

# What's Out Tonight?

## October 2019 Sky Chart

OPTIMIZED FOR  
1½ HOURS  
AFTER SUNSET

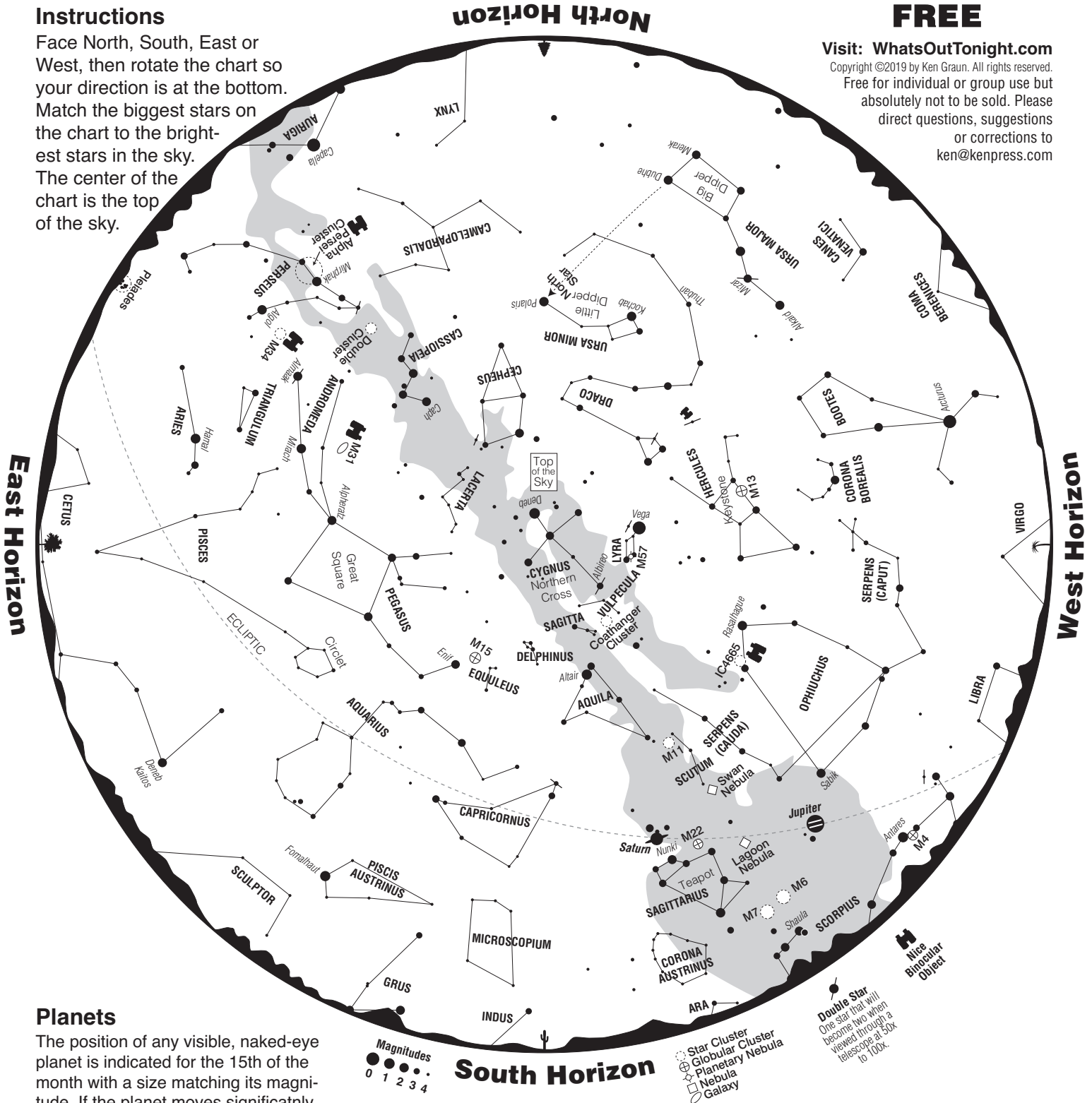
### Instructions

Face North, South, East or West, then rotate the chart so your direction is at the bottom. Match the biggest stars on the chart to the brightest stars in the sky. The center of the chart is the top of the sky.

