AGES 8+

2009

Star Theater® 3

Planetarium Projector with Astronomy Software

Instruction Manual

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Music and audio production by Donovan Reimer

Discover the Universe!

Welcome to the amazing world of astronomy! Astronomers spend their time discovering the nature of space and everything in it. As big as our planet Earth is, it is just one of eight planets orbiting the sun, which is just one of billions of stars in our home galaxy, the Milky Way, which is just one of billions of galaxies in the universe. So you can see that it will be a long, long time, if ever, until astronomers run out of things to discover!

Your Own Planetarium

Have you ever been to a planetarium show? Do you remember when you sat back and saw the night sky projected by a huge star projector, while the astronomer guided you on a journey through space and time? Remember how much fun and how interesting that show was? Your planetarium does much the same thing, right in your own room.

Your planetarium allows you to...

- Project stars, outlines of the constellations, and their names on the walls and ceiling all around you
- Project the night sky for any season or month of the year with its one-piece fully-integrated star sphere — no separate overlays to break or lose
- Accurately project the night sky by date and hour
- Project the night sky in its correct directional orientation
- Treat yourself and your friends to an exciting sight and sound tour of the night sky.

With your planetarium, you will learn the locations of the brightest and easiest-to-find constellations, stars, and planets. By taking the tour and reading this guide, you will come away with a good understanding of the night sky.

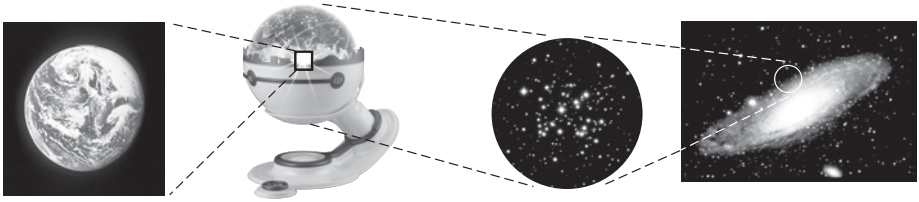
What Is a Constellation?

If you look at the stars in the night sky long enough, you will notice how groups of stars form familiar objects, something like connect-the-dots pictures. Many centuries ago, people who gazed at the stars noticed pictures out there— and gave names to them. This helped them create a "map" of the night sky, making it easier to locate the stars.

But these figures are not really sitting out there in space. They are only imaginary patterns created by the relative positions of the stars as we see them from Earth. Some stars that appear to be right next to each other are in fact very far apart. They just look close together from where we are looking at them on Earth. If you could somehow see the night sky from another part of the galaxy, the relative positions of the stars would be completely different and you would be able to discover totally new constellations.

The Star Sphere

The Star Sphere™ is a replica in miniature of the largest and brightest objects in space surrounding our planet. If you were to put Earth in the sphere, it would be located at the exact center, where the light bulb is. The dots printed on the sphere represent stars. The glow-in-the dark dots represent the brightest, easiest-to-find stars. The lines connecting the stars show the constellations.



About 99 percent of visible stars like those on the star sphere are in the solar neighbourhood. That means they are within about 100 light-years of Earth. This is nearby, compared to the other stars in the spiral arm of our galaxy where our solar system is located. A light-year is the distance light can travel in one year, which is about 6 trillion miles or nine and a half trillion kilometers.

Assembly and Operation

Installing Batteries for the Light Wand

1. First remove the horizon ring and then remove light wand from base (see Fig. 1).

2. With a small Phillips-head screwdriver, remove the screw on the battery cap. Unscrew battery cap located at the end of wand. Gently shake the wand so that the battery module slides out (see Fig. 2).

3. Insert three (3) AA batteries into battery module, making sure the "+" and "-" ends are in correct placement as indicated (see Fig. 3). Alkaline batteries are recommended.

4. Insert battery module into light wand, making sure the grooves align (see Fig. 4). Replace battery cap and Phillips head screw (do not over-tighten). Place the light wand back into base.

