

Family Space Day Overview - Constellations

Family Space Day is a three hour event. The activities are set up so that children and parents can select the order in which they undertake activities. Parents and children are encouraged to learn, play, and explore *together*.

Objectives of the Day

Children will:

- ❖ learn what constellations are.
- ❖ learn how different cultures have created stories about constellations.
- ❖ learn to recognize several commonly known constellations.

Activities

- ❖ **Station 1: Storytelling – How Constellations Came to Be**
Children listen to a legend about how the constellations came to be. They learn what a constellation is.
- ❖ **Station 2: Pin the Star on the Sky**
Children, with eyes closed or covered, place stars randomly on paper. Using these fixed stars, they create their own constellation – and its story.
- ❖ **Station 3: Constellation Circle**
Children discover which constellations can be seen during the different months of the year.
- ❖ **Station 4: StarMaster Viewer**
Children create pattern templates of constellations and view them through a “StarMaster Viewer” to help them learn to recognize the arrangement of the stars.
- ❖ **Station 5: Sky Wheel**
Children will make a chart of the sky in order to find the different constellations.
- ❖ **Station 6: Coloring Sheets and Games**
Children can relax and color and play simple games related to constellations.
- ❖ **Station 7: Reading Room**
Children and their parents can browse and read a selection of books about constellations (refer to book list for suggested reading).

Other Materials

- ❖ *Facilitator Information – Constellations*
- ❖ *Explore Constellations – Book and Website References*

- ❖ *All About Constellations* – A Constellation Fact Sheet
- ❖ *View the Night Sky* – An invitation to families to look at the sky together
- ❖ *Hipparcos Star Globe* – Create a star globe using a template

Facilitator Information

(All you need to know about constellations to survive the day)

What's a constellation?

A constellation is a group of stars that appears to form a pattern or picture like Orion the Great Hunter, Leo the Lion, or Taurus the Bull. Constellations are easily recognizable patterns that help people orient themselves using the night sky. There are 88 “official” constellations.

Are the stars in a constellation near each other?

Not necessarily. Each constellation is a collection of stars that are distributed in space in three dimensions – the stars are all different distances from Earth. The stars in a constellation appear to be in the same plane because we are viewing them from very, very, far away. Stars vary greatly in size, distance from Earth, and temperature. Dimmer stars may be smaller, farther away, or cooler than brighter stars. By the same token, the brightest stars are not necessarily the closest. Of the stars in Cygnus, the swan, the faintest star is the closest and the brightest star is the farthest!

How are constellations named?

Most of the constellation names we know came from the ancient Middle Eastern, Greek, and Roman cultures. They identified clusters of stars as gods, goddesses, animals, and objects of their stories. It is important to understand that these were not the only cultures populating the night sky with characters important to their lives. Cultures all over the world and throughout time — Native American, Asian, and African — have made pictures with those same stars. In some cases the constellations may have had ceremonial or religious significance. In other cases, the star groupings helped to mark the passage of time between planting and harvesting. There are 48 “ancient” constellations and they are the brightest groupings of stars – those observed easily by the unaided eye. There actually are 50 “ancient” constellations; astronomers divided one of the constellations (Argo) into 3 parts.

“Modern” constellations — like the Peacock, Telescope, and Giraffe — were identified by later astronomers of the 1500s, 1600s, and 1700s who used telescopes and who were able to observe the night sky in the southern hemisphere. These scientists “connected” the dimmer stars between the ancient constellations. There are 38 modern constellations. In 1930 the International Astronomical Union officially listed 88 modern and ancient constellations (one of the ancient constellations was divided into 3 parts) and drew a boundary around each. The boundary edges meet, dividing the imaginary sphere — the celestial sphere — surrounding Earth into 88 pieces. Astronomers consider any star within a constellation boundary to be part of that constellation, even if it is not part of the actual picture.

Why Do We See Different Constellations During the Year?

If observed through the year, the constellations shift gradually to the west. This is caused by Earth’s orbit around our Sun. In the summer, viewers are looking in a different direction in space at night than they are during the winter.

Read more about constellations at:

<http://www.lpi.usra.edu/education/skytellers/constellations/about.shtml>

Storytelling – How Constellations Came to Be

This activity will introduce children to constellations through a mythical story about how constellations came to be. Children will learn what constellations are, and how they are organized.

