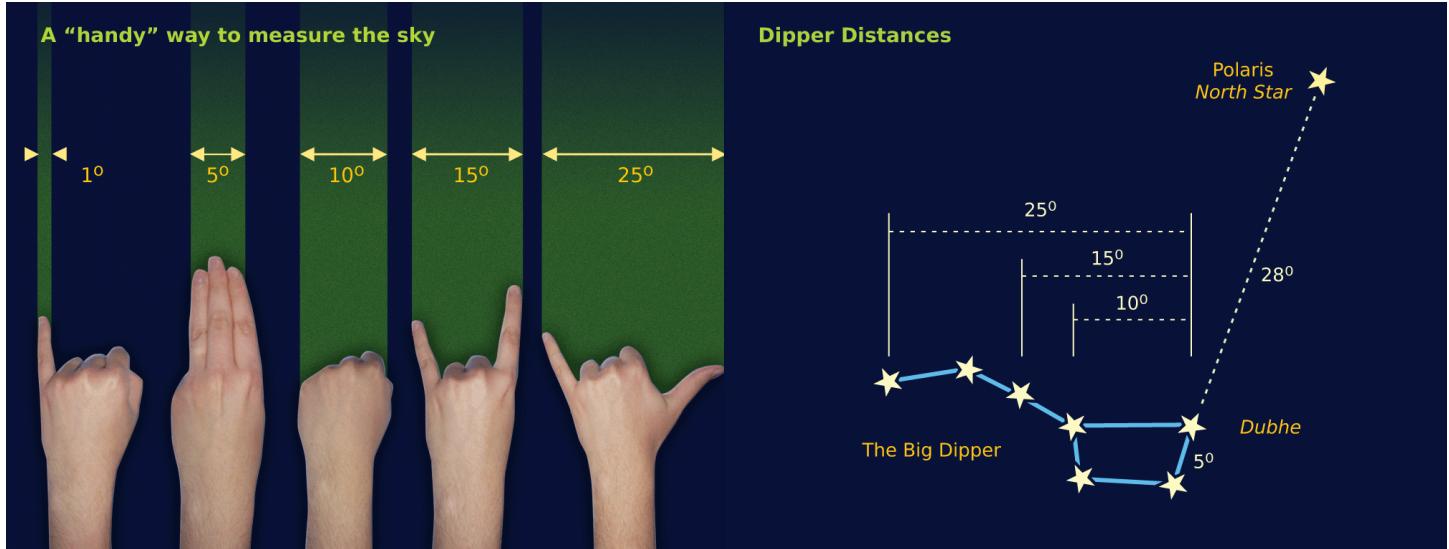




Observational Astronomy Cheat Sheet^[v6]

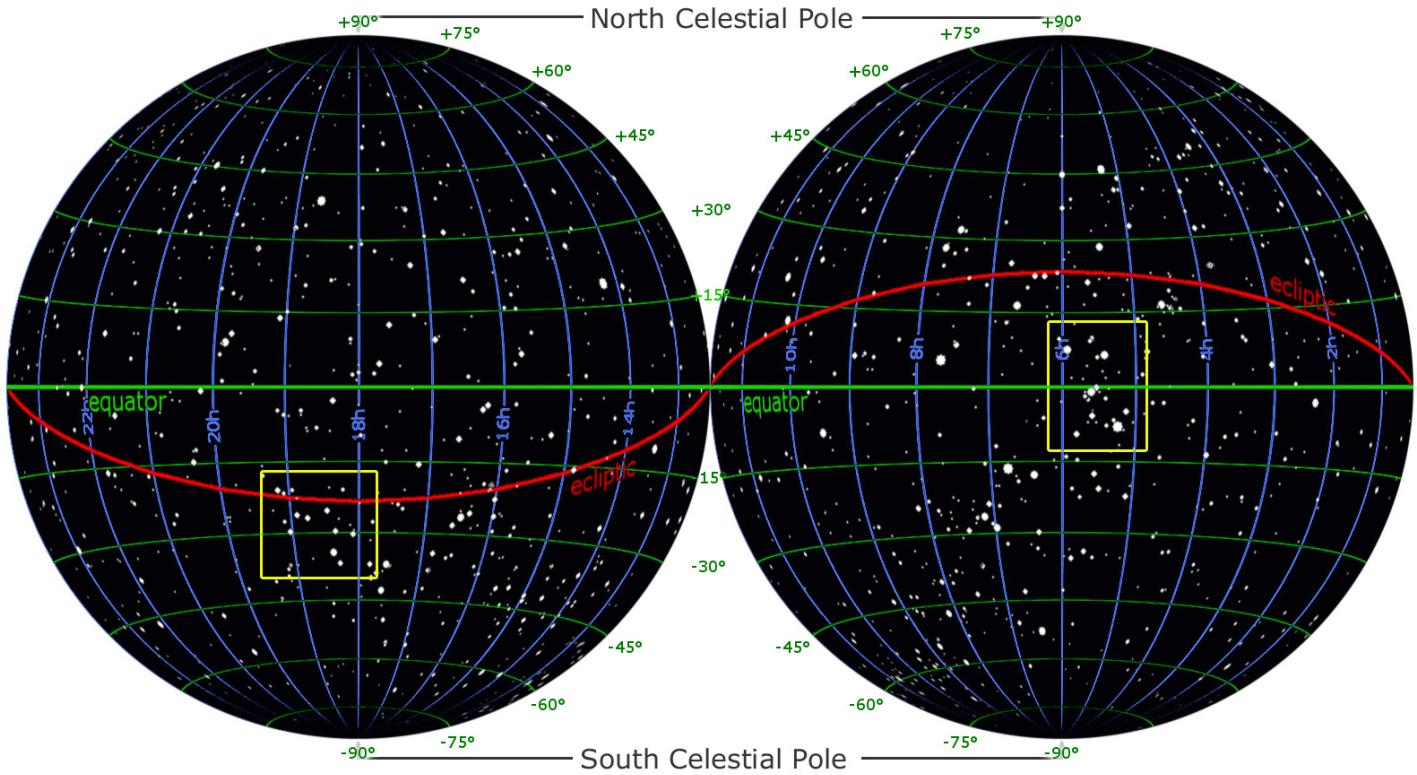
The content in this document, with rare exception, is an aggregation of astronomical information from several websites. If you find problems or have recommendations for additional data, please contact info@cnyo.org.

Getting Around The Night Sky



Images from blog.simulationcurriculum.com/articles/2015/5/15/measuring-distances-in-the-sky. From horizon to horizon (eg., East-to-West, North-to-South) through the zenith (the point directly above you), the sky is divided into 180 degrees. Your hand can be used to estimate angular distances. Check for yourself - compare with measured distances for the Big Dipper (right).

Right Ascension And Declination



The entire sky, divided into two parts. **Right ascension** (blue) begins at the vernal equinox (at far right, at the intersection of the ecliptic (red) and the equator (green)) and increases eastward (towards the left). The lines of right ascension (blue) from pole to pole divide the sky into 24^h , each equivalent to 15° . **Declination** (green) begins at the equator (green) and is positive northward (towards the top) and negative southward (towards the bottom). The lines of declination (green) divide the sky into small circles, here 15° apart. For orientation, the yellow box at left contains the tea pot of Capricorn. The yellow box at right contains the body of Orion. **Image (recolored) and text taken directly from en.wikipedia.org/wiki/Declination and en.wikipedia.org/wiki/Right_ascension (on 17 Oct 2016)**.

Moon And Planets	MERCURY	VENUS	EARTH	MOON	MARS	JUPITER	SATURN	URANUS	NEPTUNE
Mass (x 10²⁴ kg)	0.33	4.87	5.97	0.073	0.642	1898.0	568.0	86.8	102.0
Equatorial Diameter (km)	4879	12,104	12,756	3475	6792	142,984	120,536	51,118	49,528
Polar Diameter (km)	4879	12,104	12,714	3475	6752	133,708	108,728	49,946	48,682
Avg. Diameter As 1/Earth	0.383	0.950	1.000	0.273	0.532	10.863	9.001	3.968	3.856
Density (kg/m³)	5427	5243	5514	3340	3933	1326	687	1271	1638
Gravity (m/s²)	3.7	8.9	9.8	1.6	3.7	23.1	9.0	8.7	11.0
If 100 lbs* On Earth	37.8	90.7	100.0	16.6	37.7	236.4	106.4	88.9	112.5
Escape Velocity (km/s)	4.3	10.4	11.2	2.4	5.0	59.5	35.5	21.3	23.5
Rotation Period (hours)	1407.6	-5832.5	23.9	655.7	24.6	9.9	10.7	-17.2	16.1
Length Of Day (hours)	4222.6	2802.0	24.0	708.7	24.7	9.9	10.7	17.2	16.1
Dist. From Sun (x 10⁶ km)	57.9	108.2	149.6	0.384	227.9	778.6	1433.5	2872.5	4495.1
Distance From Sun (AU)	0.39	0.73	1.0	n/a	1.38	5.20	9.58	19.22	30.10
Perihelion (x 10⁶ km)	46.0	107.5	147.1	0.363	206.6	740.5	1352.6	2741.3	4444.5
Aphelion (x 10⁶ km)	69.8	108.9	152.1	0.406	249.2	816.6	1514.5	3003.6	4545.7
Orbital Period (days)	88.0	224.7	365.2	27.3	687.0	4331.0	10,747.0	30,589.0	59,800.0
Orbital Period (years)	0.2	0.6	1.0	0.1	1.9	11.9	29.4	83.8	163.8
Orbital Velocity (km/s)	47.4	35.0	29.8	1.0	24.1	13.1	9.7	6.8	5.4
Orbital Inclination (°)	7.0	3.4	0.0	5.1	1.9	1.3	2.5	0.8	1.8
Orbital Eccentricity	0.205	0.007	0.017	0.055	0.094	0.049	0.057	0.046	0.011
Obliqu. To Orbit/Axial Tilt (°)	0.01	177.4	23.4	6.7	25.2	3.1	26.7	97.8	28.3
Hill Sphere Radius	94	167	235	n/a	320	740	1100	2700	4700
Geometric Albedo	0.106	0.65	0.37	0.12	0.15	0.52	0.47	0.51	0.41
Mean Temp. (°C, °F)	167,333	464,867	15,59	-20,-4	-65,-85	-110,-166	-140,-220	-195,-320	-200,-330
Highest Temp. (°C, °F)	450,840	465,870	58,136	127,260	20,70	n/a	n/a	n/a	n/a
Lowest Temp. (°C, °F)	-170,-275	465,870	-89,-129	-173,-280	-125,-195	n/a	n/a	n/a	n/a
Surface Pressure (bars)	0	92	1	0	0.01	?????	?????	?????	?????
Number Of Moons	0	0	1	0	2	67	62	27	14
Moons Visible In Binoculars	0	0	1	n/a	0	4	1	0	0
Ring System?	No	No	No	No	No	Yes	Yes	Yes	Yes
Global Magnetic Field?	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes

Moon And Planets: For the Moon, information with respect to Earth is provided (grey boxes). **Mass (10²⁴ kg)** - This is the mass of the planet in septillion (1 followed by 24 zeros) kilograms. **Diameter (km)** - The diameter of the planet at the equator and poles, the distance through the center of the planet from one point to the opposite side. **Density (kg/m³)** - The average density (mass divided by volume) of the whole planet (not including the atmosphere for the terrestrial planets) in kilograms per cubic meter. **Gravity (m/s²)** - The gravitational acceleration on the surface at the equator in meters per second squared, including the effects of rotation. For the gas giant planets the gravity is given at the 1 bar pressure level in the atmosphere. The gravity on Earth is designated as 1 "G." **Escape Velocity (km/s)** - Initial velocity, in kilometers per second, needed at the surface (at the 1 bar pressure level for the gas giants) to escape the body's gravitational pull, ignoring atmospheric drag. **Rotation Period (hours)** - This is the time it takes for the planet to complete one rotation relative to the fixed background stars (not relative to the Sun) in hours. Negative numbers indicate retrograde (backwards relative to the Earth) rotation. **Length of Day (hours)** - The average time in hours for the Sun to move from the noon position in the sky at a point on the equator back to the same position. **Distance from Sun (10⁶ km and AU)** - This is the average distance from the planet to the Sun in millions of kilometers and AU, also known as the semi-major axis. All planets have orbits which are elliptical, not perfectly circular, so there is a point in the orbit at which the planet is closest to the Sun, the perihelion, and a point furthest from the Sun, the aphelion. The average distance from the Sun is midway between these two values. The average distance from the Earth to the Sun is defined as 1 Astronomical Unit (AU), so the ratio table gives this distance in AU. **For the Moon, the average distance from the Earth is given.** **Perihelion, Aphelion (10⁶ km)** - The closest and furthest points in a planet's orbit about the Sun, see "Distance from Sun" above. For the Moon, the closest and furthest points to Earth are given, known as the "Perigee" and "Apogee" respectively. **Orbital Period (days)** - This is the time in Earth days for a planet to orbit the Sun from one vernal equinox to the next. Also known as the **tropical orbit period**, this is equal to a year on Earth. * For the Moon, the **sidereal orbit** period, the time to orbit once relative to the fixed background stars, is given. The time from full Moon to full Moon, or **synodic period**, is 29.53 days. **Orbital Velocity (km/s)** - The average velocity or speed of the planet as it orbits the Sun, in kilometers per second. **Orbital Inclination (degrees)** - The angle in degrees at which a planet's orbit around the Sun is tilted relative to the ecliptic plane. The ecliptic plane is defined as the plane containing the Earth's orbit, so the Earth's inclination is 0. **Orbital Eccentricity** - This is a measure of how far a planet's orbit about the Sun (or the Moon's orbit about the Earth) is from being circular. The larger the eccentricity, the more elongated is the orbit, an eccentricity of 0 means the orbit is a perfect circle. There are no units for eccentricity. **Obliquity to Orbit/Axial Tilt (degrees)** - The angle in degrees the axis of a planet (the imaginary line running through the center of the planet from the north to south poles) is tilted relative to a line perpendicular to the planet's orbit around the Sun, north pole defined by right hand rule. *Venus rotates in a retrograde direction, opposite the other planets, so the tilt is almost 180 degrees, it is considered to be spinning with its "top", or north pole pointing "downward" (southward). Uranus rotates almost on its side relative to the orbit. The ratios with Earth refer to the axis without reference to north or south. **Mean Temperature (°C or °F)** - This is the average temperature over the whole planet's surface (or for the gas giants at the one bar level) in degrees C (Celsius or Centigrade) or degrees F (Fahrenheit). For Mercury and the Moon, for example, this is an average over the sunlit (very hot) and dark (very cold) hemispheres and so is not representative of any given region on the planet, and most of the surface is quite different from this average value. As with the Earth, there will tend to be variations in temperature from the equator to the poles, from the day to night sides, and seasonal changes on most of the planets. **Surface Pressure (bars)** - This is the atmospheric pressure (the weight of the atmosphere per unit area) at the surface of the planet in bars. *The surfaces of Jupiter, Saturn, Uranus, and Neptune are deep in the atmosphere and the location and pressures are not known. **Number of Moons** - This gives the number of IAU officially confirmed moons orbiting the planet. New moons are still being discovered. **Ring System?** - This tells whether a planet has a set of rings around it, Saturn being the most obvious example. **Global Magnetic Field?** - This tells whether the planet has a measurable large-scale magnetic field. Mars and the Moon have localized regional magnetic fields but no global field. The term "terrestrial planets" refers to Mercury, Venus, Earth, Moon, and Mars. The term "gas giants" refers to Jupiter, Saturn, Uranus, and Neptune. **Nearly all data and all text (some unit description and other text removed) taken directly from nssdc.gsfc.nasa.gov/planetary/factsheet/**.

Best Meteor Showers	C	IAU	Activity Period	Maximum	S.L.	R.A.	Dec.	km/s	r	ZHR	Time	Originating Body
*Antihelion Source	II	ANT	Dec 10 - Sep 10	-	-	-	-	30.0	3.0	4	01:00	
Quadrantids	I	QUA	Dec 30 - Jan 12	Jan 4	283.2°	15:24	+48° 42'	40.9	2.1	120	05:00	2003 EH (Asteroid)
Alpha Centaurids	II	ACE	Jan 28 - Feb 21	Feb 8	319.2°	14:00	-59° 00'	56.0	2.0	6	05:00	
Lyrids	I	LYR	Apr 18 - Apr 25	Apr 22	32.5°	18:10	+33° 12'	45.5	2.1	18	04:00	C/1861 G1 (Thatcher)
Pi Puppids	III	PPU	Apr 15 - Apr 28	Apr 23	33.5°	07:20	-45° 00'	18.0	2.0	var	19:00	
Eta Aquariids	I	ETA	Apr 24 - May 19	May 7	46.8°	22:36	-00° 30'	66.5	2.4	40	04:00	1P/Halley
Eta Lyrids	II	ELY	May 05 - May 12	May 10	50.0°	19:24	+43° 12'	43.4	3.0	3	04:00	
June Bootids	III	JBO	Jun 23 - Jun 25	Jun 23	92.5°	14:58	+48° 00'	13.0	2.2	var	21:00	
Alpha Capricornids	II	CAP	Jul 06 - Aug 10	Jul 26	127.0°	20:18	-10° 30'	21.8	2.5	5	01:00	169P/NEAT
Delta Aquariids	I	SDA	Jul 21 - Aug 23	Jul 28	128.0°	22:42	-16° 24'	42.0	3.2	16	03:00	96P/Machholz?
Perseids	I	PER	Jul 13 - Aug 26	Aug 12	140.0°	03:12	+57° 36'	60.5	2.2	100	04:00	109P/Swift-Tuttle
Kappa Cygnids	II	KCG	Aug 06 - Aug 31	Aug 17	145.0°	18:30	+58° 00'	22.7	3.0	3	23:00	
Aurigids	II	AUR	Aug 29 - Sep 04	Aug 31	158.6°	06:02	+39° 18'	66.7	2.5	6	04:00	
Sept. Epsilon Perseids	II	SPE	Sep 05 - Sep 28	Sep 9	167.0°	03:12	+39° 36'	64.5	3.0	5	05:00	
Draconids	III	GIA	Oct 06 - Oct 10	Oct 9	196.0°	17:28	+56° 00'	19.0	2.6	var	18:00	
Southern Taurids	II	STA	Sep 07 - Nov 19	Oct 10	197.0°	02:06	+08° 42'	28.9	2.3	5	02:00	2P/Encke
Orionids	I	ORI	Aug 25 - Nov 19	Oct 22	208.9°	06:24	+15° 30'	67.1	2.5	15	05:00	1P/Halley
Epsilon Geminids	II	EGE	Sep 29 - Nov 02	Oct 22	209.0°	06:58	+27° 36'	69.6	3.0	3	05:00	
Leonis Minorids	II	LMI	Oct 17 - Oct 27	Oct 22	209.0°	10:40	+36° 42'	59.9	3.0	2	05:00	
Andromedids	III	AND	Oct 26 - Nov 20	Nov 8	226.0°	01:31	+29° 24'	15.9	2.5	var	22:00	
Northern Taurids	II	NTA	Oct 25 - Dec 04	Nov 11	229.0°	03:54	+22° 24'	27.1	2.3	5	00:00	2P/Encke
Leonids	I	LEO	Nov 05 - Dec 03	Nov 18	236.1°	10:17	+21° 30'	69.7	2.5	15	05:00	55P/Tempel-Tuttle
Alpha Monocerotids	III	AMO	Nov 21 - Nov 23	Nov 21	239.3°	07:52	+01° 00'	68.0	2.4	var	03:00	
November Orionids	II	NOO	Nov 13 - Dec 07	Nov 28	247.0°	06:02	+15° 30'	43.7	3.0	3	04:00	
Sigma Hydrids	II	HYD	Nov 24 - Dec 21	Dec 6	254.0°	08:16	+02° 42'	60.7	3.0	3	03:00	
Dec Phoenicids	III	PHO	Nov 28 - Dec 09	Dec 6	254.3°	01:12	-53° 00'	18.0	2.8	var	20:00	
Puppid/Velids	II	PUP	Dec 01 - Dec 15	Dec 7	255.0°	08:12	-45° 00'	40.0	2.9	10	04:00	
Monocerotids	II	MON	Nov 27 - Dec 17	Dec 9	257.0°	06:40	+08° 18'	40.5	3.0	2	01:00	
Geminids	I	GEM	Nov 30 - Dec 17	Dec 13	261.5°	07:33	+32° 24'	33.7	2.6	120	01:00	3200 Phaethon (Ast.)
Dec. Leonis Minorids	II	DLM	Dec 06 - Jan 18	Dec 20	269.0°	10:50	+30° 00'	63.1	3.0	5	05:00	
Ursids	I	URS	Dec 17 - Dec 24	Dec 22	270.7°	14:30	+74° 48'	32.6	3.0	10	05:00	8P/Tuttle
Coma Berenicids	II	COM	Dec 24 - Jan 03	Dec 31	280.0°	12:22	+11° 42'	69.7	3.0	5	05:00	

Best Meteor Showers: named for the constellation or closest star within a constellation where the radiant is located at maximum activity.