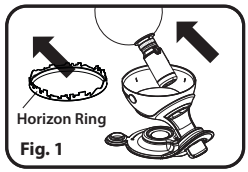


Fig. 1

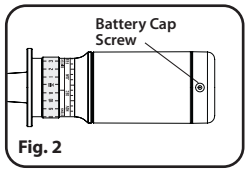


Fig. 2

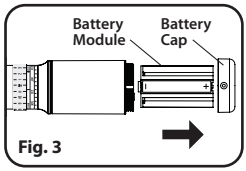


Fig. 3

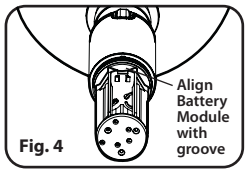


Fig. 4

Installing Batteries for the Night-light

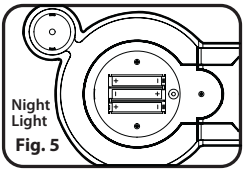
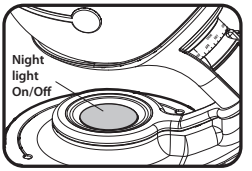


Fig. 5



1. Turn Star Theater 3.0 on its side and, using a small Phillips-head screwdriver, remove the battery cover.

2. Insert three (3) "AAA" batteries. Make sure the "+" and "-" ends are inserted correctly, as indicated (see Fig. 5).

3. Replace battery cover.

Operating Your Planetarium

1. Place your planetarium in the corner of a room on a table or bookshelf. This allows the projection to cover walls and ceiling. A room with smooth light-colored walls and ceiling works best. A room that is approximately 12 x 12 feet provides the best projection quality. Star Theater 3.0 works best when it is located between one to six feet from the projection surface. If your ceiling is very high, place the planetarium on a shelf or create a raised platform by piling up books for example. Raise or lower the planetarium until the stars are in sharp focus.

2. Rotate your planetarium so that N (North) on the compass lines up with the raised dot. This allows your planetarium to project the stars in the same directional orientation as they are in the real night sky outside.

   Your planetarium projects stars that are visible from Earth's Northern Hemisphere, including North and Central America, Hawaii, Europe, Russia, Asia, Northern Africa, and the Middle East.

3. Date selector is located on light wand. To set your planetarium for the beginning of the audio tour, rotate light wand until "AUTUMN" lines up with pointer on the base. At various breaks during the audio tour, you will be asked to pause the CD and adjust your planetarium for the next season. (The month and date settings and the time ring will be used after the audio tour to set your planetarium for a specific date and time of day.)

4. Close curtains or blinds. Turn on projection lamp. (Do not look directly at the Star Sphere while its light is on, or you will lose your darkness adaptation.)

5. Start the audio tour CD, turn off the lights, sit back and enjoy the show.

Setting the Date and Time

Once you've taken the audio tour, you can set your planetarium to project the night sky for any date and hour. You can easily adjust your planetarium for any date you wish: your birthday, a holiday, the final day of school, last Thursday, or any other date. Here is how:

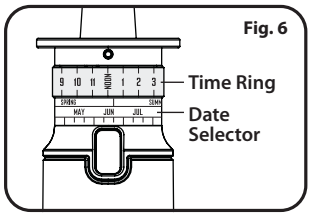


Fig. 6

1. Setting the date: With projection lamp off, turn light wand until the month you want lines up with the pointer on date selector (see Fig 6). Below the month, there are markings indicating the 1st, 10th and 20th of the month. Turn light wand to the left (so that Star Sphere turns to the west) until the date you want lines up with the pointer. For example, if you want to project the night sky the way it is on July 4th, first select July, then turn further to the left, to just past the mark for the first day of the month.
2. Setting the time: Once you have selected the month and date, rotate the time ring— without turning the light wand—so that the time at which the sun sets lines up with the pointer. (The time at sunset can be found in the local newspaper or on the Internet.) Now turn the light wand to the exact time you want. (Don't worry that the months and dates are changing on the date selector as you are adjusting the time; once you've selected the date and set the time ring for sunset, the time selection function takes over.) You can set your planetarium to project the stars for any time of the night. You can even see what stars are up during the day, when they are not visible.

Care and Maintenance

Remove batteries when not in use for extended periods. Keep star sphere clean with a soft cloth and quality anti-static cleaner/polish. Never use abrasive cleaners.

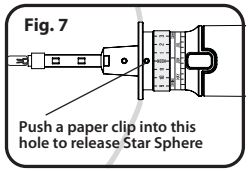


Fig. 7

Bulb replacement: Replacement bulbs are available at most electronics retailers. Halogen bulb, Voltage: 3.6 V, Current: 500 – 600 mA. Part No. LR00001.

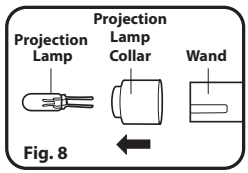


Fig. 8

The bulb is only to be replaced by an adult.