**FREE**

Visit: [WhatsOutTonight.com](http://WhatsOutTonight.com)

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### Planets

The position of any visible, naked-eye planet is indicated for the 15th of the month with a size matching its magnitude. If the planet moves significantly during a month, other positions will be noted with dates. The **ECLIPTIC** is the path of the Sun through the sky but the planets and Moon move along it, too. It passes through the constellations of the zodiac.

### October 2019 Planet Notes

**Venus** (around the 15th), at magnitude  $-3.9$ , sets in the west 1 hour after the Sun. **Mars**, at magnitude 1.8, in Virgo, rises in the east 1 hour before the Sun. **Jupiter**, at magnitude  $-2.0$ , is in Ophiuchus and low in the southeast at dark and sets in the west 3 hours after sunset. **Saturn**, at magnitude  $+0.5$ , in Sagittarius, is low in the south at dark and sets in the west around 11:30 PM.

Distances planets are from the Earth on the 15th of this month:

**Venus:** 151,000,000 miles, **Mars:** 242,000,000 miles, **Jupiter:** 532,000,000 miles, **Saturn:** 942,000,000 miles.

## October Notes

The bright stars *Deneb*, *Vega* and *Altair* form the **Summer Triangle**. **CYGNUS** is usually referred to as the **Northern Cross** because of its shape. *Albireo*, the bottom star in the cross is a beautiful blue/gold double star but you need a telescope to see it. If you are under a dark sky, you will easily see a dark lane in the Milky Way Band passing through the Northern Cross that is known as the **Great Rift**. If you have binoculars, observe some of the binocular objects indicated below and/or use it to explore the Milky Way Band and its many clumps of stars.

## Clusters, Nebulae & Galaxies

ly = Light year, a unit of distance. 1 ly = 6 trillion miles.

- ♠ Alpha Persei Cluster.** Distance: 600 ly / Diameter: 31 ly / Mag 1.2 / Spans 3° / 30 stars.
- ♠ Andromeda Galaxy.** Companion to our Milky Way Galaxy. Distance: 2,400,000 ly / Diameter: 120,000 ly / Mag 3.5 / Spans 3° x 1°.
- ♠ Coathanger Cluster.** 10 stars shaped like a bar-type coathanger. It spans 2° and its stars are 150 ly away.
- Double Cluster.** Two side-by-side clusters. Distances: 7,200 ly / Diameters: 63 ly / Mag 3.5 / Span 1° / 320 stars total. Best in a telescope.
- ♠ IC4665.** Cluster. A large sprinkle of stars. Distance: 1,400 ly / Diameter: 17 ly / Mag 4.2 / Spans 40' / 30 stars.
- M15.** Globular Cluster. Distance: 34,000 ly / Diameter: 122 ly / Mag 6.2 / Spans 13'.
- M11.** *Wild Duck Cluster.* Distance: 5,600 ly / Diameter: 23 ly / Mag 5.8 / Spans 14' / 200 stars.
- M13.** Favorite Globular Cluster. Distance: 21,000 ly / Diameter: 104 ly / Mag 5.8 / Spans 17'.
- M34.** Large Cluster. Distance: 1,400 ly / Diameter: 14 ly / Mag 5.2 / Spans 35' / 60 stars. Try with binoculars, too.
- M57.** *Ring Nebula.* Planetary Nebula that looks like a smoke ring. Smaller than what you might think. Estimated to be 1 ly in diameter and 2,000 ly away. Mag 9 / Spans 76" or 1.3'.

## Observing Tips

If possible, observe at a dark location and when the Moon is not bright. A bright Moon will make it more difficult to see the stars and impossible to see clusters, nebulae and galaxies. Only a small telescope at lower magnifications, around 50x, is required to see the objects listed above. The planets and Moon are best observed with a telescope around 100x. To get a feel for the size of objects, the Moon extends 30' (30 arc minutes). The binocular objects are best with binoculars because these objects are large in size—telescopes have too much magnification.

## Meteor Showers

- DRACONIDS.** Peaks around **October 8** with 5 meteors/hour.
- ORIONIDS.** Peaks around **October 21** with 20 meteors/hour.

