlights are not in the way. If you live in a city, find a safe rooftop or park area. Pick a clear night without the moon. A bright moon will block the stars and make it hard to see.
  3. Use your binoculars, telescope, or the naked eye to find the Big Dipper and the North Star first.



4. Orient your star map to your vantage point to make sure it's flipped the correct direction, north or south. Use the North Star as your pivot point for the map.

5. Look for at least 5 constellations. These are a few near the North Star.

- Cassiopeia
- Big Dipper
- Little Dipper
- Dragon
- Cephus
- Giraffe



6. See if you can identify a planet. Usually at least one is out per night. Any bright star not on a star map is likely Venus, Mars, Jupiter, or Saturn.

- Venus*: Brighter than any true star, comes out in the evening or before sunrise, but not in the middle of the night. Sits low in the sky. Appears white.
- Jupiter*: Not as bright as Venus, but brighter than the other stars. Appears white.
- Mars*: Brightness varies; appears reddish tinged.
- Saturn*: Fairly bright; appears yellow tinged.

**TIP: Lookup ahead of time which planets are visible in the sky for the year and month you are stargazing.**

### Step 3—Measure the Sky with Your Hand

Without special equipment you can gauge degrees in the sky. Why do you need this? Your horizon is part of a 180 degree arc. From the horizon line to directly above you is 90 degrees. You can measure how far apart any point of the sky is from the horizon, or from another object using these tools.

#### Hand Measuring

- Pointer finger* is **1 degree** across
- Three middle fingers* together are **5 degrees** across
- Your *fist* is about **10 degrees** across.
- A *hand span* from thumb to pinky tip is about **25 degrees**.

**TIP:** This will work for adults and children's different hand sizes. (smaller hand with shorter arm equals ratios of a larger hand and longer arm).

1. Hold your hand out at arm's length in the direction you want to view. Close one eye.
2. Measure how wide the Big Dipper's bowl is and the Little Dipper's full length.
3. Measure the North Star's distance from the northern edge of your sky.

**FUN FACT:** Sailors in the northern hemisphere knew that the degrees between the North Star and their northern horizon line is their latitude!

### RESEARCH MORE

- *Amazing Solar System Projects you can Build Yourself* by Delano Lopez
- *Find the Constellations (2nd Edition)* by H.A. Rey
- [nasa.gov/kidsclub](http://nasa.gov/kidsclub)
- Internet search: "How to make a reflective telescope at home"
- Research starmaps at [kidsastronomy.com](http://kidsastronomy.com)

*My child has successfully completed the Project Goals for the topic—Astronomy.*

Adult Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(Complete SIX projects to earn your NATURE award)