1. Remove Star Sphere and light wand from base.
2. Push a paper clip into the small hole directly above the on/off button. At the same time, rotate light wand counterclockwise to Star Sphere. Remove it from Star Sphere (see Fig. 7).
3. Carefully pull old projection lamp out of tip of light wand.
4. Insert replacement bulb into tip of light wand (see Fig. 8). (Important: Be careful not to bend prongs of the bulb.) Turn light wand on to make sure bulb lights up, then turn it off.

5. Reinsert light wand into Star Sphere. Rotate light wand clockwise until it clicks into place. This is important for accurate date and time adjustments.
6. Place Star Sphere and light wand back into base.

Meteors and Comets

A comet is basically a big rock, made of ice and dust, that orbits the sun in a wide, elliptical path. Most comets take many years to complete a full orbit. One of the most famous, comet Halley, visits the inner solar system once every 76 years. Comets are smaller than planets. Some are relatively small in size and some are many miles across.

A meteoroid is a tiny particle, usually about the size of a grain of sand, that was left behind by a comet. When it comes close to Earth and enters the atmosphere, it burns up brightly and is called a meteor. Usually, meteors come in large bunches. During a meteor shower thousands of meteors can be seen streaking across the sky for several nights. A meteorite is a meteor that fell to the ground without burning up. (See Annual Meteor Showers table on page 14.)

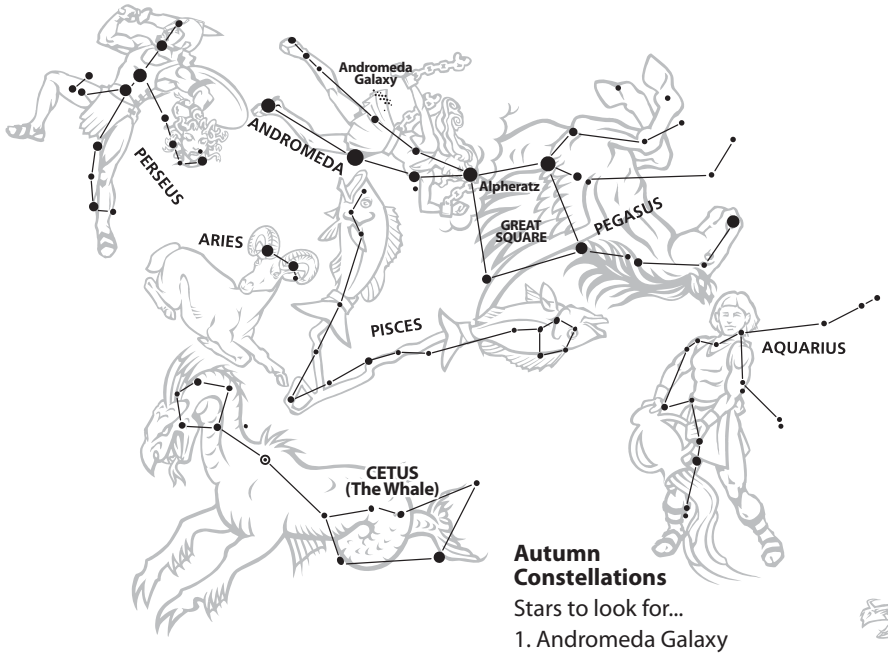
The Constellations

Constellations are imaginary pictures created by connecting stars together with imaginary lines. These "star pictures" were usually named after ancient Mesopotamian and Greek gods, heroes, and animals. Today's astronomers consider constellations as an agreed-upon region of the sky containing a group of stars. There are 88 official constellations.

Each constellation can contain dozens, if not hundreds, of visible stars. The following star maps show the brighter stars — the ones you see when looking for star groupings in the night sky. The "connect-the-dot" lines will help you as you learn these constellations. You will also see the mythological drawings of some of the constellations.

The constellations are divided into five different groupings—the stars in the northern sky and the stars of each season. It's important to remember that the seasonal groupings are a general guide. For example, winter constellations are not just visible during the winter months of December, January, and February. (Experiment with your planetarium to discover why!) The season refers to the time of year the constellation or group of constellations become easily visible in the night sky after the sun sets.