Class (C) - A scale developed by Robert Lunsford to group meteor showers by their intensity: **Class I** - the strongest annual showers with ZHR's normally ten or better. **Class II** - reliable minor showers with ZHR's normally two to ten. **Class III** - showers that do not provide annual activity. These showers are rarely active yet have the potential to produce a major display on occasion. **Class IV (next page)** - weak minor showers with ZHR's rarely exceeding two. Observers with less experience are urged to limit their shower associations to showers with a rating of I to III. These stronger showers are also good targets for video and photographic work. **IAU** - International Astronomical Union three-letter designation. **Activity Period** - the dates when the shower is active and the observer can expect activity from this source (as of 2015). **Maximum** - the date on which the maximum activity is expected to occur (as of 2015). **S.L.** - the equivalent **solar longitude** of the date of maximum activity. Solar longitude is measured in degrees (0-359) with 0 occurring at the exact moment of the spring equinox, 90 at the summer solstice, 180 at the autumnal equinox, and 270 at the winter solstice. Scientists use this time measurement as it is independent of the calendar. **Radiant** - the area in the sky where shower meteors seem to appear from. This position is given in **Right Ascension** (R.A., celestial longitude) and **Declination** (Dec., celestial latitude). The radiant must be near or above the horizon in order to witness activity from a particular shower. **Velocity** - the velocity at which shower meteors strike the Earth's atmosphere. The velocity depends on the angle meteoroids (meteors in space) intersect the Earth. Meteoroids orbiting in the opposite direction of the Earth and striking the atmosphere head-on are much faster than those orbiting in the same direction as the Earth. This velocity is measured in kilometers per second (km/s). **r** - The **Population Index**, An estimate of the ratio of the number of meteors in subsequent magnitude classes. Simply stated: the lower the "r" value, the resulting overall mean magnitude of each shower will be brighter. "r" usually ranges from 2.0 (bright) to 3.5 (faint). **ZHR** - Zenith Hourly Rate, the average maximum number of shower meteors visible per hour if the radiant is located exactly overhead and the limiting magnitude equals +6.5 (a very dark sky). Actual counts rarely reach this figure as the zenith angle of the radiant is usually less and the limiting magnitude is usually lower than +6.5. ZHR is a useful tool when comparing the actual observed rates between individual observers as it sets observing conditions for all to the same standards. **Time** - this is the time of night when meteors from each shower are best seen. Quite often the radiant will culminate after sunrise therefore the last dark hour before dawn will be listed. Daylight Saving Time (Summer Time) is used from March through October. These figures are also highly dependent on the location of the observer. The time listed is most precise for northern latitudes of North America. * = "In 2006, the International Meteor Organization (IMO) decided to summarize a number of well-known meteor showers under the term antihelion source." - from www.dl1dbc.net/Meteorscatter/meteortopics.html

Data and text taken from: star.arm.ac.uk/~dja/shower/codes.html, www.amsmeteors.org/meteor-showers/2016-meteor-shower-list/, and en.wikipedia.org/wiki/List_of_meteor_showers; wikipedia content as of 17 Oct 2016.

Marginal Meteor Showers	C	IAU	Activity Period	Maximum	S.L.	R.A.	Dec.	km/s	ZHR	Time
January Leonids	IV	JLE	Dec 30 - Jan 05	Jan 2	281.0°	09:46	+24° 18'	59.4	<2	03:00
Xi Coronae Borealis	IV	XCB	Jan 11 - Jan 18	Jan 15	295.0°	16:36	+30° 00'	49.0	<2	05:00
Canum Venaticids	IV	CVN	Jan 13 - Jan 18	Jan 15	295.0°	14:00	+38° 00'	56.0	<2	05:00
Lambda Bootids	IV	LBO	Jan 17 - Jan 18	Jan 17	297.0°	14:48	+45° 00'	41.0	<2	05:00
January Xi Ursae Majorids	IV	XUM	Jan 16 - Jan 20	Jan 18	298.0°	11:16	+33° 00'	44.0	<2	03:00
Nu Bootids	IV	NBO	Jan 16 - Jan 20	Jan 18	298.0°	13:44	+13° 00'	67.0	<2	05:00
Gamma Ursae Minorids	IV	GUM	Jan 18 - Jan 24	Jan 20	300.0°	15:12	+67° 00'	30.0	<2	05:00
Eta Corvids	IV	ECV	Jan 18 - Jan 26	Jan 23	303.0°	12:56	-17° 00'	69.0	<2	05:00
January Comae Berenicids	IV	JCO	Jan 21 - Jan 27	Jan 24	304.0°	12:52	+15° 00'	65.0	<2	05:00
Alpha Coronae Borealis	IV	ACB	Jan 27 - Feb 05	Jan 28	308.0°	15:24	+26° 00'	57.0	<2	05:00
February Eta Draconids	IV	FED	Feb 03 - Feb 06	Feb 4	315.0°	15:59	+61° 00'	32.0	<2	05:00
February Epsilon Virginids	IV	FEV	Jan 29 - Feb 09	Feb 4	315.0°	13:24	+11° 00'	64.0	<2	05:00
Pi Hydrids	IV	PIH	Feb 04 - Feb 15	Feb 7	318.0°	14:00	-21° 00'	55.3	<2	05:00
Omega Centaurids	IV	OCA	Feb 12 - Feb 16	Feb 14	325.0°	13:16	-55° 00'	48.0	<2	05:00
Theta Centaurids	IV	TCN	Feb 12 - Feb 16	Feb 14	325.0°	13:56	-29° 00'	65.0	<2	05:00
Beta Herculis	IV	BHE	Feb 13 - Feb 16	Feb 14	325.0°	16:24	+25° 00'	53.0	<2	05:00
February Mu Virginids	IV	FMV	Feb 16 - Mar 04	Feb 26	337.0°	16:12	-02° 00'	62.0	<2	05:00
Xi Herculis	IV	XHE	Mar 10 - Mar 15	Mar 12	352.0°	17:04	+48° 30'	35.0	<2	05:00
Gamma Normids	IV	GNO	Mar 23 - Mar 28	Mar 24	004.0°	16:24	-51° 00'	68.0	<2	05:00
Zeta Cygnids	IV	ZCY	Apr 03 - Apr 10	Apr 5	016.0°	20:08	+40° 00'	40.0	<2	04:00
Delta Aquiliids	IV	DAL	Apr 07 - Apr 13	Apr 9	020.0°	20:32	+12° 00'	63.0	<2	04:00
Sigma Leonids A	IV	SLE	Apr 08 - Apr 25	Apr 15	026.0°	13:24	+03° 00'	19.0	<2	01:00
April Rho Cygnids	IV	AEC	Apr 11 - May 04	Apr 22	033.0°	20:56	+44° 30'	42.0	<2	04:00
H Virginids	IV	HVI	Apr 29 - May 03	May 1	041.0°	13:40	-11° 00'	17.0	<2	04:00
Gamma Aquiliids	IV	GAQ	May 05 - May 12	May 8	048.0°	20:28	+14° 30'	66.0	<2	01:00
Theta 2 Sagittariids	IV	TTS	May 09 - May 14	May 13	053.0°	20:04	-33° 00'	67.0	<2	01:00
May Beta Capricornids	IV	MBC	May 16 - May 21	May 19	059.0°	20:20	-15° 00'	68.0	<2	01:00
June Mu Cassiopeiids	IV	JMC	May 31 - Jun 05	Jun 1	071.0°	00:44	+53° 00'	42.0	<2	04:00
Daytime Arietids	IV	ARI	May 14 - Jun 24	Jun 7	076.7°	02:56	+23° 30'	42.0	<2	04:00
June Rho Cygnids	IV	JRC	Jun 14 - Jun 16	Jun 14	084.0°	21:22	+44° 42'	48.0	<2	00:00
Northern June Aquilids	IV	NZC	Jun 10 - Jun 26	Jun 16	086.0°	19:53	-10° 00'	41.0	<2	04:00
Delta Piscids	IV	DPI	Jun 20 - Jun 26	Jun 23	092.0°	00:44	+05° 00'	69.0	<2	04:00
June Iota Pegasids	IV	JIP	Jun 24 - Jun 26	Jun 24	093.5°	22:06	+29° 00'	59.0	<2	04:00
Sigma Capricornids	IV	SCA	Jun 19 - Jul 24	Jun 27	096.0°	20:25	-07° 00'	41.0	<2	04:00
F Ophiuchids	IV	FOP	Jun 29 - Jul 01	Jun 29	098.0°	17:40	+07° 30'	17.0	<2	04:00
Pi Piscids	IV	PPS	Jun 11 - Jul 25	Jul 1	101.0°	01:00	+25° 00'	67.6	<2	04:00
July Pegasids	IV	JPE	Jun 30 - Aug 03	Jul 10	108.0°	23:12	+11° 00'	68.1	<2	04:00
C Andromedids	IV	CAN	Jun 26 - Jul 20	Jul 12	110.0°	02:10	+47° 30'	60.1	<2	04:00
Psi Cassiopeiids	IV	PCA	Jul 12 - Jul 18	Jul 16	114.0°	02:52	+70° 00'	46.0	<2	04:00
Tau Cetids	IV	TCT	Jul 20 - Jul 23	Jul 21	119.0°	01:52	-18° 00'	65.0	<2	04:00
July Gamma Draconids	IV	GDR	Jul 25 - Jul 29	Jul 27	125.0°	18:42	+50° 30'	26.5	<2	00:00
Eta Eridanids	IV	ERI	Jul 31 - Aug 17	Aug 5	133.0°	02:53	-12° 18'	65.7	<2	04:00
Beta Perseids	IV	BPE	Jul 24 - Aug 20	Aug 7	135.0°	02:57	+37° 36'	67.0	<2	04:00
Theta Piscids	IV	TPI	Aug 08 - Sep 01	Aug 19	147.0°	23:28	+04° 60'	39.0	<2	04:00
August Gamma Cepheids	IV	AGC	Aug 22 - Sep 01	Aug 28	155.0°	00:04	+77° 00'	41.0	<2	04:00
September Lyncids	IV	SLY	Sep 07 - Sep 18	Sep 9	167.0°	06:22	+55° 42'	59.7	<2	05:00
September Iota Cassiopeiids	IV	SIC	Sep 10 - Sep 16	Sep 14	172.0°	03:04	+64° 00'	55.0	<2	03:00
September Pi Orionids	IV	POR	Sep 16 - Sep 20	Sep 18	176.0°	04:08	+06° 00'	66.0	<2	04:00
Beta Aurigids	IV	BAU	Sep 21 - Sep 25	Sep 22	180.0°	05:50	+48° 00'	69.0	<2	05:00
Delta Aurigids	IV	DAU	Sep 23 - Sep 29	Sep 26	184.0°	05:08	+57° 30'	61.0	<2	05:00
Sep-Oct Lyncids	IV	SOL	Sep 27 - Sep 30	Sep 28	186.0°	07:26	+47° 00'	65.0	<2	05:00
Daytime Sextantids	IV	DSX	Sep 25 - Oct 05	Sep 28	186.0°	10:16	-01° 00'	33.0	<2	05:00
October Camelopardalids	IV	OCT	Oct 05 - Oct 06	Oct 5	192.6°	11:12	+78° 30'	44.0	<2	05:00
Psi Aurigids	IV	ZTA	Oct 09 - Oct 16	Oct 13	200.0°	07:19	+43° 00'	67.0	<2	05:00
October Ursa Majorids	IV	OCU	Oct 14 - Oct 18	Oct 15	202.0°	09:36	+64° 18'	52.4	<2	05:00
Tau Cancrids	IV	TCA	Oct 09 - Oct 25	Oct 17	204.0°	08:57	+29° 24'	67.8	<2	05:00
Gamma Piscids	IV	GPS	Oct 14 - Oct 21	Oct 17	204.0°	01:10	+16° 48'	20.8	<2	05:00
October Lyncids	IV	OLY	Oct 16 - Oct 24	Oct 20	207.0°	07:24	+64° 18'	63.0	<2	05:00
Eta Taurids	IV	ETT	Oct 15 - Oct 29	Oct 24	211.0°	03:40	+23° 00'	45.0	<2	05:00
Lambda Ursa Majorids	IV	LUM	Oct 24 - Nov 01	Oct 27	214.0°	10:24	+48° 54'	61.5	<2	05:00
Southern Lambda Draconids	IV	SLD	Oct 24 - Nov 02	Oct 27	214.0°	11:24	+48° 54'	62.5	<2	05:00
Chi Taurids	IV	CTA	Nov 04 - Nov 08	Nov 5	223.0°	04:22	+25° 00'	46.0	<2	05:00
Kappa Ursae Majorids	IV	KUM	Nov 02 - Nov 09	Nov 5	223.0°	09:44	+45° 30'	62.0	<2	05:00
Nov. Iota Draconids	IV	NID	Nov 22 - Dec 01	Nov 21	239.0°	12:40	+69° 00'	41.0	<2	05:00
Dec. Phi Cassiopeiids	IV	DPC	Nov 26 - Dec 05	Dec 1	249.0°	01:33	+52° 36'	13.9	<2	05:00
December Kappa Draconids	IV	KDR	Dec 02 - Dec 06	Dec 3	251.0°	12:22	+70° 24'	41.4	<2	05:00
Psi Ursa Majorids	IV	PSU	Dec 01 - Dec 16	Dec 4	252.0°	11:16	+43° 42'	60.5	<2	05:00
Alpha Draconids A	IV	DAD	Dec 05 - Dec 18	Dec 7	255.0°	13:40	+60° 06'	41.3	<2	05:00
Eta Hydrids	IV	EHY	Dec 10 - Dec 18	Dec 12	260.0°	09:08	+01° 30'	63.0	<2	04:00
December Chi Virginids	IV	XVI	Dec 08 - Dec 24	Dec 16	265.0°	12:52	-11° 12'	69.2	<2	04:00
December Sigma Virginids	IV	DSV	Dec 06 - Dec 31	Dec 23	272.0°	13:55	+04° 00'	68.2	<2	05:00
C Velids	IV	CVE	Dec 27 - Dec 30	Dec 28	277.0°	09:20	-54° 00'	39.0	<2	05:00
Alpha Draconids B	IV	DAD	Dec 26 - Jan 01	Dec 29	278.0°	14:51	+53° 30'	41.5	<2	05:00
Alpha Hydrids	IV	AHY	Dec 22 - Jan 07	Dec 31	280.0°	08:24	-07° 24'	43.0	<2	01:00