## Moon Phases

- ☾ **First Quarter.** Saturday, **October 5**, 11:47 am, CDT
- ☾ **Full Moon.** Sunday, **October 13**, 4:08 pm, CDT
- ☾ **Third or Last Quarter.** Monday, **October 21**, 7:39 am, CDT
- **New Moon.** Sunday, **October 27**, 10:38 pm, CDT

## Brightest Stars

- Altair.** In **AQUILA**. Magnitude +0.9. Distance: 19 ly. Diameter: 1.9 times the Sun's.
- Capella.** Rising in **AURIGA**. Magnitude +0.1. Distance: 42 ly. Diameter: 15 times the Sun's.
- Deneb.** In **CYGNUS**. Magnitude 1.3. Distance: 3200 ly. Diameter: 222 times the Sun's.
- Mirach.** In **ANDROMEDA**. Magnitude 2.1. Distance: 199 ly. Diameter: 89 times the Sun's.
- Mirfak.** In **PERSEUS**. Magnitude 1.8. Distance: 592 ly. Diameter: 64 times the Sun's.
- Polaris.** In **URSA MINOR**. Magnitude 2. Distance: 431 ly. 2,400 times brighter than the Sun.
- Vega.** In **LYRA**. Magnitude +0.02. Distance: 25 ly. Diameter: 2.4 times the Sun's.

## Mythology

FOR THE CENTRAL CONSTELLATIONS, NORTH TO SOUTH

Arcas and his beautiful mother, Callisto were turned into the Little and Big Bears, **URSA MINOR** and **MAJOR** because of jealous Juno, wife of promiscuous Jupiter, who favored Callisto. During an early war between the Titans and Olympians, **DRACO**, the Dragon was flung to the North and frozen in place by the cold.

King **CEPHEUS** and Queen **CASSIOPEIA** ruled Ethiopia. Their daughter **ANDROMEDA** is being rescued by **PERSEUS** from the Sea Monster, **CETUS**. Andromeda was to be sacrificed to Cetus because Cassiopeia boasted of her and her daughter's beauty.

**CAPRICORNUS** is a "Seagoat," the partially transformed, half-goat, half-fish body of the god Pan who got scared and hurriedly escaped the monster Typhoon in order to warn Jupiter. The word panic is derived from Pan. **AQUARIUS** is the Water and Cup Bearer, a servant of the gods. **PEGASUS**, the Winged Horse is the deliverer of Jupiter's thunderbolts. **CYGNUS**, the Swan helped Helios find the pieces of his son, having fallen from the chariot that pulls the Sun across the sky. **AQUILA** is Jupiter's Eagle that carries out tasks. **LYRA**, the Lyre was invented by Mercury and mastered by Apollo's son, Orpheus whose music had magical powers.

## Celestial Tidbits

**Polaris**, the **North Star** is the 50th brightest star in the sky. Stars twinkle because of turbulence in the atmosphere and twinkle most when low in the sky. The five planets visible to the naked eye do not normally twinkle but shine bright and steady. Each constellation has a boundary. **CRUX**, visible from the southern hemisphere has the least area and **HYDRA**, the most. A falling or shooting star is not a star but a meteor, usually a "rock" that is the size of a grain of sand burning up in our atmosphere.

### Guide to the Stars

- 11-inch diameter, ISBN 1-928771-03-3
- 16-inch diameter, ISBN 1-928771-01-7
- Equatorial, ISBN 1-928771-77-7
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# What's Out Tonight?

## Sky Chart Supplement

### Clusters, Nebulae & Galaxies

An **Open Cluster** is a group of several to hundreds of stars that were born out of the same nebula cloud. A group often forms a pretty pattern. The Pleiades and Praesepe are great examples. Open clusters reside in our Milky Way Galaxy. Our Sun is no longer in its group.

**Globular Clusters** look like fuzzy balls because they contain tens of thousands stars held together by their mutual gravity. All of the globulars that can be seen in the sky are part of our Milky Way Galaxy, and there are about 200 of them that surround our galaxy like a halo. M22 in SAGITTARIUS is a northern favorite.

A **Planetary Nebula** is an old term that has nothing to do with the planets. Instead, it is a round or symmetrical nebula that is the shed atmosphere of a dying star. At its center is a white dwarf star. When our Sun dies, it will create a planetary nebula. These objects have diameters of a few light years and are located in our galaxy. The Ring Nebula, M57, in LYRA is a favorite.

