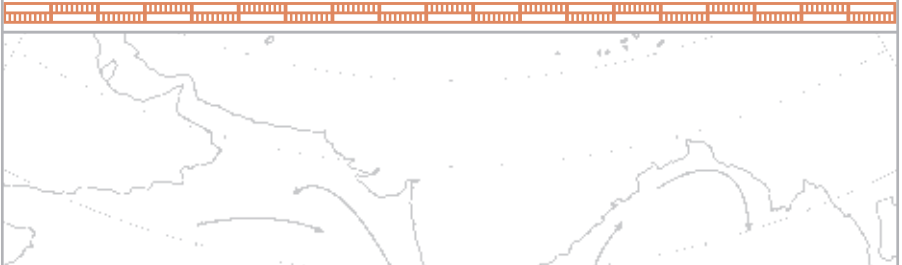


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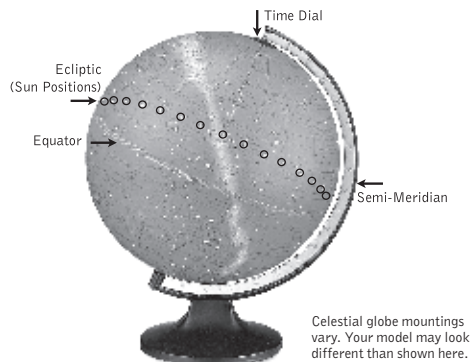
INSTRUCTIONS FOR YOUR

CELESTIAL GLOBE



Congratulations on the purchase of your new Celestial globe from Replogle Globes, Inc. We are confident you will have many fun hours with your new illuminated celestial globe and that this globe will become an educational piece as well as a decorative item in your home.

A celestial globe is a spherical map of the sun, moon, and stars which appear to surround our planet Earth. To understand and interpret the information from a celestial globe, you must first imagine yourself located in the center of the globe looking outward to the sky above. When viewed from outside the globe, the star arrangements on the sphere appear reversed since they are a mirror image of what is seen from the inside. Some celestial bodies may or may not be visible depending on the time of year and your location on Earth.



## HOW TO USE YOUR CELESTIAL GLOBE

To find the stars that are visible at certain dates and times it is important that you position the celestial globe matching the latitude of your location on Earth. When watching the stars using your celestial globe, keep in mind that your globe is mounted on a terrestrial globe base with the axis of the Earth placed on 23½°.

In order for the stars to appear in a “natural” position in relation to each other at a specified date and time, perform the following steps:

1. Set the date using the ecliptic which is represented on the globe by a series of small, orange-colored suns that are dated at approximately ten day intervals. The dates are printed near each sun in the format of Arabic or modern numerals representing the day and Roman numerals representing the month. For example, 20.IV. corresponds to the 20th of April. The selected date with its corresponding orange-colored sun should be brought centrally under the semi-meridian.

## ECLIPTIC DATE CHART

1.I.	1-Jan	11.III.	11-Mar	1.VI.	1-Jun	13.VIII.	13-Aug	3.XI.	3-Nov
10.I.	10-Jan	31.III.	31-Mar	11.VI.	11-Jun	24.VIII.	24-Aug	13.XI.	13-Nov
20.I.	20-Jan	10.IV.	10-Apr	22.VI.	22-Jun	3.IX.	3-Sep	23.XI.	23-Nov
30.I.	30-Jan	20.IV.	20-Apr	2.VII.	2-Jul	13.IX.	13-Sep	3.XII.	3-Dec
9.II.	9-Feb	30.IV.	30-Apr	13.VII.	13-Jul	4.X.	4-Oct	13.XII.	13-Dec
19.II.	19-Feb	11.V.	11-May	23.VII.	23-Jul	14.X.	14-Oct	22.XII.	22-Dec
1.III.	1-Mar	21.V.	21-May	3.VIII.	3-Aug	24.X.	24-Oct		

2. Set the time dial on the top of the globe so that twelve o'clock coincides with the meridian (longitude) of the sun of the appropriate date. The ball and time dial can be revolved together until the desired hour is under the semi-meridian.

Sunrise and sunset can be read by turning the globe (set as above) from east to west, and noting on the time disc when the sun crosses the horizon.

## THE HISTORY OF STAR WATCHING

Since the earliest ages, stars have been of great importance to man’s existence. As daylight disappeared at sunset, the little lights of the night sky came into view, slightly dispelling the gloom and providing a reliable calendar.

During the night the stars moved overhead, but always in the same grouping or celestial pattern. Some stars could always be seen as they moved round the heavens. Others came into view over the eastern horizon to follow the course of those that disappeared in the west.

The stars that did not disappear, and at least one always seemed to be in the same place, were valuable in helping people find their way on dark nights. These stars became good friends of the traveler and were named by the groups or configurations of stars in which they seemed to travel. Today, these groupings of bright stars are called constellations.