Winter	Constellation	IAU	NGC	Type	Mag.	Size	Dist. (ly)	R.A.	Dec.	Common Name
M36	Auriga	Aur	1960	Oc	6.3	12.0	4,100	05:36.1	+34° 08'	
M37	Auriga	Aur	2099	Oc	6.2	24.0	4,400	05:52.4	+32° 33'	
M38	Auriga	Aur	1912	Oc	7.4	21.0	4,200	05:28.7	+35° 50'	
M41	Canis Major	CMa	2287	Oc	4.6	38.0	2,300	06:47.0	-20° 44'	
M44	Cancer	Cnc	2632	Oc	3.7	95.0	577	08:40.1	+19° 59'	Beehive Cluster
M67	Cancer	Cnc	2682	Oc	6.1	30.0	2,700	08:50.4	+11° 49'	
M35	Gemini	Gem	2168	Oc	5.3	28.0	2,800	06:08.9	+24° 20'	
M48	Hydra	Hya	2548	Oc	5.5	54.0	1,500	08:13.8	-05° 48'	
M79	Lepus	Lep	1904	Gc	7.7	8.7	42,100	05:24.5	-24° 33'	
M50	Monoceros	Mon	2323	Oc	6.3	16.0	3,000	07:03.2	-08° 20'	
M42	Orion	Ori	1976	Di	4.0	85x60	1,600	05:35.4	-05° 27'	Great Nebula in Orion
M43	Orion	Ori	1982	Di	9.0	20x15	1,600	05:35.6	-05° 16'	De Mairan's Nebula
M78	Orion	Ori	2068	Di	8.3	8x6	1,600	05:46.7	+00° 03'	
M46	Puppis	Pup	2437	Oc	6.0	27.0	5,400	07:41.8	-14° 49'	
M47	Puppis	Pup	2422	Oc	5.2	30.0	1,600	07:36.6	-14° 30'	
M93	Puppis	Pup	2447	Oc	6.0	22.0	3,600	07:44.6	-23° 52'	
M1	Taurus	Tau	1952	Sn	8.4	6x4	6,300	05:34.5	+22° 01'	Crab Nebula
M45	Taurus	Tau	-	Oc	1.6	110.0	380	03:47.0	+24° 07'	Pleiades

Spring	Constellation	IAU	NGC	Type	Mag.	Size	Dist. (ly)	R.A.	Dec.	Common Name
M53	Coma Berenices	Com	5024	Gc	7.6	12.6	59,700	13:12.9	+18° 10'	
M64	Coma Berenices	Com	4826	Sp	8.5	9.3x5.4	19 mil	12:56.7	+21° 41'	Black Eye Galaxy
M85	Coma Berenices	Com	4382	Ln	9.1	7.1x5.2	60 mil	12:25.5	+18° 12'	
M88	Coma Berenices	Com	4501	Sp	9.6	7x4	60 mil	12:32.1	+14° 26'	
M91	Coma Berenices	Com	4548	Ba	10.2	5.4x4.4	60 mil	12:35.5	+14° 30'	
M98	Coma Berenices	Com	4192	Sp	10.1	9.5x3.2	60 mil	12:13.9	+14° 55'	
M99	Coma Berenices	Com	4254	Sp	9.9	5.4x4.8	60 mil	12:18.9	+14° 26'	
M100	Coma Berenices	Com	4321	Sp	9.3	7x6	60 mil	12:23.0	+15° 50'	
M3	Canes Venatici	CVn	5272	Gc	6.2	16.2	33,900	13:42.2	+28° 23'	
M51	Canes Venatici	CVn	5194	Sp	8.4	11x7	37 mil	13:30.0	+47° 11'	Whirlpool Galaxy
M63	Canes Venatici	CVn	5055	Sp	8.6	10x6	37 mil	13:15.8	+42° 02'	Sunflower Galaxy
M94	Canes Venatici	CVn	4736	Sp	8.2	7x3	15 mil	12:50.9	+41° 08'	
M106	Canes Venatici	CVn	4258	Sp	8.4	19x8	25 mil	12:18.9	+47° 19'	
M68	Hydra	Hya	4590	Gc	7.8	12.0	33,300	12:39.5	-26° 45'	
M83	Hydra	Hya	5236	Sp	7.6	11x10	15 mil	13:37.0	-29° 52'	Southern Pinwheel
M65	Leo	Leo	3623	Sp	9.3	8x1.5	35 mil	11:18.9	+13° 05'	
M66	Leo	Leo	3627	Sp	8.9	8x2.5	35 mil	11:20.2	+12° 59'	
M95	Leo	Leo	3351	Ba	9.7	4.4x3.3	38 mil	10:44.0	+11° 42'	
M96	Leo	Leo	3368	Sp	9.2	6x4	38 mil	10:46.8	+11° 49'	
M105	Leo	Leo	3379	EI	9.3	2.0	38 mil	10:47.8	+12° 35'	
M40	Ursa Major	UMa	Win4	Ds	8.4	0.8	510	12:22.4	+58° 05'	Winnecke 4
M81	Ursa Major	UMa	3031	Sp	6.9	21x10	12 mil	09:55.6	+69° 04'	Bode's Galaxy
M82	Ursa Major	UMa	3034	Ir	8.4	9x4	12 mil	09:55.8	+69° 41'	Cigar Galaxy
M97	Ursa Major	UMa	3587	Pl	9.9	3.4x3.3	2,600	11:14.8	+55° 01'	Owl Nebula
M101	Ursa Major	UMa	5457	Sp	7.9	22.0	27 mil	14:03.2	+54° 21'	Pinwheel Galaxy
M108	Ursa Major	UMa	3556	Sp	10.0	8x1	45 mil	11:11.5	+55° 40'	
M109	Ursa Major	UMa	3992	Ba	9.8	7x4	55 mil	11:57.6	+53° 23'	
M49	Virgo	Vir	4472	EI	8.4	9x7.5	60 mil	12:29.8	+08° 00'	
M58	Virgo	Vir	4579	Ba	9.7	5.5x4.5	60 mil	12:37.7	+11° 49'	
M59	Virgo	Vir	4621	EI	9.6	5x3.5	60 mil	12:42.0	+11° 39'	
M60	Virgo	Vir	4649	EI	8.8	7x6	60 mil	12:43.7	+11° 33'	
M61	Virgo	Vir	4303	Sp	9.7	6x5.5	60 mil	12:21.9	+04° 28'	
M84	Virgo	Vir	4374	Ln	9.1	5.0	60 mil	12:25.1	+12° 53'	
M86	Virgo	Vir	4406	Ln	8.9	7.5x5.5	60 mil	12:26.2	+12° 57'	
M87	Virgo	Vir	4486	EI	8.6	7.0	60 mil	12:30.8	+12° 24'	
M89	Virgo	Vir	4552	EI	9.8	4.0	60 mil	12:35.7	+12° 33'	
M90	Virgo	Vir	4569	Sp	9.5	9.5x4.5	60 mil	12:36.8	+13° 10'	
M104	Virgo	Vir	4594	Sp	8.0	9x4	50 mil	12:40.0	-11° 37'	Sombrero Galaxy