What You Need:

Use the online *SkyTellers* story of *Why Coyote Howls* (<http://www.lpi.usra.edu/education/skytellers/constellations/preview.shtml>)



Other possible stories about how constellations came to be can be found in:

Once Upon a Starry Night: A Book of Constellations

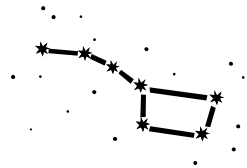
Jacqueline Mitton, 2004, National Geographic, ISBN 0792263324

Children ages 5–9 will enjoy hearing the Greek myths related to several constellations. Each two-page spread presents a mythical figure using short text pieces and illustrations in glowing colors with foil stars.

American Indian Myths and Legends

Richard Erdoes and Alfonso Ortiz, 1985, Pantheon Books, ISBN 0394740181

Over 100 Native American stories are presented for children ages 8 and older, including the Wasco tale "Coyote Places the Stars," another version of "Why Coyote Howls."



What to Do:

Play *Why Coyote Howls*, or read a story about how constellations – or a constellation – came to be.

Once the story is over, invite the children to retell the story. Help them begin the story, and prompt them through the discussion. Help them remember incidents that are left out or are out of order as needed.

Discuss with the children the scientific definition of what constellations are and how they are named.

Alternatively, have the children reenact the story as a play, taking turns as the narrator. They can create songs or dance to the stories. Invite them to illustrate the stories using craft materials.



Pin the Star on the Sky Activity

Many of the 88 constellations were named after mythological characters by the Greeks centuries ago.

This activity will help your child understand that constellations are groupings of stars that appear to form a pattern or picture in the night sky. By creating their own constellations the children will also learn about the process of how these star groupings were identified long ago!

What You Need:

- ❖ Star stickers
- ❖ Blindfold (optional)
- ❖ Precut sheet of large white paper (approximately 2 x 3 feet)
- ❖ Masking tape
- ❖ Various craft items such as colored glitter, glue, crayons, paint, sequins, etc.



What to Do:

- ❖ Using masking tape, tape a sheet of white paper to an area on the wall about the child's chest height.
- ❖ Ask your child to close his or her eyes – or, if they are comfortable, place a blindfold over their eyes.
- ❖ Have the child stand several feet away from the paper.
- ❖ Place a star sticker in your child's hand, spin your child around a few times, and have him or her walk to the paper (you may help!) and place the 'sticky star' on the paper.
- ❖ Repeat the process for several more star stickers (5-10 should do it!)
- ❖ Remove blindfold
- ❖ Ask your child to use their imagination to connect the stars to form a design, or to create a constellation around the stars. Color and use craft items to decorate the creation!
- ❖ Have your child name his or her constellation and create a story about the object represented in the constellation.

Parent Prompts:

What is a constellation? (A group of stars that appear to form a pattern or picture)

How might the constellations have gotten their names? (Many of them were named long ago by different cultures based on what they imagined the star groupings to look like – they often matched the constellations with gods and goddesses or characters of their stories)

Adapted from:

http://www.lpi.usra.edu/education/skytellers/constellations/activities/star_darts.shtml

Constellations Circle

If you were to go outside tonight, which constellations would you see? Do you think you would see those same constellations 6 or so months from now? No, you wouldn't. Do you know why? As the Earth orbits the Sun, we see different parts of the sky. The constellations you see in January will not be the constellations you see in June.

In this activity, you and your child will discover which constellations can be seen in the Northern Hemisphere during which months.

