

Sky and telescope

Summary

Short Description: This document explains how to utilize Sky and Telescope Astronomical tools.

Language: English

Suitable for age: 10-18 years

Key words: Simulations, Visualization, Predictions

Format: .doc

Link: https://skyandtelescope.org/observing/interactive-sky-watching-tools/



1. Sky and Telescope astronomical tools provide a wide range of interactive simulations that can be used to study phenomena and to predict the position of objects in order to plan your observations.

https://skyandtelescope.org/observing/interactive-sky-watching-tools/

2. These simulations are listed here:

Interactive Sky Chart

Powered by <u>Heavens Above</u>, the interactive sky chart shows the night sky as seen by eye. The map includes the Moon, stars brighter than magnitude 5, the five bright planets (Mercury, Venus, Mars, Jupiter, and Saturn), and deep-sky objects that can be seen without the use of optical aid. Enter the tool directly from <u>here</u>.



<u>Astronomical Almanac</u>

The Astronomical Almanac presents basic astronomical data customized for your location for any date from AD 1600 to 2400. The interactive tool displays sunrise and sunset times, morning and evening twilight times, moonrise and moonset times, the Moon's phase, a list of naked-eye planets visible in the evening and morning skies, rise and set times for each of these planets, and more. Enter directly the tool from <u>here</u>.



Get basic a choice of f use our cit latitude/log	Celes Alma astronomy info location and da ty/country drop ngitude calcula	stial prmation for your ate/time. You can odown menus or our ator.	Antigua Date: 11/25/2022 mm /dd/yyyy Daylight- Reset C	Country: Tim 09:19 UT Saving Time alculate	City:		Latitude 42° ∨ 23° × Longitud 71° ∨ 08° × Time Zor UT -5 Calcula	:: ∕ N ∨ de: ✓ W ∨ ne: ✓
-1 Wee	k	-1 Day	-1 Hour]	+1 Hour	+1 Day		1 Week
ALMA INFORM COMPUT	NAC IATION ED FOR:	Julian Date: Location:	2459908.8 42° 23' N Save locali	88 071° 08' W 072 Load lee	Loca Time ation?	l Date/Time: Zone:	Fri. 11/25/2022 04 -5 Hours from	4:19 am n UT
Moon's Age	01.4 days	Sun rise 06:47 am / 0 Jupiter, Satu Venus is 2° fr Mars. The sky is da Wed Nov 23	es / sets: 4:15 pm Evening planets rn om Mercury and rk. The Moon is I . 2022 New Mo	08: Antares is 4° fr below the horiz on (22:57 UT)	Moon rises / sets 55 am / 05:34 pm Morr Mars rom Mercury and Ar on. Wed Nov 30 20	ning planets: htares is 5° from \ 122 Moon at first	Twilight begins 05:09 am / 05:55 /enus and Elnath is quarter (14:39 UT)	/ ends: pm ; 4° from
	R.A.	Dec.	Magnitude	Size	Phase	Rise	Transit	Set
Sun	16h 04m	-20.8°	-26.7	32.4'		06:47 am	11:32 am	04:15 pm
Moon	17h 29m	-26.9°	-6.3	32.6'	3%	08:55 am	01:18 pm	05:34 pm
Mercury	16h 43m	-23.9°	-0.7	04.8"	97%	07:43 am	12:11 pm	04:39 pm
Venus	16h 40m	-22.3°	-3.9	10.0"	99%	07:32 am	12:07 pm	04:43 pm
Mars	05h 20m	+24.8°	-1.7	17.1"	99%	05:04 pm	12:47 am	08:31 am
Jupiter	23h 58m	-01.8°	-2.6	44.3"	100%	01:29 pm	07:26 pm	01:22 am
Saturn	21h 30m	-16.2°	+0.8	16.6"	100%	11:55 am	04:57 pm	09:59 pm
Key to the tab of date. Next a	le: The coordin are listed the a	nates of right ascens pparent visual magr	ion (R.A.) and on the second sec	declination (De size in arcsect	ec.) give the object onds (arcminutes the objection of the objection risk	t's position on th or the Sun and I	ne celestial sphere Moon); percentage	for the equinox e of the disk

setting.

• Find the Phase of the Moon

The tool shows the phase of the Moon for a chosen date. It will open with the current phase of the Moon, including a text description at the bottom. To obtain the Moon's phase on any other date, select the month and day from the dropdown menus and type the year. Select AD or BC, then click Calculate. Enter directly the tool from <u>here</u>.

SKY	& TELESCOPE on's Phase on Any Date
Month:	November V Day: 25 V
Үеаг:	2022 • AD • BC Calculate
Phase:	2 days past new Moon



• Find Jupiter's Moons

If you turn a telescope to Jupiter you'll easily pick out its "stars", the dots of light from the four big Galilean moons that orbit the planet. Which one is which? This interactive tool shows the positions of Io, Europa, Ganymede, and Callisto for any date and time between January 1900 and December 2100. The tool is also customizable, so that you can change the view according to the type of telescope you're using. You'll also find extra information on whether and when a moon might hide behind Jupiter or cast its shadow on the planet's cloudtops. Enter the tool directly from here.