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Summer	Constellation	IAU	NGC	Type	Mag.	Size	Dist. (ly)	R.A.	Dec.	Common Name
M72	Aquarius	Aqr	6981	Gc	9.3	5.9	55,400	20:53.5	-12° 32'	
M73	Aquarius	Aqr	6994	As	9	2.8	2,000	20:59.0	-12° 38'	
M29	Cygnus	Cyg	6913	Oc	7.1	7.0	4,000	20:23.9	+38° 32'	
M102	Draco	Dra	5866	Ln	9.9	5.2x2.3	40 mil	15:06.5	+55° 46'	
M13	Hercules	Her	6205	Gc	5.8	16.6	25,100	16:41.7	+36° 28'	Great Hercules Globular
M92	Hercules	Her	6341	Gc	6.4	11.2	26,700	17:17.1	+43° 08'	
M56	Lyra	Lyr	6779	Gc	8.3	7.1	32,900	19:16.6	+30° 11'	
M57	Lyra	Lyr	6720	Pl	8.8	1.4x1.0	2,300	18:53.6	+33° 02'	Ring Nebula
M9	Ophiuchus	Oph	6333	Gc	7.7	9.3	26,700	17:19.2	-18° 31'	
M10	Ophiuchus	Oph	6254	Gc	6.6	15.1	14,400	16:57.1	-04° 06'	
M12	Ophiuchus	Oph	6218	Gc	6.7	14.5	16,000	16:47.2	-01° 57'	
M14	Ophiuchus	Oph	6402	Gc	7.6	11.7	29,000	17:37.6	-03° 15'	
M19	Ophiuchus	Oph	6273	Gc	6.8	13.5	28,400	17:02.6	-26° 16'	
M62	Ophiuchus	Oph	6266	Gc	6.5	14.1	22,500	17:01.2	-30° 07'	
M107	Ophiuchus	Oph	6171	Gc	7.9	10.0	20,900	16:32.5	-13° 03'	
M4	Scorpius	Sco	6121	Gc	5.6	26.3	7,200	16:23.6	-26° 32'	
M6	Scorpius	Sco	6405	Oc	4.2	25.0	1,600	17:40.1	-32° 13'	Butterfly Cluster
M7	Scorpius	Sco	6475	Oc	3.3	80.0	800	17:53.9	-34° 49'	Ptolemy's Cluster
M80	Scorpius	Sco	6093	Gc	7.3	8.9	32,600	16:17.0	-22° 59'	
M11	Scutum	Sct	6705	Oc	6.3	14.0	6,000	18:51.1	-06° 16'	Wild Duck Cluster
M26	Scutum	Sct	6694	Oc	8	15.0	5,000	18:45.2	-09° 24'	
M5	Serpens	Ser	5904	Gc	5.6	17.4	24,500	15:18.6	+02° 05'	
M16	Serpens	Ser	6611	Oc	6.4	7.0	7,000	18:18.8	-13° 47'	Eagle Nebula
M71	Sagitta	Sge	6838	Gc	8.2	7.2	12,700	19:53.8	+18° 47'	
M8	Sagittarius	Sgr	6523	Di	6	90x40	5,200	18:03.8	-24° 23'	Lagoon Nebula
M17	Sagittarius	Sgr	6618	Di	7	11.0	5,000	18:20.8	-16° 11'	Omega Nebula
M18	Sagittarius	Sgr	6613	Oc	7.5	9.0	4,900	18:19.9	-17° 08'	
M20	Sagittarius	Sgr	6514	Di	9	28.0	5,200	18:02.6	-23° 02'	Trifid Nebula
M21	Sagittarius	Sgr	6531	Oc	6.5	13.0	4,250	18:04.6	-22° 30'	
M22	Sagittarius	Sgr	6656	Gc	5.1	24.0	10,400	18:36.4	-23° 54'	Sagittarius Cluster
M23	Sagittarius	Sgr	6494	Oc	6.9	27.0	2,150	17:56.8	-19° 01'	
M24	Sagittarius	Sgr	-	MW	4.6	90.0	10,000	18:16.9	-18° 30'	Sagittarius Star Cloud
M25	Sagittarius	Sgr	IC4725	Oc	6.5	40.0	2,000	18:31.6	-19° 15'	
M28	Sagittarius	Sgr	6626	Gc	6.8	11.2	18,600	18:24.5	-24° 52'	
M54	Sagittarius	Sgr	6715	Gc	7.6	9.1	88,700	18:55.1	-30° 29'	
M55	Sagittarius	Sgr	6809	Gc	6.3	19.0	17,600	19:40.0	-30° 58'	
M69	Sagittarius	Sgr	6637	Gc	7.6	7.1	28,000	18:31.4	-32° 21'	
M70	Sagittarius	Sgr	6681	Gc	7.9	7.8	29,400	18:43.2	-32° 18'	
M75	Sagittarius	Sgr	6864	Gc	8.5	6.0	61,300	20:06.1	-21° 55'	
M27	Vulpecula	Vul	6853	Pl	7.4	8.0x5.7	1,250	19:59.6	+22° 43'	Dumbbell Nebula

Autumn	Constellation	IAU	NGC	Type	Mag.	Size	Dist. (ly)	R.A.	Dec.	Common Name
M31	Andromeda	And	224	Sp	3.4	178x63	3 mil	00:41.8	+41° 16'	Andromeda Galaxy
M32	Andromeda	And	221	El	8.1	8x6	3 mil	00:42.8	+40° 52'	
M110	Andromeda	And	205	El	8.5	17x10	3 mil	00:40.4	+41° 41'	
M2	Aquarius	Aqr	7089	Gc	6.5	12.9	37,900	21:33.5	+00° 49'	
M30	Capricorn	Cap	7099	Gc	7.2	11.0	26,100	21:40.4	-23° 11'	
M52	Cassiopeia	Cas	7654	Oc	7.3	13.0	5,000	23:24.2	+61° 35'	
M103	Cassiopeia	Cas	581	Oc	7.4	6.0	8,500	01:33.2	+60° 42'	
M77	Cetus	Cet	1068	Sp	8.9	7x6	60 mil	02:42.7	+00° 02'	
M39	Cygnus	Cyg	7092	Oc	4.6	32.0	825	21:32.2	+48° 26'	
M15	Pegasus	Peg	7078	Gc	6.2	12.3	33,600	21:30.0	+12° 10'	Great Pegasus Globular
M34	Perseus	Per	1039	Oc	5.5	35.0	1,400	02:42.0	+42° 47'	
M76	Perseus	Per	650	Pl	10.1	2.7x1.8	3,400	01:42.4	+51° 34'	Little Dumbbell Nebula
M74	Pisces	Psc	628	Sp	9.4	10.2x9.5	35 mil	01:36.7	+15° 47'	
M33	Triangulum	Tri	598	Sp	5.7	73x45	3 mil	01:33.9	+30° 39'	Triangulum Galaxy

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Northern Con.	IUA	Meaning	Family	Origin	Brightest Star	R.A.	Dec.	Quad	%Sky	R
Andromeda	And	Andromeda	Perseus	Ptolemy	Alpheratz	00:48.46	+37° 25.91'	NQ1	1.75%	19
Aquila	Aql	Eagle	Hercules	Ptolemy	Altair	22:17.38	-10° 47.35'	SQ4	2.38%	10
Auriga	Aur	Charioteer	Perseus	Ptolemy	Capella	06:04.42	+42° 01.68'	NQ2	1.59%	21
Boötes	Boo	Herdsmen	Ursa Major	Ptolemy	Arcturus	14:42.64	+31° 12.16'	NQ3	2.20%	13
Camelopardalis	Cam	Giraffe	Ursa Major	1613, Plancius	β Camelopardalis	08:51.37	+69° 22.89'	NQ2	1.83%	18
Canes Venatici	CVn	Hunting Dogs	Ursa Major	1690, Hevelius	Cor Caroli	08:41.70	-63° 13.16'	SQ2	1.20%	34
Cassiopeia	Cas	Cassiopeia	Perseus	Ptolemy	Shedir	10:41.53	-79° 12.30'	SQ2	0.32%	79
Cepheus	Cep	Cepheus	Perseus	Ptolemy	Alderamin	06:49.74	-22° 08.42'	SQ2	0.92%	43
Coma Berenices	Com	Berenice's Hair	Ursa Major	1603, Uranomet.	β Comae Berenices	18:38.79	-41° 08.85'	SQ4	0.31%	80
Corona Borealis	CrB	Northern Crown	Ursa Major	Ptolemy	Alphecca	11:23.75	-15° 55.74'	SQ2	0.68%	53
Cygnus	Cyg	Swan	Hercules	Ptolemy	Deneb	20:35.28	+44° 32.70'	NQ4	1.95%	16
Delphinus	Del	Dolphin	Heav. Wat.	Ptolemy	Rotanev	20:41.61	+11° 40.26'	NQ4	0.46%	69
Draco	Dra	Dragon	Ursa Major	Ptolemy	Etamin	15:08.64	+67° 00.40'	NQ3	2.63%	8
Equuleus	Equ	Filly	Heav. Wat.	Ptolemy	Kitalpha	21:11.26	+07° 45.49'	NQ4	0.17%	87
Hercules	Her	Hercules	Hercules	Ptolemy	Kornephoros	17:23.16	+27° 29.93'	NQ3	2.97%	5
Hydra	Hya	Sea Serpent	Hercules	Ptolemy	Alphard	11:36.73	-14° 31.91'	SQ2	3.16%	1
Lacerta	Lac	Lizard	Perseus	1690, Hevelius	α Lacertae	22:27.68	+46° 02.51'	NQ4	0.49%	68
Leo Minor	LMi	Little Lion	Ursa Major	1690, Hevelius	Praecipua	05:33.95	-19° 02.78'	SQ1	0.70%	51
Lynx	Lyn	Lynx	Ursa Major	1690, Hevelius	Elvashak	07:59.53	+47° 28.00'	NQ2	1.32%	28
Lyra	Lyr	Lyre (Harp)	Hercules	Ptolemy	Vega	18:51.17	+36° 41.36'	NQ4	0.69%	52
Ophiuchus	Oph	Serpent-Bearer	Hercules	Ptolemy	Rasalhague	17:23.69	-07° 54.74'	SQ3	2.30%	11
Pegasus	Peg	Pegasus	Perseus	Ptolemy	Enif	22:41.84	+19° 27.98'	NQ4	2.72%	7
Perseus	Per	Perseus	Perseus	Ptolemy	Mirfak	03:10.50	+45° 00.79'	NQ1	1.49%	24
Sagitta	Sge	Arrow	Hercules	Ptolemy	γ Sagittae	00:26.28	-32° 05.30'	SQ1	1.15%	36
Scutum	Sct	Shield	Hercules	1690, Hevelius	α Scuti	10:16.29	-02° 36.88'	SQ2	0.76%	47
Serpens^(P)	Ser	Serpent	Hercules	Ptolemy	Unukalhai	19:39.05	+18° 51.68'	NQ4	0.19%	86
Triangulum	Tri	Triangle	Perseus	Ptolemy	β Trianguli	16:04.95	-65° 23.28'	SQ3	0.27%	83
Ursa Major	UMa	Big Dipper	Ursa Major	Ptolemy	Alioth	11:18.76	+50° 43.27'	NQ2	3.10%	3
Ursa Minor	UMi	Little Dipper	Ursa Major	Ptolemy	Polaris	15:00.00	+77° 41.99'	NQ3	0.62%	56
Vulpecula	Vul	Fox	Hercules	1690, Hevelius	Anser	20:13.88	+24° 26.56'	NQ4	0.65%	55