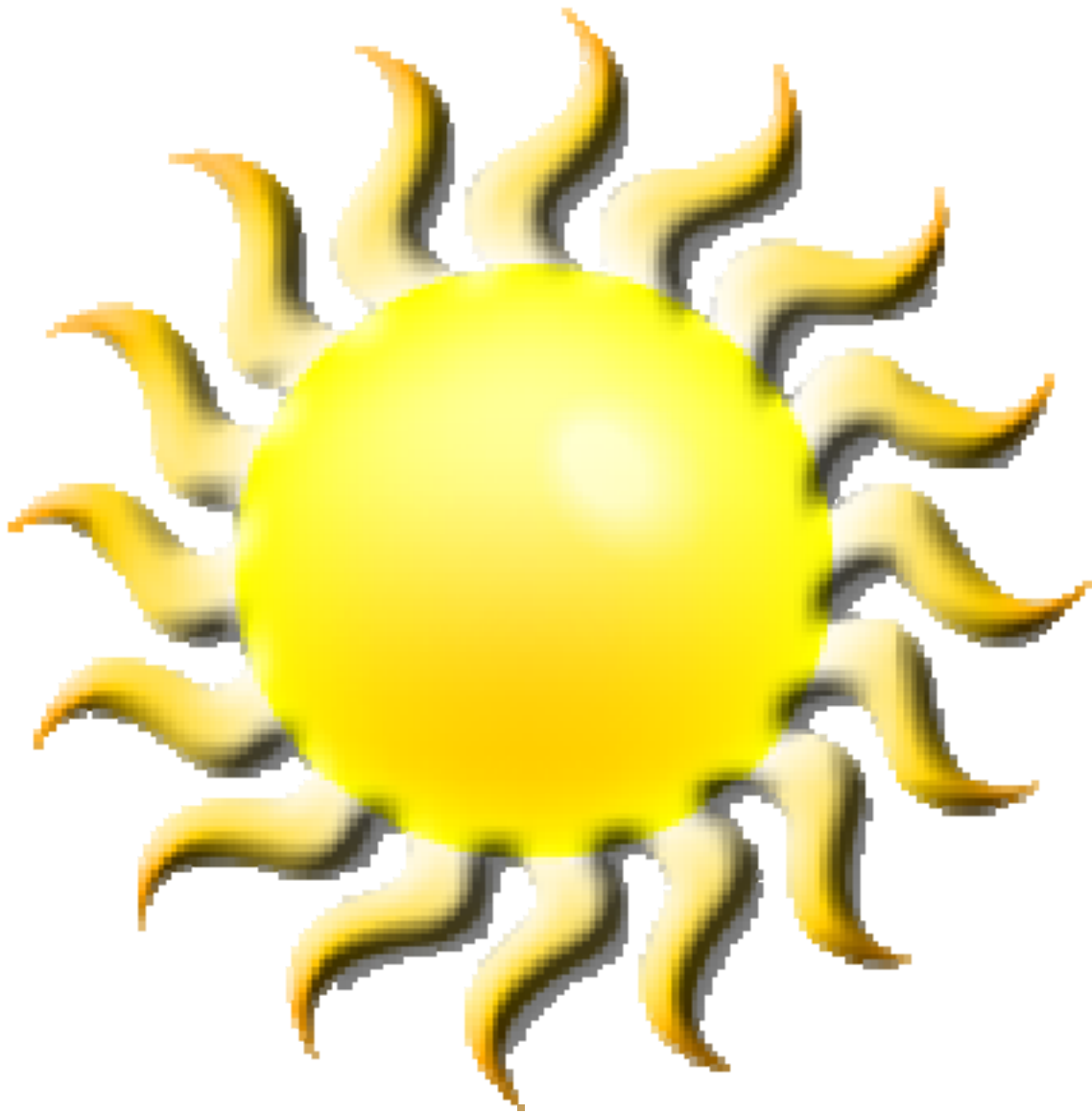
What You Need:

- ❖ Print-outs of the 13 constellations (make a link) (or 13 bright poster boards)
- ❖ Print-outs of months
- ❖ A large open space
- ❖ Tape
- ❖ Glue, glitter, pom-poms and other small craft items (only needed if you're using the poster boards)
- ❖ Image of the sun

What to Do:

- ❖ If using the poster boards, create each constellation on a different poster board using the glue and craft items.
 - Tape poster boards or print-outs to surrounding walls, in order counterclockwise: Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Ophiuchus, Sagittarius, Capricornus, Aquarius, Pisces, Aries
- ❖ Use tape to make a very large circle on the floor in the middle of the room
- ❖ Tape the Sun image to the floor in the center of the circle.
- ❖ Have your child orbit the Sun and look at the constellations. Let them know that they are moving around the Sun as the Earth does during the year.
- ❖ Ask your child to stand and look away from the Sun. Which constellation do they see? If your child turns to face the Sun, do they still see that constellation? (No)
- ❖ Ask your child to look towards the Sun; which constellation do they see? If they are looking at the Sun, what time of day is it? (Daytime). Could someone really see that constellation that's in the direction of the Sun? (No, the Sun's in the way—that constellation is only up during the day)
- ❖ Ask your child to walk some of the distance around the Sun, using the circle. Now invite them to turn to look at that same constellation as before. Is it still blocked by the Sun? (No). So would someone be able to see it now in the night sky? (Yes).