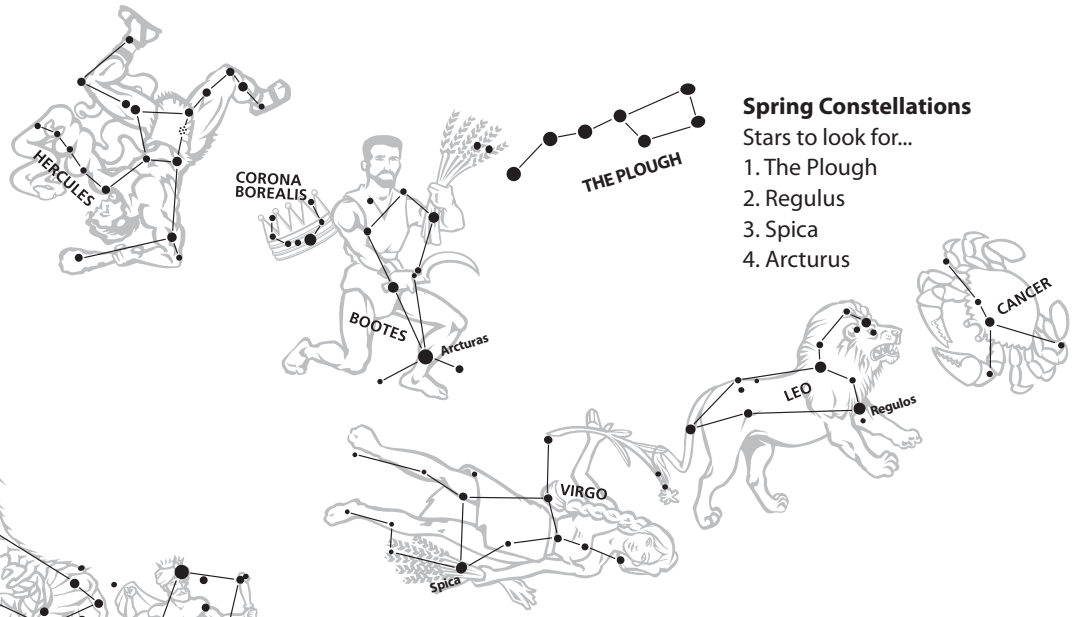
The seasonal groupings also help us understand the cycle of the sky. Because of the Earth's annual orbit around the sun, the stars in the night sky change over the course of a year. But due to the fixed nature of the constellations, spring stars always follow the winter stars into the sky, summer stars follow the spring stars, etc. Learning the brighter constellations from each season will open the door to understanding the entire night sky.



Autumn Constellations

Stars to look for...

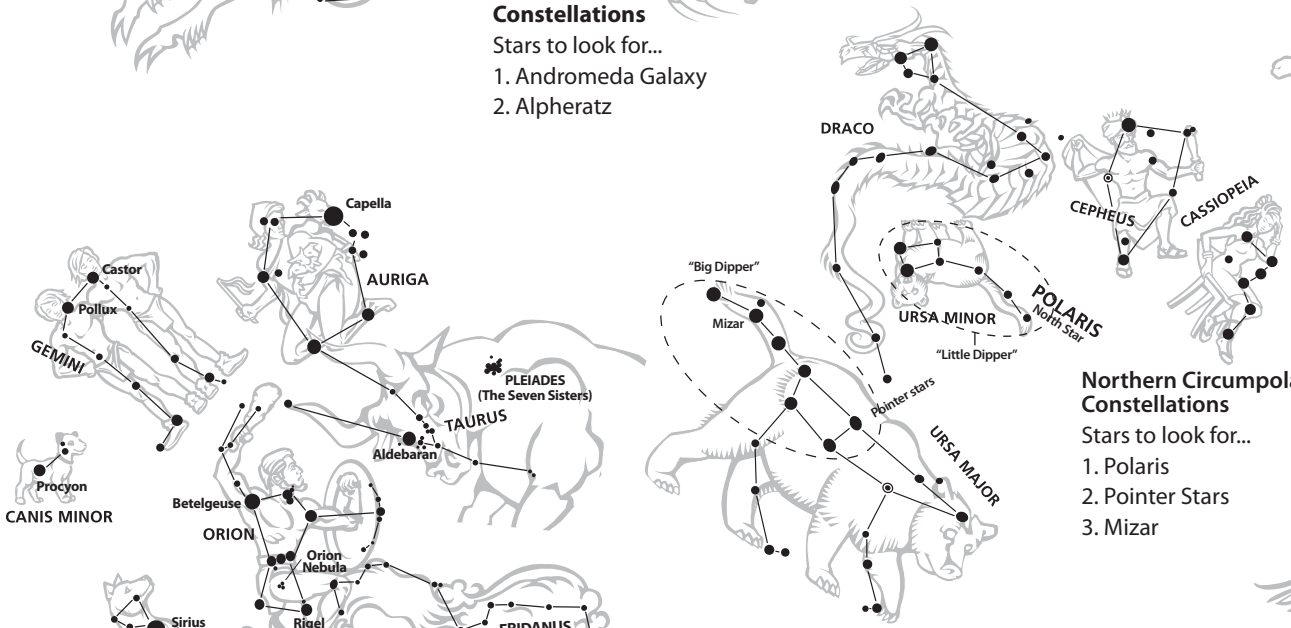
1. Andromeda Galaxy
2. Alpheratz



Spring Constellations

Stars to look for...