Zodiacal Con.	IUA	Meaning	Family	Origin	Brightest Star	R.A.	Dec.	Quad.	%Sky	Rank
Aquarius	Aqr	Water Bearer	Zodiac	Ptolemy	Sadalsuud	19:40.02	+03° 24.65'	NQ4	1.58%	22
Aries	Ari	Ram	Zodiac	Ptolemy	Hamal	02:38.16	+20° 47.54'	NQ1	1.07%	39
Cancer	Cnc	Crab	Zodiac	Ptolemy	Tarf	21:02.93	-18° 01.39'	SQ4	1.00%	40
Capricornus	Cap	Goat (Seagoat)	Zodiac	Ptolemy	Deneb Algiedi	02:32.64	+71° 00.51'	NQ4	1.42%	27
Gemini	Gem	Twins	Zodiac	Ptolemy	Pollux	07:04.24	+22° 36.01'	NQ2	1.25%	30
Leo	Leo	Lion	Zodiac	Ptolemy	Regulus	10:40.03	+13° 08.32'	NQ2	2.30%	12
Libra	Lib	Scales	Zodiac	Ptolemy	Zubeneshamali	10:14.72	+32° 08.08'	NQ2	0.56%	64
Pisces	Psc	Fishes	Zodiac	Ptolemy	Alpherg	22:17.07	-30° 38.53'	SQ4	0.59%	60
Sagittarius	Sgr	Archer	Zodiac	Ptolemy	Kaus Australis	16:53.24	-27° 01.89'	SQ3	1.20%	33
Scorpius	Sco	Scorpion	Zodiac	Ptolemy	Antares	18:40.39	-09° 53.32'	SQ4	0.26%	84
Taurus	Tau	Bull	Zodiac	Ptolemy	Aldebaran	04:42.13	+14° 52.63'	NQ1	1.93%	17
Virgo	Vir	Virgin	Zodiac	Ptolemy	Spica	13:24.39	-04° 09.51'	SQ3	3.14%	2

Northern & Zodiacal Constellations In The Western Tradition. IUA - International Astronomical Union three-letter abbreviation. **Meaning** - Historical association of the constellation. **Family** - refers to the constellation families introduced by Donald Menzel in 1975. Constellation families are collections of constellations sharing some defining characteristic, such as proximity on the celestial sphere, common historical origin, or common mythological theme. **Heav. Wat.** = Heavenly Waters. **Origin** - First official mention of the constellation. **Ptolemy** – one of the ancient constellations (many throughout antiquity) catalogues in “The Almagest.” **1592, Plancius** - Published in “Nova et exacta terrarum tabula geographica et hydrographica.” Columba was split from Canis Major. **1613, Plancius** - Introduction of eight new constellations (published in Amsterdam). **1603, Uranomet.** - Constellation defined in “Uranometria: omnium asterismorum continens schemata, nova methodo delineata, aereis laminis expressa” (“Uranometria, containing charts of all the constellations, drawn by a new method and engraved on copper plates”), produced by Johann Bayer. **1690, Hevelius** - Constellation published in “Firmamentum Sobiescianum,” by Johannes Hevelius. **1763, Lacaille** - One of 14 constellations added in “Coelum Australe Stelliferum,” published posthumously by Nicolas-Louis de Lacaille. **Brightest Star** - The brightest star in the constellation. **R.A.** - Right Ascension in hours, minutes, and seconds. **Dec.** - Declination in degrees and minutes. **Quad.** - Associated galactic quadrant. **%Sky** - Percent of the sky the constellation takes up. **Rank** - Rank (by size) of the constellation. Data and history taken from en.wikipedia.org/wiki/88_modern_constellations_by_area and en.wikipedia.org/wiki/88_modern_constellations; wikipedia content as of 17 Oct 2016.

Southern Con.	IUA	Meaning	Family	Origin	Brightest Star	R.A.	Dec.	Quad.	%Sky	Rank
Antlia	Ant	Airpump	La Caille	1763, Lacaille	a Antliae	10:16.43	-32° 29.01'	SQ2	0.58%	62
Apus	Aps	Bird of Paradise	Bayer	1603, Uranomet.	a Apodis	16:08.65	-75° 18.00'	SQ3	0.50%	67
Ara	Ara	Altar	Hercules	Ptolemy	β Arae	17:22.49	-56° 35.30'	SQ3	0.57%	63
Caelum	Cae	Sculptor's Tool	La Caille	1763, Lacaille	a Caeli	04:42.27	-37° 52.90'	SQ1	0.30%	81
Canis Major	CMa	Great Dog	Orion	Ptolemy	Sirius	01:19.16	+62° 11.04'	NQ1	1.45%	25
Canis Minor	CMi	Little Dog	Orion	Ptolemy	Procyon	13:04.27	-47° 20.72'	SQ3	2.57%	9
Carina	Car	Keel (of Argo) ¹	Heav. Wat.	1763, Lacaille	Canopus	01:40.10	-07° 10.76'	SQ1	2.99%	4
Centaurus	Cen	Centaur	Hercules	Ptolemy	Alpha Centauri	14:34.54	-63° 01.82'	SQ3	0.23%	85
Cetus	Cet	Whale	Perseus	Ptolemy	Deneb Kaitos	07:39.17	+06° 25.63'	NQ2	0.44%	71
Chamaeleon	Cha	Chameleon	Bayer	1603, Uranomet.	a Chamaeleontis	08:38.96	+19° 48.35'	NQ2	1.23%	31
Circinus	Cir	Compasses	La Caille	1763, Lacaille	a Circini	05:51.76	-35° 05.67'	SQ1	0.65%	54
Columba	Col	Dove	Heav. Wat.	1592, Plancius	Phact	12:47.27	+23° 18.34'	NQ3	0.94%	42
Corona Australis	CrA	Southern Crown	Hercules	Ptolemy	Alphekka Meridiana	15:50.59	+32° 37.49'	NQ3	0.43%	73
Corvus	Crv	Crow (Raven)	Hercules	Ptolemy	Gienah	12:26.99	-60° 11.19'	SQ3	0.17%	88
Crater	Crt	Cup	Hercules	Ptolemy	Labrum	12:26.52	-18° 26.20'	SQ3	0.45%	70
Crux	Cru	Southern Cross	Hercules	1603, Uranomet.	Acrux	13:06.96	+40° 06.11'	NQ3	1.13%	38
Dorado	Dor	Sword/Goldfish	Bayer	1603, Uranomet.	a Doradus	05:14.51	-59° 23.22'	SQ1	0.43%	72
Eridanus	Eri	Eridanus (river)	Heav. Wat.	Ptolemy	Achernar	03:18.02	-28° 45.37'	SQ1	2.76%	6
Fornax	For	Furnace	La Caille	1763, Lacaille	Fornacis	02:47.88	-31° 38.07'	SQ1	0.96%	41
Grus	Gru	Crane	Bayer	1603, Uranomet.	Alnair	22:27.39	-46° 21.11'	SQ4	0.89%	45
Horologium	Hor	Clock	La Caille	1763, Lacaille	a Horologii	03:16.56	-53° 20.18'	SQ1	0.60%	58
Hydrus	Hyi	Water Snake	Bayer	1603, Uranomet.	β Hydri	02:20.65	-69° 57.39'	SQ1	0.59%	61
Indus	Ind	Indian	Bayer	1603, Uranomet.	The Persian	21:58.33	-59° 42.40'	SQ4	0.71%	49
Lepus	Lep	Hare	Orion	Ptolemy	Arneb	15:11.96	-15° 14.08'	SQ3	1.30%	29
Lupus	Lup	Wolf	Hercules	Ptolemy	Men	15:13.21	-42° 42.53'	SQ3	0.81%	46
Mensa	Men	Table/mountain	La Caille	1763, Lacaille	a Mensae	05:24.90	-77° 30.24'	SQ1	0.37%	75
Microscopium	Mic	Microscope	La Caille	1763, Lacaille	γ Microscopii	20:57.88	-36° 16.49'	SQ4	0.51%	66
Monoceros	Mon	Unicorn	Orion	1613, Plancius	β Monocerotis	07:03.63	+00° 16.93'	NQ2	1.17%	35
Musca	Mus	Southern Fly	Bayer	1603, Uranomet.	a Muscae	12:35.28	-70° 09.66'	SQ3	0.34%	77
Norma	Nor	Straightedge	La Caille	1763, Lacaille	γ2 Normae	15:54.18	-51° 21.09'	SQ3	0.40%	74
Octans	Oct	Octant	La Caille	1763, Lacaille	v Oct	23:00.00	-82° 09.12'	SQ4	0.71%	50
Orion	Ori	Orion	Orion	Ptolemy	Rigel	05:34.59	+05° 56.94'	NQ1	1.44%	26
Pavo	Pav	Peacock	Bayer	1603, Uranomet.	Peacock	19:36.71	-65° 46.89'	SQ4	0.92%	44
Phoenix	Phe	Phoenix	Bayer	1603, Uranomet.	Ankaa	00:55.91	-48° 34.84'	SQ1	1.14%	37
Pictor	Pic	Painter (Easel)	La Caille	1763, Lacaille	a Pictoris	05:42.46	-53° 28.45'	SQ1	0.60%	59
Piscis Austrinus	PsA	Southern Fish	Heav. Wat.	Ptolemy	Fomalhaut	00:28.97	+13° 41.23'	NQ1	2.16%	14
Puppis	Pup	Poop (of Argo)	Heav. Wat.	1763, Lacaille	Naos	07:15.48	-31° 10.64'	SQ2	1.63%	20
Pyxis	Pyx	Mariner Compass	Heav. Wat.	1763, Lacaille	a Pyxidis	08:57.16	-27° 21.10'	SQ2	0.54%	65
Reticulum	Ret	Net	La Caille	1763, Lacaille	a Reticuli	03:55.27	-59° 59.85'	SQ1	0.28%	82
Sculptor	Scl	Sculptor	La Caille	1763, Lacaille	a Sculptoris	16:57.04	+06° 07.32'	NQ3	1.54%	23
Sextans	Sex	Sextant	Hercules	1690, Hevelius	a Sextantis	19:05.94	-28° 28.61'	SQ4	2.10%	15
Telescopium	Tel	Telescope	La Caille	1763, Lacaille	a Telescopii	19:19.54	-51° 02.21'	SQ4	0.61%	57
Triang. Australe	TrA	South. Triangle	Hercules	1603, Uranomet.	Atria	02:11.07	+31° 28.56'	NQ1	0.32%	78
Tucana	Tuc	Toucan	Bayer	1603, Uranomet.	a Tucanae	23:46.64	-65° 49.80'	SQ4	0.71%	48
Vela	Vel	Sail (of Argo)	Heav. Wat.	1763, Lacaille	Regor	09:34.64	-47° 10.03'	SQ2	1.21%	32
Volans	Vol	Flying Fish	Bayer	1603, Uranomet.	β Volantis	07:47.73	-69° 48.07'	SQ2	0.34%	76