Adapted from <http://mcdonaldobservatory.org/astroday09/ModelTheNightSky.pdf>



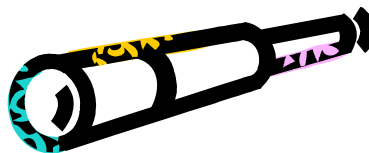
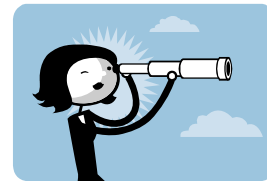
StarMaster Viewer

A constellation is a grouping of stars that appears to form a pattern or picture. Constellations help people orient themselves using the night sky by appearing as recognizable organizations of stars, such as the stars that make up the constellations Orion, Cygnus and Hercules. Stars and constellation are used in navigation. There are 88 “official” constellations. Many of the names we use today for constellations come from the ancient Greeks. They assigned their gods and heroes to certain star groupings in the sky.

In this activity, your child will design different star pattern templates to observe a few of the constellations that are visible in the night sky.

What You Need:

- ❖ 1 cardstock StarMaster Viewer template
- ❖ 1 cardstock StarCards template
- ❖ SkyChart
- ❖ Tape
- ❖ Scissors
- ❖ Embroidery needle with yarn
- ❖ Popsicle sticks
- ❖ Pen or pencil
- ❖ Various craft materials to decorate your StarMaster Viewer
- ❖ Constellation Description Page



What to Do:

- ❖ Using your Constellation Description Page, have your child choose a few constellations that they will design for their viewer. Talk about the constellation.
- ❖ Get copies of the cardstock StarCard and StarMaster Viewer templates.
- ❖ Allow your child to decorate the StarMaster Viewer template using craft items.
- ❖ Cut along the bold line on the template that says “insert StarCard here”. Do not cut the entire line; the cards will be inserted in the partially cut slit.
- ❖ Have them construct the viewing tube by cutting along the designated line shown on the template.
- ❖ Roll the paper into a tube, and tape the tube securely on the edge shown.
- ❖ Have them cut out the cardstock circles — the StarCards. They should cut on the outside edge of the larger circle.

What to Do (Cont'd):

- ❖ On the front of each StarCard, have your child carefully reproduce the arrangement of the stars in the constellation by placing a pencil dot for each star.
- ❖ Have them draw or color the object that each constellation represents.
- ❖ Help your child use an embroidery needle (with yarn attached) to poke a small hole in the cardstock for each star in the constellation.
- ❖ Tape a Popsicle stick to the back (on the edge of the larger circle) trying not to block any of the small holes that were punched.
- ❖ On the back of each StarCard ask your child to write the name of the selected constellation.
- ❖ Once you have completed your StarMaster Viewer, look through it at a light source and enjoy your constellation!!
- ❖ Invite your child to tell you why their constellation is named what it is. Without looking at the back of the StarCard, can they identify their constellations?

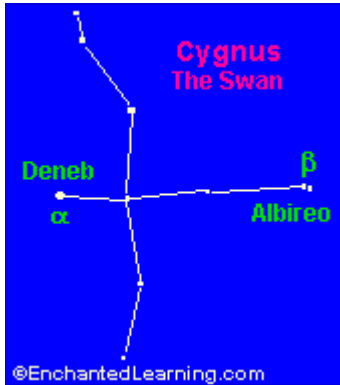
Warning: Do not look at
the sun through the
viewer!



Adapted from:

http://www.lpi.usra.edu/education/skytellers/constellations/activities/star_master.shtml

Constellation Description Page



CYGNUS

Cygnus (the swan) is a constellation that is shaped like a large cross. It is also known as the Northern Cross. It is seen along the Milky Way in the northern hemisphere. At its tail is the very bright star Deneb, and at its head is the double star Albireo.