1. The Plough
2. Regulus
3. Spica
4. Arcturus



Northern Circumpolar Constellations

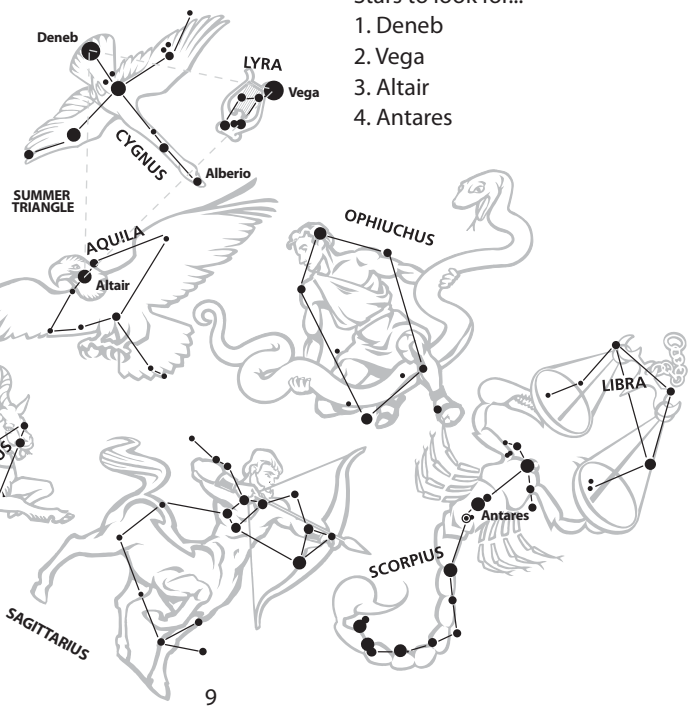
Stars to look for...

1. Polaris
2. Pointer Stars
3. Mizar

Winter Constellations

Stars to look for...

1. Aldebaran
2. Pleiades
3. Orion Nebula
4. Betelgeuse
5. Rigel
6. Sirius
7. Procyon
8. Castor



Summer Constellations

Stars to look for...

1. Deneb
2. Vega
3. Altair
4. Antares

The Moving Sky

The horizon ring is an important part of your planetarium. It divides the sky into two halves, the visible and the nonvisible. In the course of 24 hours, all of the objects visible from a given location on Earth seem to rise in the east and set in the west.

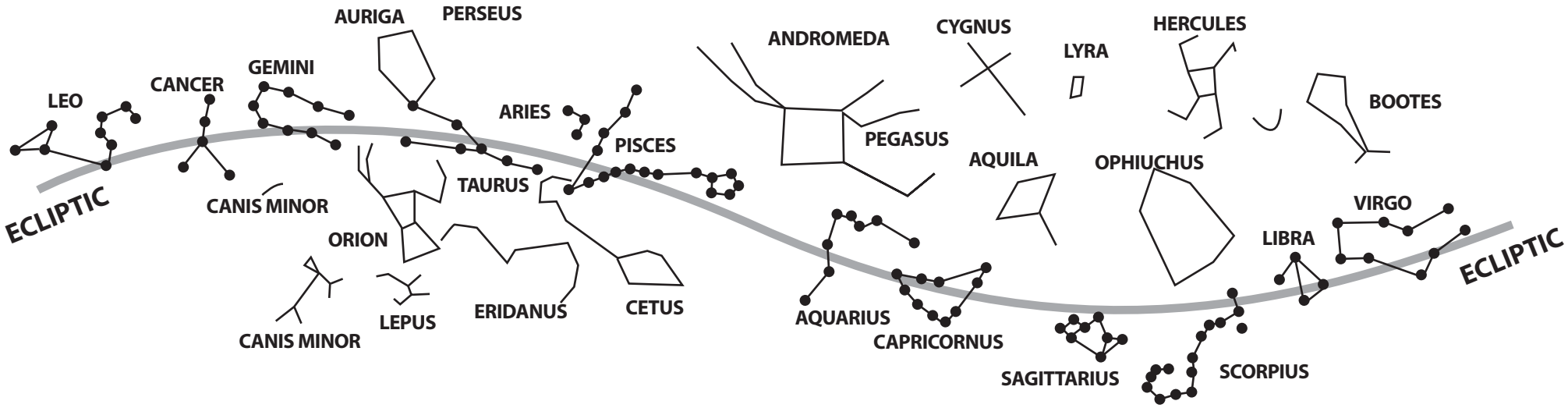
To see all the stars that are visible from the Northern Hemisphere, slowly rotate the light wand to the left (westward) while the projection lamp is on. Do you notice that some stars around Polaris never set while some of the stars that can be seen from the Southern Hemisphere (at the opposite pole of the star sphere from Polaris) never rise in the Northern Hemisphere?