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Top Asteroids	Diam. (km)	Dimensions	M. Dst. (AU)	Discovery	Discoverer	Class	Mass (10 ¹⁸ kg)	%M _{Tot}	Mag. _{Max}
1 Ceres	946±2	965×962×891	2.766	1 Jan 1801	Piazzi, G.	G	939.3	31%	6.65
4 Vesta	525.4±0.2	572.6×557.2×446.4	2.362	29 Mar 1807	Olbers, H. W.	V	259.076	8.60%	5.20
2 Pallas	512±3	550±4×516±3×476±3	2.773	28 Mar 1802	Olbers, H. W.	B	201.0	6.70%	6.49
10 Hygiea	431±7	530×407×370	3.139	12 Apr 1849	de Gasparis, A.	C	86.7	2.90%	
704 Interamnia	326	350×304	3.062	2 Oct 2010	Cerulli, V.	F	58.1	1.90%	
52 Europa	315	380×330×250	3.095	4 Feb 1858	Goldschmidt, H.	C	38.8	1.30%	
511 Davida	289	357×294×231	3.168	30 May 2003	Dugan, R. S.	C	37.7	1.30%	
87 Sylvia	286	385×265×230	3.485	16 May 1866	Pogson, N. R.	X	33.0	1.10%	
65 Cybele	273	302×290×232	3.439	8 Mar 1861	Tempel, E. W.	C	31.8	1.10%	
15 Eunomia	268	357×255×212	2.643	29 Jul 1851	de Gasparis, A.	S	28.6	0.95%	7.9
3 Juno	258	320×267×200	2.672	1 Sep 1804	Harding, K. L.	S	22.7	0.76%	7.5
31 Euphrosyne	256		3.149	1 Sep 1854	Ferguson, J.	C	22.7	0.76%	
624 Hektor	241	370×195(×195)	5.235	10 Feb 2007	Kopff, A.	D	18.3	0.61%	
88 Thisbe	232	221×201×168	2.769	15 Jun 1866	Peters, C. H. F.	B	16.2	0.54%	
324 Bamberga	229		2.684	25 Feb 1892	Palisa, J.	C	16.0	0.53%	8.0
451 Patientia	225		3.059	4 Dec 1899	Charlois, A.		16.0	0.53%	
532 Herculina	222		2.772	20 Apr 2004	Wolf, M.	S	15.2	0.51%	
48 Doris	222	278×142	3.108	19 Sep 1857	Goldschmidt, H.	C	14.78	0.49%	
375 Ursula	216		3.126	18 Sep 1893	Charlois, A.		12.0	0.40%	
107 Camilla	215	285×205×170	3.476	17 Nov 1868	Pogson, N. R.	C			
45 Eugenia	213	305×220×145	2.72	27 Jun 1857	Goldschmidt, H.	F			
7 Iris	213	240×200×200	2.386	13 Aug 1847	Hind, J. R.	S			6.73
29 Amphitrite	212	233×212×193	2.554	1 Mar 1854	Marth, A.	S			
423 Diotima	209	171×138	3.065	7 Dec 1896	Charlois, A.	C			
19 Fortuna	208	225×205×195	2.442	22 Aug 1852	Hind, J. R.	G			
13 Egeria	206	217×196	2.576	2 Nov 1850	de Gasparis, A.	G			
24 Themis	198		3.136	5 Apr 1853	de Gasparis, A.	C			
94 Aurora	197	225×173	3.16	6 Sep 1867	Watson, J. C.	C			
702 Alauda	195		3.195	16 Jul 2010	Heilfrich, J.				
121 Hermione	190	268×186×183	3.457	12 May 1872	Watson, J. C.	C			
259 Aletheia	190		3.135	28 Jun 1886	Peters, C. H. F.	CP/X			
372 Palma	189		3.149	19 Aug 1893	Charlois, A.				
128 Nemesis	188		2.751	25 Nov 1872	Watson, J. C.	C			
6 Hebe	186	205×185×170	2.426	1 Jul 1847	Hencke, K. L.	S			7.5
16 Psyche	186	240×185×145	2.924	17 Mar 1852	de Gasparis, A.	M			
120 Lachesis	174		3.301	10 Apr 1872	Borrelly, A.	C			
41 Daphne	174	213×160	2.765	22 May 1856	Goldschmidt, H.	C			
9 Metis	174	222×182×130	2.385	25 Apr 1848	Graham, A.	S			8.1

Top (Exceptional) Asteroids. **Diam. (km)** - Asteroid Belt object diameter as calculated by geometric mean. **Dimensions** - X,Y,Z-approximate dimensions in kilometers (as available). **Mn. Dst. (AU)** - Mean distance from the Sun in Astronomical Units (1 AU = 149 million km = distance from the Sun to the Earth along the semi-major axis). **Discovery** - day, month, and year of discovery. **Discoverer** - Person associated with the discovery. **Class** - Asteroid spectral type. The most widely used taxonomy for over a decade has been that of David J. Tholen, first proposed in 1984. This classification was developed from broad band spectra (between 0.31 μm and 1.06 μm) obtained during the Eight-Color Asteroid Survey (ECAS) in the 1980s, in combination with albedo measurements. The original formulation was based on 978 asteroids. This scheme includes 14 types with the majority of asteroids falling into one of three broad categories, and several smaller types. They are, with their largest exemplars: **C-group** dark carbonaceous objects. **B-type** (2 Pallas), **F-type** (704 Interamnia), **G-type** (1 Ceres), **C-type** (10 Hygiea), the remaining majority of 'standard' **C-type** asteroids. **S-type** (15 Eunomia, 3 Juno) silicaceous (or "stony") objects. **X-group M-type** (16 Psyche) metallic objects, the third most populous group. **E-type** (44 Nysa, 55 Pandora) differ from M-type mostly by high albedo. **P-type** (259 Aletheia, 190 Ismene; CP: 324 Bamberga) differ from M-type mostly by low albedo. The small classes: **A-type** (246 Asporina), **D-type** (624 Hektor), **T-type** (96 Aegle), **Q-type** (1862 Apollo), **R-type** (349 Dembowska), **V-type** (4 Vesta). Objects were sometimes assigned a combined type such as e.g. CG when their properties were a combination of those typical for several types. **Mass (10¹⁸ kg)** - total mass (x 10¹⁸ kg). **%M_{Tot}** - Percent total mass of this objects to the total Asteroid Belt mass. **Mag._{Max}** - Apparent magnitude when brightest. All data and most of the text from en.wikipedia.org/wiki/List_of_exceptional_asteroids; wikipedia content as of 17 Oct 2016.