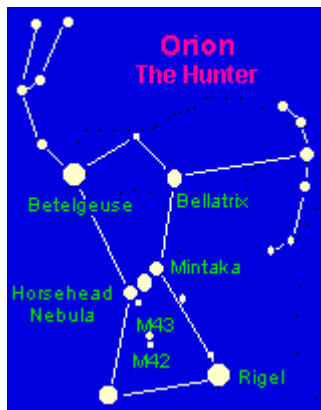
HERCULES

Hercules is a Northern Hemisphere constellation that is the fifth largest in the sky. It is named for Hercules, the legendary hero of Greek mythology. The brightest of its rather dim stars is Ras Algethi, a variable red supergiant.



ORION

Orion, also known as "The Hunter," is a constellation. The brightest stars in Orion are Rigel, Betelgeuse, and Bellatrix. The Horsehead Nebula and the Orion nebula (M42 and M43) are also in this constellation.



URSA MAJOR

Ursa major (The Great Bear) is a well-known constellation in the Northern Hemisphere that contains the 7 stars of the Big Dipper.



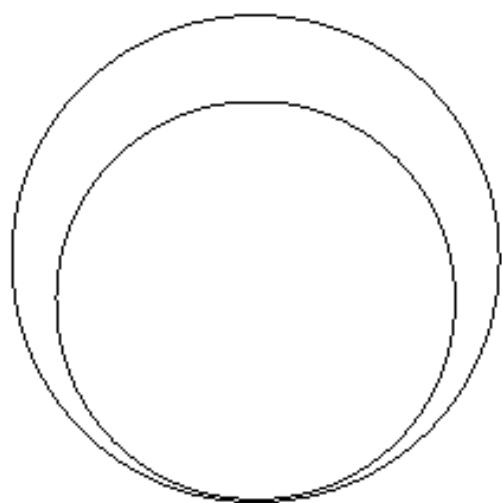
URSA MINOR

Ursa minor (The Little Bear) is a Northern Hemisphere constellation that is also known as the Little Dipper. This group of stars starts at Polaris, the pole star of the Northern Hemisphere.

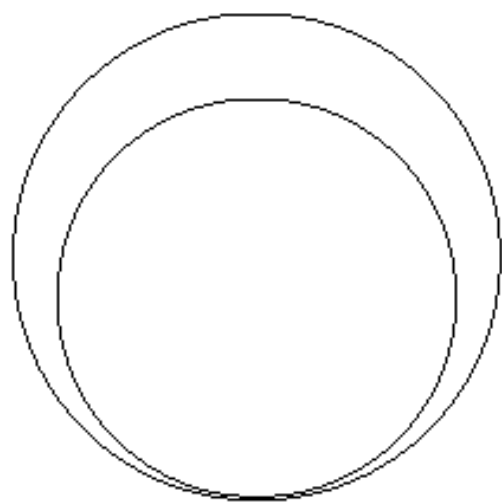
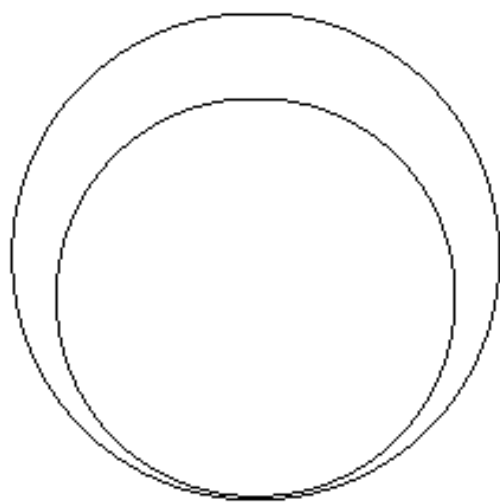
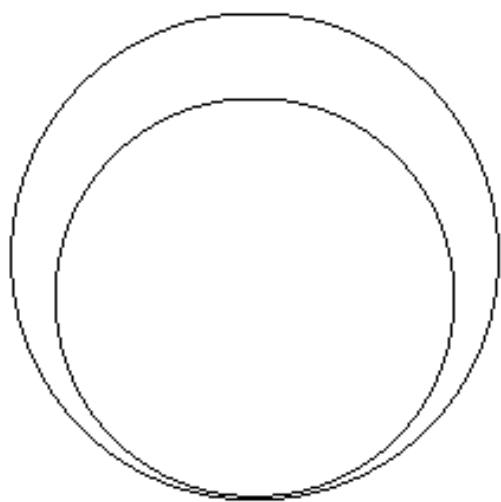
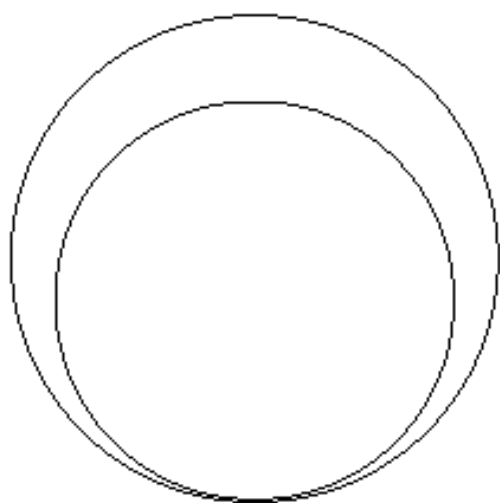
BOOTES