A **Nebula** is a giant hydrogen gas cloud that is located in our galaxy. Within these clouds, concentrations of gas can occur and gravitationally condense to form stars and accompanying planets. A set of stars created by a nebula is known as an Open Cluster. The Orion Nebula, M42 is a favorite.

**Galaxies** contain billions of stars. All galaxies are beyond our Milky Way Galaxy, where our Sun resides. When you are observing a galaxy, you are looking through our galaxy into the true depths of the universe. The Andromeda Galaxy, M31 can be seen with the naked eye.

### Double Stars

A Double Star is a star that looks like one star but when magnified sufficiently (from 6x to 200x), it separates into two or more stars. Some are very pretty because of contrasting colors. *Castor* in GEMINI is a favorite and *Albireo* in CYGNUS is well liked for its blue & gold colors.

### Moon

Starting from New Moon, the Moon cycles through phases every 29 days, 12 hours, 44 minutes, 3 seconds. It is 2,160 miles in diameter and averages 239,000 miles from Earth. A New Moon is not visible in the sky because the Moon is positioned very close to the Sun. Solar eclipses occur at New Moon. The best time to observe the Moon is during a phase because the craters appear their sharpest near the terminator, the line that separates the lighted side (day side) from the dark side (night side).

#### Cycle of Moon Phases



### Planets

The planets are best observed with a telescope using magnifications from 50x to 200x. The five naked-eye planets are Mercury, Venus, Mars, Jupiter and Saturn. Venus is extremely bright and hugs close to the Sun, so you see it for a short time in the west after sunset or in the east before sunrise. Jupiter can be out all night and always outshines any star. Everyone enjoys its 4 Galilean moons and cloud bands, easily visible at 50x. It is possible to see the moons with well-focused binoculars. Saturn is everyone's favorite because of its beautiful rings. Mars gets close to Earth about every 2 years at which time it is very bright. This is the best time to observe it but you need higher magnifications around 150x to see the surface coloration.

At arm's length...



One thumb width is 4 Moon diameters.



Orion's height is one hand span.



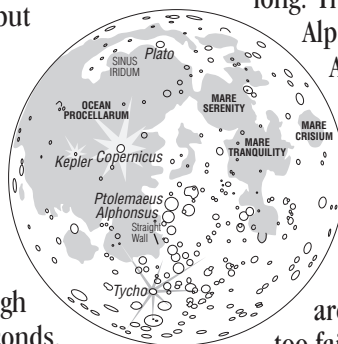
The width of a fist spans the Big Dipper's bowl.

	Diameter In Miles	Rotation Its Day	Distance from Sun In Miles	Revolution Its Year
SUN	865,000	30 days	—	—
MERCURY	3,032	59 days	36,000,000	88 days
VENUS	7,521	243 days	67,000,000	225 days
EARTH	7,926	24 hours	93,000,000	365 days
MARS	4,228	24.6 hours	142,000,000	687 days
JUPITER	88,844	9.8 hours	484,000,000	11.8 years
SATURN	74,900	10.2 hours	887,000,000	29 years
URANUS	31,764	17.9 hours	1,800,000,000	84 years
NEPTUNE	30,777	19.2 hours	2,800,000,000	164 years
PLUTO	1,433	6.4 days	3,700,000,000	248 years

### Light Year (ly) & Nearest Stars

A Light Year (ly) is a unit of length and is equal to the distance light travels in one year. Since light moves at the speed of 186,282 miles a second, one light year is nearly 6 trillion miles long. The closest nighttime star visible to the naked eye is Alpha ( $\alpha$ ) Centauri in the constellation CENTAURUS. Alpha Centauri shines brightly at magnitude  $-0.01$  and is just 4.4 light years away. The very closest star is Proxima in CENTAURUS at just 4.22 ly away. It is too faint to see with the eyes because it shines at magnitude  $+11$ . The second closest star visible to the naked eye is Sirius at 8.6 ly followed by Epsilon ( $\epsilon$ ) Eridani at 10.5 ly and Procyon at 11.4 ly. There are several stars closer than these three but they are too faint to be seen with the naked eye.

### Our Moon



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