

Explore the Night Sky

BY JIM CORNISH

*“Mortal as I am, I know that I am born for a day.
But when I follow at my pleasure the serried multitude
of the stars in their circular course, my feet
no longer touch the earth.”*

– Ptolemy, c.150 A.D.

A night sky studded with stars has fascinated humankind for millennia. Thinking they were deities, the ancient Babylonians, Egyptians and Chinese organized them into constellations; making star maps to predict cataclysmic events or planting and harvest times, and to mark religious celebrations. Amazingly, some of these same constellations remain as part of astrology and modern astronomy. So, when taking your youth stargazing, you are doing more than earning a badge; you are engaging in a wondrous experience, as old as humanity itself.

Indoor Stargazing Activities

Make Your Own Constellations

space.about.com/od/backyardscience/ss/constellcannist.htm
www.wnit.org/outdoorelements/pdf/Constellation_Canisters.pdf

Mythology of the Constellations

www.comfychair.org/~cmbell/myth/myth.html

Make a Star Finder

www.spaceplace.jpl.nasa.gov/en/kids/st6starfinder/st6starfinder.shtml

Sky Maps

There are 88 constellations spread across the northern and southern hemispheric sky. To locate the ones overhead in your area, think of the night sky as a huge dome with stars stuck on its inside surface. Just as you need a map when exploring an unfamiliar landscape, use a sky map as your guide. Star maps can be purchased at a local book/magazine store or downloaded from several astronomy-related web sites on-line. Some of the on-line versions can even be customized to your exact longitude and latitude!

Since sky maps are held over your head when looking skyward, they will show the east/west cardinal points switched around when laid on your lap. To use the map properly, hold it printed side up, then rotate it clockwise 180 degrees. Keeping the face of the map visible, lift it over your head. With N on the map pointing northward, east and west will now be properly aligned. The center of the map is the part of the sky nearly or directly overhead. The outer circle of the sky map corresponds to the horizon.

You may need a flashlight to read a printed sky map. Cover the lens with red cellophane or a red sock to produce a red light that makes reading the map possible without affecting your night vision. Better yet, use commercial “glow-in-the-dark” maps.

Like all areas of study, astronomy has its own language. Understanding and using its vocabulary is essential when search-

ing for constellations. See “Words You Gotta Know” (www.skyandtelescope.com/howto/basics/Words_Ya_Gotta_Know.html) for a great list.

Let's Get Started

1. Start your stargazing adventure indoors first. Become familiar with a good star guide book and sky map for the current season as well as your location on earth. Pick one or two constellations to look for and learn how to find them.
2. When ready, find a high spot of ground away from any light source and where the horizon is visible.
3. Allow a half hour for your eyes to adjust to the darkness. (See *Star Myths* sidebar for one way to pass the time.)
4. Lie on your back with your feet pointed towards one of the cardinal points of the compass. Most stargazers begin by pointing north to find Polaris.
5. Orient the sky map.
6. Find Ursa Major (the Big Dipper), as a starting point.
7. From there, focus your attention on finding the popular constellations (Ursa Minor - containing the Little Dipper), Orion (completely visible in winter), Cassiopeia, Leo and Vega. Some star maps show star alignments you can use to find other stars and constellations. For example, after you locate the Big Dipper, look at the two stars that mark the outer edge of its bowl. Connect these two stars with an imaginary line and extend it below the dipper's bowl. Polaris, the North star, lies along this line, about five times the distance between the two pointers. No matter where the Big Dipper is in our sky, these two pointer stars always point to Polaris.
8. Be patient. There is a lot in the night sky to study. Wait for a clear night.

Just as topographic maps vary depending on where you live, sky maps vary too. The earth's curvature, rotation and changing position while orbiting the sun, change the rising

position of a constellation by about four minutes each night. Depending on your location on the earth and the season, how much of a constellation is visible on the horizon varies. While constellations like Orion partially dip below the horizon in summer, others like Ursa Major, Ursa Minor, Cassiopeia, Cepheus and Draco are circumpolar; they circle nearer the north polar star and remain visible year-round in the northern hemisphere.

Sources of Printable Sky Maps

Skymaps

www.skymaps.com/downloads.html

Starry Night Online

www.space.com/snserversnweb.php

(Type in your postal code and receive an up-to-the-minute, on-line sky map for your exact location.)

Star Bright, Star Light

On a perfectly clear and pitch-black night, only 1,500 stars are visible overhead. Most stargazers focus on just the 26 brightest, working through them one constellation at a time.

Most stars are suns and no two are exactly alike. They either glow dull red, blue, yellow or white. Varying from a few to several million kilometres in diameter, they are huge balls of mostly hydrogen gas held together by their own mass and producing enough gravity to create a constant fusion reaction in their cores.

The study of a specific star begins by first finding the constellation in which it appears and then locating where in the constellation it is positioned. To find Betelgeuse (pronounced beetle juice) for example, find Orion first. Betelgeuse is in the upper left hand corner and marks Orion's right shoulder. Being a red supergiant, it is the ninth brightest star in the night sky. While cooler than our sun, it is more massive and over 1000 times larger. If placed at the center of our Solar System, it would extend past the orbit of Jupiter.