You can easily find Bootes by following the Big Dipper's handle. Bootes is an elongated diamond shaped constellation between the Big Dipper and Virgo. Bootes contains the fourth brightest star in the sky - Arcturus. Arcturus is so bright because it is a mere 36 light years from Earth and because it is near the end of its life span. Just as our Sun will in about five or six billion years from now, Arcturus, has run out of Hydrogen to convert to Helium and has expanded to many times its original size.





1.



StarCard
Template

1. Cut along this line

2. After cutting, roll the paper into a tube and tape along this edge

StarMaster Viewer Template

Sky Wheel

What do you see in the night sky? Stars! Do you know that for a very long time, people have made pictures out of the stars in the sky? There are now 88 pictures or constellations in our sky! How many do you think you can find?

You won't be able to all of the constellations at one time; but during the year, as our Earth orbits the Sun, we see different parts of space – and different constellations.

Your child will create a Sky Wheel to help them find the constellations in the sky.

What You Need:

- ❖ Sky Wheel templates (3) on cardstock from <http://www.lhs.berkeley.edu/starclock/skywheel.htm>
- ❖ Scissors
- ❖ Tape

What to Do:

- ❖ Cut out and assemble the Sky Wheel according to instructions.
- ❖ Rotate the Star Wheel in the Star Holder until your desired time of night lines up with the desired date.
- ❖ Pick a horizon (North, South, East, or West) and hold the Sky Wheel and holder so that the horizon's name is right-side up. Look at the constellations in the area just above that horizon. These are the stars and constellations you will see outside facing that direction!

Parent Prompts:

What constellations did you find?

What happens to the constellations when you change the time or date?
(They move—they change positions)

Are the same constellations up every night?
(No, many constellations only appear during certain times of the year)

Coloring Sheets

The following are links to different coloring sheets and games.

Enchanted Learning – Big Dipper Connect-the-Dots

<http://www.enchantedlearning.com/subjects/astronomy/activities/dots/bigdipper.shtml>

Enchanted Learning – Cassiopeia Connect-the-Dots

<http://www.enchantedlearning.com/subjects/astronomy/activities/dots/cassiopeia/>

Enchanted Learning – Cygnus Connect-the-Dots

<http://www.enchantedlearning.com/subjects/astronomy/activities/dots/cygnus/>

Enchanted Learning – Leo Connect-the-Dots

<http://www.enchantedlearning.com/subjects/astronomy/activities/dots/leo/>

Enchanted Learning – Orion Connect-the-Dots

<http://www.enchantedlearning.com/subjects/astronomy/activities/dots/orion/>

Explore Constellations!

Websites

http://skyandtelescope.com/observing/skychart/article_1220_1.asp

Sky & Telescope magazine offers an easy-to-access interactive sky chart where viewers get a customized view of the sky for any location on Earth, on any date, at any time.

<http://familyeducation.com/topic/front/0,1156,1-3910,00.html?ssb>

The Night Sky from FamilyEducation.com facilitates family interaction through night sky observing. It includes activities, an instructional, inquiry-based guide for parents on three levels, grades pre-K through 12, a list of astronomy tools and downloads, and a fun section called "night sky scrapbook," where viewers are invited to post their notes and observations of the night sky and read those from others.