Just for practice, adjust your planetarium to project the stars visible in the evening of March 20, which is about the first day of spring for us. Which constellations will be on the meridian (the arc spanning across the sky from pole to pole)? Which constellations will be rising and which will be setting? That's easy! With the projection lamp off, set the date selector to March 20, and then set the time ring to the time at which the Sun sets (about 6:30 p.m.). Turn off the room lights, turn the projection lamp on, and see what constellations are up!

Although we can't feel it, the Earth rotates eastward at about 800 miles an hour at its surface. The stars, sun, and moon appear to us to move westward when, in fact, we are the ones that are moving eastward. Because of this, it seems like any given constellation or star takes about 24 hours to make one round trip around the Earth.

Astronomers, ancient and modern, counted on this 24-hour trip, day after year after century. They agreed to divide the east-to-west movement of stars into 24 equal parts.

Astronomers picked the spot in the sky where the ecliptic (the path the sun takes in relation to Earth during a year) crosses the celestial equator as the sun heads north, for the point at which the 24-hour celestial cycle begins. This is the vernal point, the first day of spring in the Northern Hemisphere.



The Constellations of the Zodiac

The constellations of the zodiac are the oldest star patterns, with Taurus the bull being the most ancient of them all. Because of the Earth's orbit around the sun once a year, the sun seems to move against the background stars.

The path the sun appears to take is called the ecliptic. The zodiacal constellations lay along the ecliptic, which made them very important star patterns to the ancient peoples who relied on the night sky as their calendar.

While this map of the zodiacal constellations shows the ecliptic as a curved line, your planetarium projects this path as a great circle around the entire sky. Turn on your planetarium and project the stars onto a wall. Rotate it slowly so you follow the constellations of the zodiac through one year.

Here are the 25 brightest stars, after the sun, each listed by its common name, constellation in which it can be found, and hemisphere from which it is visible:

Rank	Name	Constellation	Hemisphere
1.	Sirius	Canis Major	N & S
2.	Canopus	Carina	S
3.	Alpha Centauri	Centauri	S
4.	Arcturus	Boôtes	N & S
5.	Vega	Lyra	N & S
6.	Capella	Auriga	N & S
7.	Rigel	Orion	N & S
8.	Procyon	Canis Minor	N & S
9.	Achernar	Eridanus	S
10.	Hadar	Centauri	S
11.	Betelgeuse	Orion	N & S
12.	Altair	Aquila	N & S
13.	Aldebaran	Taurus	N & S
14.	Acrux	Crux	S
15.	Antares	Scorpius	N & S
16.	Spica	Virgo	N & S
17.	Pollux	Gemini	N & S
18.	Fomalhaut	Pisces Austrinis	N & S
19.	Deneb	Cygnus	N & S
20.	Beta Crucis	Crux	S
21.	Regulus	Leo	N & S
22.	Adhara	Canis Major	N & S
23.	Castor	Gemini	N & S
24.	Shaula	Scorpius	S
25.	Bellatrix	Orion	N & S

Take your time as you cruise the cosmos. Pick out a few of the brightest stars and study the stars near them. Use the constellations to guide you to the dimmer stars that can easily escape the casual observer.

For easier star-watching, you will need to give your eyes time to adjust to the darkness. Astronomers call this becoming darkness adapted. You will see best after about 20 minutes in the dark. Care should be taken not to look directly at the bright projection lamp inside your planetarium, so you don't ruin your night vision.

How to Find the Visible Planets

Officially, there are eight planets and at least three dwarf planets in our solar system. Four of the planets can be seen without the aid of a telescope or binoculars: Venus, Mars, Jupiter, and Saturn. (Mercury stays close to the sun, so it is very difficult to see. Ceres is too small and Uranus and Neptune, Pluto and Eris are too far away to see without a high-powered telescope.) As four visible planets move in the sky throughout the year, each appears to pass through certain constellations (the twelve zodiac constellations plus four others) at any given time. This makes it easy to find them.