Orion has more surprises. Another of its stars is a binary – two stars appearing as one as they revolve around one another. Another star is actually a star cluster. A star-like object located in Orion’s sword hanging straight down from the middle star of his three starred belt and visible with the naked eye is actually a nebulae – a huge gaseous cloud.

The Planets

Of course, not all of the points of light in the night sky are stars, nebulae or galaxies. Five of them (Mercury, Venus, Mars, Jupiter and Saturn), move among the “fixed” stars and were named “planets” (wanderers) by the ancient astronomers. The three remaining planets (Pluto recently lost its planetary status) are not visible with the naked eye. It was Galileo who discovered the planets were not rogue stars but worlds like our own. By noting the changing positions of stars and planets over the course of two or more nights, you can witness how the Earth’s yearly motion around the sun alters the position of objects in the night sky. With the aid of binoculars or a telescope, features such as phases, moons, rings and surface storms may also be visible. This site provides a good guide to the Solar System: www.astronomytoday.com/astronomy/solarsystem.html

Shooting Stars

“Shooting star” is the name used to describe a meteor – an intense streak of light across the night sky. Meteors form when

small bits of interplanetary rock and debris called meteoroids burn as they pass through the Earth’s upper atmosphere. The rare few meteors that survive the plunge and hit the earth are known as meteorites. While it’s possible to see a “shooting star” any clear night, there are times of the year when they seem to “shower” the earth.

Meteor showers are named after the constellations from which they seem to appear. One of the most spectacular showers is the Perseid which produces between 40 to 60 meteors per hour around August 12/13 each year. Other strong meteor showers are listed in a calendar at: www.meteorshoweronline.com/calendar.html.

Artificial Stars

Unlike meteors which streak quickly and for only a short distance, some points of lights move gracefully west to east from horizon to horizon. These are satellites – man-made objects launched into space for relaying messages, observing the weather, mapping the earth’s surface and even spying on other countries. Satellites can be best seen during the two hours right after sunset and two hours before sunrise when they reflect the light of the setting/rising sun. You can tell where the satellites are orbiting by their speeds and brightness. Satellites orbiting on lower levels usually move faster and brighter than those located higher above the earth. One of these moving lights could be the International Space Station (ISS). To learn of possible ISS sighting times for your area of Canada, visit: www.spaceflight1.nasa.gov/realdata/sightings/cities/skywatch.cgi?country=Canada.

Just Look Up

From believing that the stars and planets are gods and goddesses and that Earth is the center of the universe to now knowing that our sun is just one of hundreds of billions of stars that make up just our own galaxy in a vast universe of galaxies, human knowledge has taken an amazing journey over the past 5000 years. And like the great earthly and heavenly explorers of the Renaissance who separated fact from fiction, astronomers today continue to venture into unimaginable places. Just where this journey will take us, no one knows, yet we can share part of it by just looking up. ^

– Jim Cornish is a 5th grade science teacher in Gander, NL, an amateur photographer, and loves sharing the joys of learning with his students.

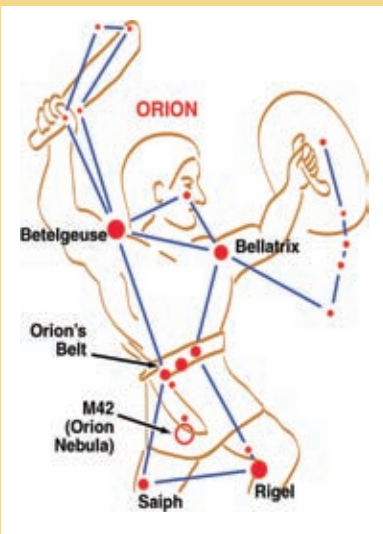
Program Links
Cubs – Astronomer Badge, #1 - 4

Orion, The Hunter

O Orion is one of the most beautiful of all constellations, and one of the easiest to find. It looks like a large rectangle high in winter’s south-southeastern sky.

Two of the brightest stars in the evening sky lie at opposite corners of the rectangle: bright red Betelgeuse at the northeastern corner and even brighter Rigel at the southwest.

Near the centre of the rectangle, look for a short diagonal line of three stars – Orion’s belt. Extending south from the belt, you’ll see another, fainter line of stars that forms Orion’s sword.



One of the objects in Orion’s sword isn’t a star at all. It’s a nebula – a cloud of gas and dust that’s like a giant fluorescent bulb. Hot young stars inside the nebula pump energy into its gas, causing the gas to glow.

Credit: Illustration and words provided by Stardate Online. Used by permission of The University of Texas McDonald Observatory. www.stardate.org/nightsky/constellations.

Star Myths

Reading aloud the myths of the constellations passes the time while waiting for eyes to adjust to the darkness. Tailor the story to the age of the youth and the constellation you are going to find. For instance, read aloud the story of Orion, and then find Orion in the sky.

Give Me More!

More interesting star web sites can be found on Scouts Canada’s web site, under *Scouting Life’s* current issue, as an additional page.