The oldest names of the constellations can be tracked to approximately 3,000 B.C. The Chaldeans, astrologers who inhabited the region around the Euphrates and Tigris Rivers, attached great importance to the science of astronomy. It is from them that we get the names of the constellations grouped around the ecliptic, or apparent track of the sun throughout the year. The constellation names Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces can be found on your celestial globe. The Greeks added to these names based on their mythology. Ptolemy, the 2nd-century Greek astronomer, compiled a treatise on astronomy, the *Almagest*, and in it he names forty-eight constellations. Eighty-eight official constellations exist today.

Ancient people generally worshipped the phenomena of seasons, Sun, Moon and stars even though they could not explain them. Their imagination stirred by nightly processions overhead, they soon linked stars with mythology. They named stars and constellations after creatures such as Orion, the mighty hunter and warrior whom they believed lingered above them.

The stories told varied with their teller as indeed they do today. Most people now find it challenging to envision the images which stars and constellations are supposed to suggest—the Square of Pegasus, the Chair of Cassiopeia, the Big Dipper or Plough, and perhaps Orion himself, with his belt and sword.

The group known as the Big Dipper is easily recognized, and is probably the best known because it has a simple practical value in indicating true North. It has different names in different countries, but is visible in the northern skies year-round. From mythology it takes the name Ursa Major, or the Great Bear. To those in Britain it is known as the Plough or Charles’ Wain, to Americans it is the Dipper, to Arctic natives it is the Reindeer, to Malaysians the Ship. Arabs call it the Bier, incorporating four bearers and three mourners, while in ancient Egypt it was spoken of as the “Hind Legs of the Holy Ox.”

Early people soon realized the practical value of astronomy. The Dipper, always pointing to the Pole Star, served as a compass. Stars which came into view at certain seasons provided a perpetual calendar invaluable to agricultural and nomadic people. In ancient Egypt it was very important to know when the floods of the Nile would start. The priests could tell this by watching the stars. When the constellation Orion appeared in the east shortly before sunrise, they would keep watch because they knew that the helical rise of Sirius was drawing near. They waited for Sirius to appear in the sky shortly before the sun came over the horizon, and when this happened the trumpets would be sounded as a warning that the floods were about to begin. By our present-day reckoning this would be about July 20th. In the 6,000 years that have since passed, a slow change in the position of the stars has brought the helical rise of Sirius to July 2nd, and it would no longer serve as a warning for the Nile floods if modern methods had not provided an alternative. Sirius (Sothis to the Egyptian) also marked the start of the Egyptian year and of the Sothis period.

Early people found it universally necessary to work out the approximate length of a year. Most established a time scale in relation to the appearances of the Moon, and this Lunar Year they divided into months of twenty-nine or thirty days, with a few months having additional days to compensate for inaccuracies.

There is evidence that it was early realized that a year contained about 365¼ days, and when it is remembered that this was worked out without the aid of devices available today, one must agree with the Danish astronomer Tycho Brahe that astronomy is the oldest science and it is fundamentally important. Even today, as professional astronomical research is carried out in observatories with the aid of costly and complex instruments, research continues to be supplemented by the patient watching of amateur observers with simple equipment.

## CONSTELLATIONS

Constellations are groupings of stars that appear as highly imaginative representations of mythological objects or characters. Many civilizations have seen patterns in the stars. These star configurations help us track our way through the heavens by relating the positions of one star or group of stars to another. A key to many stars and constellations in the northern hemisphere is the easily recognizable Big Dipper or Plough, a part of the constellations in Ursa Major, the Great Bear. Using its familiar bowl and handle configuration, these four major stars and constellations can be easily located.

## COORDINATES

A significant reference point is the celestial North Pole, placed at the star Polaris (North Star). When viewed from the North Pole, this star remains directly overhead year-round. Once the celestial North Pole has been located, the South Pole, equator, and parallel lines of latitude can be determined. On this globe, the lines of latitude have been drawn at 10° intervals north and south of the equator line.

A further set of lines (meridians or longitudes) connecting North Pole to South Pole are added at 15° intervals. The interval between each of the 24 lines represents one hour to correspond with the full rotation of the Earth on its axis once every 24 hours. Since there is no Earth to rotate inside the celestial sphere, we must rotate the sphere to obtain the star locations.

To a viewer on Earth the stars seem to move across the sky at night. Actually, the stars are fixed in space and the Earth's rotation is what causes the stars to appear to change position.

## THE FIXED STARS (MAGNITUDES)

Approximately 5,000–6,000 stars in the sky are visible to the naked eye, but not all of them have the same brightness. The apparent brightness of a star is called the star's magnitude. The brightest star by far is the Aldebaran which has a magnitude of 1. Weaker stars have magnitudes of 2, 3, 4, etc. The weakest stars that can be seen by the naked eye have a magnitude of 6, which is 100 times weaker than a magnitude 1 star. On this celestial globe, the weakest stars shown have a magnitude of 4, about 16 times weaker than magnitude 1 stars.