<http://www.enchantedlearning.com/subjects/astronomy/stars/constellations.shtml>

On Enchanted Learning's Zoom Astronomy site, young viewers ages 8–15 can find a list of the 88 constellations and short descriptions and clear illustrations of 33 of the more common ones.

Explore Constellations!

Books

The Sky Is Full of Stars. Franklyn Branley, 1983, HarperTrophy Publishers, ISBN 0064450023.

Information to engage stargazers, ages 4–8, in viewing and locating star pictures.

Find the Constellations H. A. Rey, 1976, Houghton Mifflin, ISBN 0395244188.

One of the best star and constellation guides for beginners, offering comprehensive explanations of the essentials, presented in an easy-to-understand format for children.

Constellations (Galaxy) Gregory Vogt, Bridgestone Books, 2002, ISBN 0736813829.

Children ages 4–8 can explore what constellations are and how to locate them. Images of constellations are paired with descriptive text.

The Constellations: Stars & Stories Chris Sasaki and Joe Boddy, 2001, Sterling Publishing, ISBN 0806976357.

The 88 constellations, listed in alphabetical order, are illustrated with accompanying explanations of the myths behind them.

All About Constellations

- ❖ A constellation is a grouping of stars that appears to form a pattern or picture.
- ❖ Constellation is an ancient word that comes from the Latin language.
- ❖ “Con” means “with” and “stella” means “star.” So a *constellation* is a picture made “with stars.”
- ❖ There are 88 “official” constellations. Each constellation is a collection of stars that are distributed three-dimensionally in space.
- ❖ Most of the constellations were named before recorded history. People of different cultures identified groupings of stars in the sky with gods, goddesses, animals, and objects of their stories.
- ❖ There are billions of stars, and only a fraction of them make up the shapes of our constellations — these are the stars that are easily seen with the unaided eye.
- ❖ Constellations are used to define pieces of the celestial sphere.
- ❖ All stars within a constellation boundary, whether part of the actual constellation or not, are assigned to that constellation.
- ❖ *All* the stars you see belong to one special group of stars — the stars in the Milky Way galaxy and fall within the boundaries of one of the 88 constellation regions.
- ❖ Our closest star is Proxima Centauri, 4.2 light years away, located in the constellation of Centaurus, the Centaur.
- ❖ The Big Dipper is not a constellation! It is *part* of Ursa Major, the Big Bear.
- ❖ The Big Dipper is an asterism, a recognized, but not official, grouping of stars.
- ❖ Some asterisms fall within a single constellation, others cross constellations.

Star Viewing

A Take-Home Activity

On a dark night you and your child can view the sky and identify constellations

What You Need:

- ❖ Clear, dark viewing sky
- ❖ Sky chart for your location
(<http://skytonight.com/observing/skychart/3308911.html>)
- ❖ Binoculars or a telescope
- ❖ Mosquito repellent
- ❖ Flashlight
- ❖ Snacks

What to Do:

Head outside on a clear night and see if you can identify some of the constellations you learned!

Parent Prompts:

Can the children find Polaris?

Draco the dragon?

Lyra, the lyre?

Pegasus, the winged horse?

Orion, the great hunter?

What about other constellations?

A sky chart for your local area will display a night sky view, as observed with the unaided eye. Sky and Telescope offers an overview of viewing highlights (<http://skytonight.com/observing/ataglance>) and an interactive Sky Chart (<http://skytonight.com/observing/skychart/3308911.html>) that can be generated and printed easily using a local zip code.

Adapted from: <http://www.lpi.usra.edu/education/skytellers/stars/activities/viewing.shtml>

Hipparcos Star Globe

You and your child can create a star globe and discover what the night sky looks like all around the world!

What You Need:

- ❖ Print-out of Hipparcos Star Globe on cardstock
http://www.rssd.esa.int/SA/HIPPARCOS/docs/STar_Globe_Images.pdf
- ❖ Folding Instructions
http://www.rssd.esa.int/SA/HIPPARCOS/docs/Folding_Instructions_Star_Globe.pdf
- ❖ Tape
- ❖ Scissors

What to Do:

- ❖ Cut out template.
- ❖ Fold according to instructions.
- ❖ Adhere where directed.
- ❖ Go outside and compare what you see on the Hipparcos Star Globe to what is in the sky!

Parent Prompts:

Which constellations are in your part of the sky?

Which constellations are on the opposite side?