The planet position tables on the back page show you where to locate the visible planets. Look at how much a planet changes position and compare that to the planet's distance from the sun. Notice that the planets farthest from the sun change position more slowly than the planets closer to the sun. Jupiter spends about a year drifting through a zodiac constellation, while Saturn takes two years. Meanwhile, Mars and Venus go speeding through the zodiac constellations.

You can also locate planet positions using the Stellarium software, using the Object Search function.

Stellarium Astronomy Software

The included Stellarium Astronomy computer software lets you explore the cosmos in great detail. You can view the night sky for any time—past, present or future—and from any point on Earth. You can see the constellations and their names and you can locate the positions of stars, nebulas, planets, and their moons.

Insert the Stellarium disk into your computer's CD player and follow the set-up instructions on the screen. The software is compatible with either PC or Mac. System requirements: Windows XP or Mac OS X with at least 500 MHz processor, 128 MB RAM and 500 MB of hard disk space . Minimum recommended monitor resolutions is 1024 x 768 pixels. (Note: Software is not currently compatible with Windows Vista or Macs using Intel Processors.)

Learn More About Astronomy

If you want to learn more about the exciting subject of astronomy, check out your school's library, your local public library, a book store, or the Internet. Astronomers are constantly making new discoveries of the universe.

Planet Information Table

NAME	DISTANCE FROM SUN (millions of mi/km)	ORBITAL PERIOD (in Earth years)	ROTATION PERIOD (hours in day)	SIZE RELATIVE TO EARTH	MASS RELATIVE TO EARTH	MOONS**	RINGS
MERCURY	36 / 58	0.2	1416	0.39 X	0.06 X	0	No
VENUS	67 / 108	0.6	5833	0.95 X	0.8 X	0	No
EARTH	93 / 150	1.0	24	1 X	1 X	1	No
MARS	142 / 228	1.9	25	0.53 X	0.1 X	2	No
CERES*	260 / 420	4.6	9	0.08 X	0.0002 X	0	No
JUPITER	484 / 778	11.9	10	11.2 X	318 X	63	Yes
SATURN	884 / 1423	29.5	10	9.4 X	95 X	56	Yes
URANUS	1783 / 2869	84	17	4.0 X	15 X	27	Yes
NEPTUNE	2792 / 4492	164.8	16	3.8 X	17 X	13	Yes
PLUTO*	4650 / 7500	248	153	0.2 X	0.002 X	3	No
ERIS*	9114 / 14,700	557	7	0.2 X	0.003 X	1	No

*Dwarf planet
**Known as of March 2009

Annual Meteor Showers

Shower	Date	Hourly	Parent comet
Quadrantids	January 3	40	Asteroid 2003 EH1
Lyrids	Apri 22	15	Comet Thatcher
Eta Aquarids	May 5	20	Comet Halley
Delta Aquarids	July 28	20	(Unknown)
Perseids	August 12	50	Comet Swift-Tuttle
Orionids	October 22	25	Comet Halley
Taurids	November 3	15	Comet Encke
Leonids	November 17	15	Comet Temple-Tuttle
Geminids	December 14	50	Asteroid 3200 Phaethon
Ursids	December 23	20	Comet Tuttle

Dates can vary slightly. Hourly rate represents the number of meteors you might see under a dark sky when the radient is near the zenith. Expect to see perhaps half as many more if the shower is strong.

Source: *Skywatching* by David H. Levy (Time-Life Books, 1994-98).

Planet Position Tables

Source: Griffith Observatory, Los Angeles.

2010	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Sag	Aqr	Pis	Ari	Tau	Can	Leo	Vir	Vir	Lib	Vir	Lib
Mars	Can	Can	Can	Can	Leo	Leo	Leo	Vir	Vir	Lib	Oph	Sag
Jupiter	Aqr	Aqr	Aqr	Aqr	Pis	Pis	Pis	Pis	Pis	Pis	Aqr	Aqr
Saturn	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir

2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Oph	Sgr	Cap	Aqr	Psc	Tau	Gem	Leo	Vir	Lib	Oph	Sgr
Mars	Cap	Cap	Aqr	Psc	Ari	Tau	Tau	Gem	Cnc	Cnc	Leo	Leo
Jupiter	Psc	Psc	Psc	Psc	Psc	Ari	Ari	Ari	Ari	Ari	Ari	Psc
Saturn	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Aqr	Psc	Ari	Tau	Tau	Tau	Tau	Gem	Cnc	Leo	Vir	Lib
Mars	Vir	Leo	Leo	Leo	Leo	Leo	Vir	Vir	Lib	Sco	Sgr	Sgr
Jupiter	Ari	Ari	Ari	Ari	Tau	Tau	Tau	Tau	Tau	Tau	Tau	Tau
Saturn	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir

2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Sgr	Cap	Aqr	Ari	Tau	Gem	Leo	Vir	Vir	Oph	Sgr	Sgr
Mars	Cap	Aqr	Psc	Psc	Ari	Tau	Gem	Gem	Cnc	Leo	Leo	Vir
Jupiter	Tau	Tau	Tau	Tau	Tau	Tau	Gem	Gem	Gem	Gem	Gem	Gem
Saturn	Lib	Lib	Lib	Vir	Vir	Vir	Vir	Vir	Lib	Lib	Lib	Lib

2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Sgr	Sgr	Cap	Aqr	Psc	Ari	Tau	Cnc	Leo	Vir	Lib	Sgr
Mars	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Lib	Sco	Oph	Sgr	Cap
Jupiter	Gem	Gem	Gem	Gem	Gem	Gem	Cnc	Cnc	Cnc	Leo	Leo	Leo
Saturn	Lib	Lib	Lib	Lib	Lib	Lib	Lib	Lib	Lib	Lib	Lib	Lib

2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Cap	Aqr	Psc	Tau	Gem	Cnc	Leo	Leo	Cnc	Leo	Vir	Lib
Mars	Aqr	Psc	Psc	Ari	Tau	Tau	Gem	Cnc	Leo	Leo	Vir	Vir
Jupiter	Leo	Cnc	Cnc	Cnc	Cnc	Leo	Leo	Leo	Leo	Leo	Leo	Leo
Saturn	Sco	Sco	Sco	Sco	Sco	Lib	Lib	Lib	Lib	Sco	Sco	Oph

2016	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Oph	Sgr	Aqr	Psc	Ari	Tau	Cnc	Leo	Vir	Lib	Sgr	Cap
Mars	Vir	Lib	Sco	Oph	Sco	Lib	Lib	Sco	Oph	Sgr	Cap	Aqr
Jupiter	Leo	Leo	Leo	Leo	Leo	Leo	Leo	Vir	Vir	Vir	Vir	Vir
Saturn	Oph	Oph	Oph	Oph	Oph	Oph	Oph	Oph	Oph	Oph	Oph	Oph

2017	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Venus	Aqr	Psc	Psc	Psc	Psc	Ari	Tau	Gem	Leo	Vir	Lib	Oph
Mars	Aqr	Psc	Ari	Tau	Tau	Gem	Gem	Cnc	Leo	Vir	Vir	Vir
Jupiter	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Vir	Lib	Lib
Saturn	Oph	Oph	Sgr	Sgr	Sgr	Oph	Oph	Oph	Oph	Oph	Oph	Sgr

Quick Start

(See inside for full instructions)

1. Place your planetarium in the center of the room. Raise or lower the planetarium (use a pile of books for example) until the stars are in sharp focus. Position toward north using the compass.
2. To set for season: Rotate light wand until current season lines up with pointer.
3. To set for month and date: Rotate light wand until current month and date lines up with pointer.
4. To set for time: Turn the time ring to the hour the sun sets. Then rotate light wand left to the current time.
5. Close curtains or blinds and turn off room lights. Turn projection lamp on (but do not look at it).
6. The sky as it presently appears is projected on the walls and ceiling. Slowly rotate the light wand to the left to watch the stars rise in the east and set in the west. The time ring shows the correct time as the sky's east-west movement progresses.

BATTERY SAFETY INFORMATION

- Non-rechargeable batteries are not to be recharged
- Rechargeable batteries are only to be charged under adult supervision
- Rechargeable batteries are to be removed from the toy before being charged
- Different types of batteries or new and used batteries are not to be mixed
- Batteries are to be inserted with the correct polarity
- Exhausted batteries are to be removed from the toy
- The supply terminals are not to be short-circuited

Help the environment by disposing of your products responsibly. The wheelie bin symbol indicate the product and batteries must not be disposed of in the domestic waste as they contain substances which can be damaging to the environment and health. Please use designated collection points or recycling facilities when disposing of the item or batteries.

KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE — DO NOT DISCARD

Questions? Comments? Please contact us. We can help!
1-888-742-2484 or go to www.unclemilton.com

2009-0250-0310