Stars	Name	Constellation	Bayer ID	V.Mag.	A.Mag.	Dist.(ly)	Spect.Class	Lum.(Sol)	Mass(Sol)	Diam.(Sol)	R.A.	Dec.
0	Sun	n/a	n/a	-26.74	4.83	1.5x10 ⁻⁵	G2V	1.0	1.0	1.0	19:04	+63° 54'
1	Sirius	Canis Major	Alp CMa	-1.44	1.45	8.6	A1V	25	2.0	1.7	06:45	-16° 42'
2	Canopus	Carina	Alp Car	-0.62	-5.53	310	F0lb	13,600	8.5	65.0	06:24	-52° 42'
3	Rigel Kent.	Centaurus	Alp Cen	-0.28c	4.34	4.4	G2V+K1V	1.5	1.1	1.2	14:40	-60° 48'
4	Arcturus	Bootes	Alp Boo	-0.05v	-0.31	36.7	K2III	170	1.1	26.0	14:16	+19° 12'
5	Vega	Lyra	Alp Lyr	0.03v	0.58	25.3	A0V	37	2.1	2.3	18:37	+38° 48'
6	Capella	Auriga	Alp Aur	0.08v	-0.48	42.2	G5III+G0II	79	2.7	12.0	05:17	+46° 00'
7	Rigel	Orion	Bet Ori	0.18v	-6.69	770	B8Ia	66,000	17.0	78.0	05:15	-8° 12'
8	Procyon	Canis Minor	Alp CMi	0.4	2.68	11.4	F5IV-V	7.7	1.5	2.0	07:39	+5° 12'
9	Betelgeuse	Orion	Alp Ori	0.45v	-5.14	430	M2Ib	105,000	18.0	936.0	05:55	+7° 24'
10	Achernar	Eridanus	Alp Eri	0.45v	-2.77	144	B3V	3,300	XXX	10.0	01:38	-57° 12'
11	Hadar	Centaurus	Bet Cen	0.61v	-5.42	525	B1III	16,000	10.7	8.0	14:04	-60° 24'
12	Altair	Aquila	Alp Aql	0.76v	2.20	16.8	A7V	10.6	1.8	1.8	19:51	+8° 54'
13	Crux	Crux	Alp Cru	0.77c	-4.19	320	B0.5IV+B1V	25,000	14	?	12:27	-63° 06'
14	Aldebaran	Taurus	Alp Tau	0.87	-0.63	65.1	K5III	425	1.7	44.2	04:36	+16° 30'
15	Spica	Virgo	Alp Vir	0.98v	-3.55	260	B1V+B2V	13,400	11.0	7.8	13:25	-11° 12'
16	Antares	Scorpius	Alp Sco	1.06v	-5.28	605	M1Ib+B4V	65,000	15.5	800.0	16:29	-26° 24'
17	Pollux	Gemini	Bet Gem	1.16	1.09	33.7	K0III	32	1.9	8.0	07:45	+28° 00'
18	Fomalhaut	Piscis Austrinus	Alp Psa	1.17	1.74	25.1	A3V	17.7	2.1	1.8	22:58	-29° 30'
19	Deneb	Cygnus	Alp Cyg	1.25v	-8.73	3200	A2Ia	54,000	20.0	110.0	20:41	+45° 18'
20	Mimosa	Crux	Bet Cru	1.25v	-3.92	350	B0.5III	34,000	14.0	8.0	12:48	-59° 42'
21	Regulus	Leo	Alp Leo	1.36	-0.52	77.5	B7V	150	3.5	3.2	10:08	+12° 00'
22	Adhara	Canis Major	Eps CMa	1.5	-4.10	430	B2II	20,000	10.0	?	06:59	-29° 00'
23	Castor	Gemini	Alp Gem	1.58c	0.59	51.5	A1V+A2V	30/14	2.2/1.7	2.3/1.6	07:35	+31° 54'
24	Gacrux	Crux	Gam Cru	1.59v	-0.56	87.9	M3.5III	1,500	3.0	113.0	12:31	-57° 06'
25	Shaula	Scorpius	Lam Sco	1.62v	-5.05	700	B2IV	?	10.4	6.2	17:34	-37° 06'
26	Bellatrix	Orion	Gam Ori	1.64	-2.72	240	B2III	21,500	8.0	5.7	05:25	+6° 18'
27	Elnath	Taurus	Bet Tau	1.65	-1.37	131	B7III	70	4.5	5.5	05:26	+28° 36'
28	Miaplacidus	Carina	Bet Car	1.67	-0.99	111	A2III	210	3.0	5.7	09:13	-69° 42'
29	Alnilam	Orion	Eps Ori	1.69v	-6.38	1300	B0Ia	375,000	40.0	26.0	05:36	-1° 12'
30	Alnair	Grus	Alp Gru	1.73	-0.73	101	B7IV	380	4.0	3.6	22:08	-47° 00'
31	Alnitak	Orion	Zet Ori	1.74c	-5.26	820	O9.5Ib+B0I	100,000	28.0	20.0	05:41	-1° 54'
32	Regor	Vela	Gam Vel	1.75v	-5.31	840	WC8+O9Ib	100,000	30.0	13.0	08:10	-47° 18'
33	Alioth	Ursa Major	Eps UMa	1.76v	-0.21	80.9	A0IV	108	3.0	3.7	12:54	+56° 00'
34	Kaus Aust.	Sagittarius	Eps Sgr	1.79	-1.44	145	B9.5III	375	5.0	7.0	18:24	-34° 24'
35	Mirfak	Perseus	Alp Per	1.79	-4.50	590	F5Ib	5,400	11.0	56.0	03:24	+49° 54'
36	Dubhe	Ursa Major	Alp UMa	1.81	-1.08	124	K0III+F0V	300	4.0	30.0	11:04	+61° 48'
37	Wezen	Canis Major	Del CMa	1.83	-6.87	1800	F8Ia	50,000	17.0	200.0	07:08	-26° 24'
38	Alkaid	Ursa Major	Eta UMa	1.85	-0.60	101	B3V	700	6.0	1.8	13:48	+49° 18'
39	Sargas	Scorpius	The Sco	1.86c	-2.75	270	F1II	960	3.7	20.0	17:37	-43° 00'
40	Avior	Carina	Eps Car	1.86v	-4.58	630	K3II+B2V	6/11 K	4.6/16	153.0/6.0	08:23	-59° 30'
41	Menkalinan	Auriga	Bet Aur	1.90v	-0.10	82.1	A2IV	48	2.4	2.8	06:00	+44° 54'
42	Atria	Triang.Australe	Alp Tra	1.91	-3.62	415	K2Ib-II	5,500	7.0	?	16:49	-69° 00'
43	Koo She	Vela	Del Vel	1.93	-0.01	79.7	A0V	?	?	?	08:45	-54° 42'
44	Alhena	Gemini	Gam_Gem	1.93	-0.60	105	A0IV	160	2.8	4.4	06:38	+16° 24'
45	Peacock	Pavo	Alp Pav	1.94	-1.81	180	B0.5V+B2V	2,100	5.0	4.4	20:26	-56° 42'
46	Polaris	Ursa Minor	Alp UMi	1.97v	-3.64	430	F7Ib-II	2,200	7.5	30.0	02:32	+89° 18'
47	Mirzam	Canis Major	Bet CMa	1.98v	-3.95	500	B1III	19,000	?	?	06:23	-18° 00'
48	Alphard	Hydra	Alp Hya	1.99	-1.69	180	K3II	?	3.0	50.5	09:28	-8° 42'
49	Algiedba	Leo	Gam Leo	2.01	-0.92	126	K0III+G7II	320/50	1.23	32.0	10:20	+19° 48'
50	Hamal	Aries	Alp Ari	2.01	0.48	65.9	K2III	90	2.0	15.0	02:07	+23° 30'

Class	Effect. Temp.	Vega-Rel Color Label	Chromaticity	Main-Seq. Mass	Main-Seq. Radius	Main-Seq. Luminosity	H Lines	FAMSS
O	≥ 30k K	blue	blue	≥ 16 M \odot	≥ 6.6 R \odot	≥ 30,000 L \odot	Weak	~0.00003%
B	10k–30k K	blue white	deep blue white	2.1–16 M \odot	1.8–6.6 R \odot	25–30,000 L \odot	Medium	0.13%
A	7.5k–10k K	white	blue white	1.4–2.1 M \odot	1.4–1.8 R \odot	5–25 L \odot	Strong	0.60%
F	6k–7.5k K	yellow white	white	1.04–1.4 M \odot	1.15–1.4 R \odot	1.5–5 L \odot	Medium	3%
G	5.2k–6k K	yellow	yellowish white	0.8–1.04 M \odot	0.96–1.15 R \odot	0.6–1.5 L \odot	Weak	7.60%
K	3.7k–5.2k K	orange	pale yellow orange	0.45–0.8 M \odot	0.7–0.96 R \odot	0.08–0.6 L \odot	Very weak	12.10%
M	2,400–3,700 K	red	light orange red	0.08–0.45 M \odot	≤ 0.7 R \odot	≤ 0.08 L \odot	Very weak	76.45%

50 Brightest Stars (And Sun): Name - Star name. **Constellation** - Associated constellation. **Bayer ID** - Non-name designation with its associated constellation. **V.Mag.** - Apparent visible magnitude from Earth (v = variable, c = combined for the multi-star system). **A.Mag.** - Absolute magnitude, the hypothetical apparent magnitude of an object at a standard distance of exactly 10 parsecs (32.6 light years) from the observer, assuming no astronomical extinction of starlight. **Dist.(ly)** - Distance (in light years). **Spect.Class** - Spectral Class. See [Class Table](#). **Lum.(Sol)** - Luminosity relative to the Sun. **Mass(Sol)** - Mass relative to the Sun (Solar mass = 1.988550×10³⁰ kg). **Diam.(Sol)** - Diameter relative to the Sun (Solar diameter = 1,391,400 km). **R.A.** - Right ascension in hours and minutes. **Dec.** - Declination in degrees and minutes. A number of different **luminosity classes** are distinguished; **0** or **Ia*** (hypergiants or extremely luminous supergiants). Example: Cygnus OB2#12 (B3-4Ia+); **Ia** (luminous supergiants). Example: Eta Canis Majoris (B5Ia); **Iab** (intermediate luminous supergiants). Example: Gamma Cygni (F8Iab); **Ib** (less luminous supergiants). Example: Zeta Persei (B1Ib); **II** bright giants. Example: Beta Leporis (G0II); **III** normal giants. Example: Arcturus (K0III); **IV** subgiants. Example: Gamma Cassiopeiae (B0.5IVpe); **V** main-sequence stars (dwarfs). Example: Achernar (B6Vep); **sd** (prefix) subdwarfs. Example: HD 149382 (sdB5); **D** (prefix) white dwarfs. Example: van Maanen 2 (DZ8); **The apparent magnitude (m)** of a celestial object is a number that is a measure of its brightness as seen by an observer on Earth. The brighter an object appears, the lower its magnitude value (i.e. inverse relation). The Sun, at apparent magnitude of -27, is the brightest object in the sky. It is adjusted to the value it would have in the absence of the atmosphere. Furthermore, the magnitude scale is logarithmic; a difference of one in magnitude corresponds to a change in brightness by a factor of 5th root of 100, or about 2.512. **Class Table: FAMSS** - fraction of all main sequence stars. \odot = Sun ("with respect to"). Data from astropixels.com/stars/brightstars.html (with thanks to Fred Espenak for reprinting permissions), en.wikipedia.org/wiki/List_of_brightest_stars, en.wikipedia.org/wiki/Stellar_classification, and en.wikipedia.org/wiki/Apparent_magnitude; wikipedia content as of 17 Oct 2016.