To distinguish the various magnitudes of the stars it is necessary to print the stars at a certain size on the globe. If the sun has the correct size in relation to the size of the globe it will appear only as a star of magnitude 2. This can occasionally cause an overlap of the star symbols, although even to naked eye observers the stars themselves may have an easily discerned distance between them in the sky.

About 70 of the brightest stars are named on the celestial globe. Most of the others are identified by their internationally recognized Greek letters and the remainder by their Latin letters and numbers.

## DOUBLE STARS

The telescope will sometimes resolve, or split, an apparently solitary star into a twin. Such a star is usually referred to as a double star or binary. True double stars are gravitationally bound and travel together, usually revolving round each other in an elliptical orbit. However, some only appear to be together because they are close to the same line of sight, in which case one may be far beyond the other and not related in any way. The celestial globe shows approximately 110 double stars.

## VARIABLE STARS

About twenty variable stars are marked on the celestial globe. Since the magnitude differs for variable stars, they make fascinating subjects for regular observations. In some cases, the variation is caused by a sequence of periodical eclipses as two stars circle round each other. A good example is the famous “winking” star Algol in the constellation Perseus. As the dimmer star revolves around and passes in front of the brighter star, the magnitude of Algol decreases and a winking effect appears.

Other variable stars experience periodical contraction and expansion, with some extreme cases of magnitude variation from 1.7 to 9.6. The period of variation may be as short as a few hours to as long as several hundred days. Some stars vary in magnitude significantly while other stars show a more consistent magnitude so that maximum and minimum of brightness can be accurately predicted.

## STAR CLUSTERS AND NEBULAE

Star clusters and nebulae are at immense distances from the Earth. As a result, the only nebula visible to the naked eye is the Belt of Orion located directly south of the center star. With binoculars, however, others can be seen as misty flecks of light. For example, the Great Nebula in Andromeda is the easiest to pick out. Using a telescope with sufficient power, you can see some of the light flecks as clusters of hundreds of stars, which are almost certainly physically grouped together. True nebulae can only be studied photographically, when the detail can be built up over prolonged exposure.

About seventy star clusters or nebulae are marked on the celestial globe and are numbered by international standard usage, e.g.:

42 is No. 42 in the Messier Catalog.

376 is No. 376 in the New General Catalog.

## NOVAS / NEW STARS

Sometimes a star increases its brightness for a short time before fading to its previous magnitude. Such stars are known as novae, and the best known of them are marked on the celestial globe by a cross and the year of discovery.

The sudden increase in magnitude can be between 10 and 15 and take only a few days to occur and then the star returns to normal magnitude in a few months to two years. The cause is thought to result from a sudden expansion of the star. There are also super-novae whose brightness increases by up to 20 magnitudes and it is suggested that such an increase can only be caused by the explosion of the whole star.

## THE ECLIPTIC

Since the Moon and the planets (Mercury, Venus, Mars, etc.) do not appear permanently in the same place relative to each other and to the stars, they cannot be shown on a celestial globe. When they are visible, however, they always appear to traverse the same path, which is also followed by the sun.

Regular observations will show that in addition to its passage above us, the Moon will have moved a little to the east along this path every twenty-four hours. The planets, although following the same path, have a complicated movement.

The sun follows the same path, but as its light is so strong that it blots out the stars, it is not possible to observe it. If the position relative to the stars could be plotted at twenty-four hour intervals we would have a line cutting the Equator at 21st March and 23rd September, at an angle of 23½° which is the tilt of the axis of the Earth. The line would show the Sun moving eastward through Taurus, Aries and the other Zodiacal constellations, and it is this line that is called the Ecliptic.

On the celestial globe, the ecliptic is shown by a row of orange-colored suns. Each sun indicates the date on which the Sun will be at that position mostly at ten days intervals, but with some intervals of nine or eleven days. See the Ecliptic Date Chart on page 2 for further detail.

## THE ZODIAC

The twelve constellations which fall along the ecliptic and which are known as the zodiac have always had a special significance for some star watchers. Astrologists believe that the positioning of these constellations—Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius and Pisces—and their relationship to the Sun, Moon and other planets have an effect on human affairs and terrestrial events.

Your celestial globe beautifully displays over 70 zodiac images when illuminated. These images are cartographer Karl F. Harig's interpretation of the various zodiacs.

## CARING FOR YOUR GLOBE

For non-illuminated globes and globes with hand-applied maps, use a dry cloth to remove household dust and markings. For illuminated globes, household dust can be removed with a dry cloth, though you may wish occasionally to use a slightly dampened cloth to remove fingerprints or smudges. Do not use industrial or even household cleaners that contain alcohol or any solvent. Minimize exposure to direct sunlight to preserve the rich colors of your globe map.