SKY Jupiter's Moons	This illustration shows the positions of Jupiter's four Galilean satellites — Io, Europa, Ganymede,and Callisto — in orbit about the planet for any date and time from January 1, 1900, to December 31 2100.
ç Direct view	Jupiter I E G
Please choose Direct View	Inverted View wtonian/Dobson)
Date: 11/25/2022 Time: 09:29	UT Time Zone offset from UT in hours 2
Reset to current date Calculate using entered & time date and time	-1 Day -1 Hour -10 Min +10 Min +1 Hour +1 Day
Basic data abou	t Jupiter for telescopic observers:
Magnitude: -2.6 Angular Size(arcsec): 44.3	Distance (a.u.): 4.44 System II longitude(°): 208
Table of J	ovian Satellite Phenomena:
Friday, November 25, 20	22
00:48 UT, Io's shadow be 01:48 UT, Io's shadow be 03:04 UT, Io's shadow le 20:46 UT, Io enters occul 22:36 UT, Europa enters	egins to cross Jupiter. of Jupiter. aves Jupiter's disk. tation behind Jupiter.

<u>Transit times of Jupiter's Great Red Spot</u>

This tool is a calculator that you can use to predict the local and Universal Times and dates that the center of the Great Red Spot should cross Jupiter's central meridian, the imaginary line down the center of the planet's disk from pole to pole. Click "Initialize to today" to view the dates and times of the next three transits of the GRS. Or you can enter any date this year to find other transit times. The listed times should be accurate to within a few minutes.



(mm/dd/yyyy)	
Calculate	Initialize to today
iversal Times of Red Spot transits ntered on date:	Corresponding local dates & times of Red Spot transits:

• Find Saturn's Moons

For any date and time between 1900 and 2100, this tool shows the positions of Titan and four other bright moons: 10th-magnitude Rhea, Tethys, and Dione, and 12th-magnitude Enceladus. Moreover, the tool can match the view through your telescope's optical system whether it shows the sky with north up or south up, and either correct-imaged or mirror-reversed. Enter the tool directly from <u>here</u>.

Saturn's Moons This diagram shows the positions of Saturn's brightest moons in their orbits about the planet for any entered date and time between January 1, 1900 to December 21, 2100	Key to Saturnian satellites: E = Enceladus T = Tethys D = Dione R = Rhea Ti = Titan
Date: 11/25/2022 Time: 09:41	J Ř
Reset to current Calculate using entered date & time	÷
-1 Day -1 hour +1 Hour +1 Day	
Time-zone offset from UT in hours	
(from your web browser) 2	
Telescope type: Direct View	
E (Erect-image system)	d View //Dobson) (SCT/Mak/refractor+diagonal)

• The Elusive Moons of Uranus

Four of Uranus's 27 known satellites can be seen in moderate to large amateur telescopes. Both Titania and Oberon have been glimpsed with apertures as small as 20 centimeters (8 inches). Umbriel and Ariel, however, because they lie much closer to the planet's glare, are difficult to distinguish with even twice that aperture. For any date and time between 2008 and the current year, this interactive tool shows the positions of Ariel, Umbriel, Titania, Oberon, and — for those seeking a special challenge — Miranda. Moreover, the utility can match the view in your telescope's optical system, whether it shows a correct or mirror-reversed image. Enter the tool directly from <u>here</u>.



This diagram shows the positions of Uranus's five brightest moons — Miranda, Ariel, Umbriel, Titania, and Oberon — in their orbits about the planet.	
Date: 11/25/2022 Time: 09:49 U	Ú ÷
Reset to current date and time Calculate using entered date & time	Мд́
-1 Day -1 hour +1 Hour +1 Day	
(from your web browser) 2	
Telescope type: Inverted View	ò
Direct View (Erect-image system)	sson)

<u>Track Triton, Neptune's largest Moon</u>

Neptune, at magnitude 8, is beyond the reach of the naked eye and even some binoculars. Locating the most distant planet can be a bit daunting on its own. But if you are up for a serious challenge, you can go further and try spotting its largest moon, Triton. Triton is tricky. It shines at only ~13.5 magnitude, nearly as dim as Pluto. With this interactive tool you can try to spot it. Enter the simulation directly from <u>here</u>.

Triton Tracker This diagram shows the position of Triton, Neptune's largest moon, in its orbit about the planet.	
Date: 11/25/2022 Time: 09:54 U (mm/dd/yyyy)	
Reset to current Calculate using date and time entered date & time	•
-1 Day -1 hour +1 Hour +1 Day	
Time-zone offset from UT in hours	÷
(from your web browser) 2	
Telescope type: Inverted View	
■ Direct View (Erect-image system)	Mirrored reversed View (SCT/Mak/refractor+diagonal)

• <u>Telescope calculator: How does your telescope preform?</u>

With this tool you can find out how different eyepieces and accessories change your telescope's performance. To use this calculator properly, you'll need to know a few basic details about your telescope and eyepieces. Most of these numbers can be found on your eyepiece barrel, on your telescope's tube or mount, or in the equipment's instruction manual. Failing that, you can always visit the website of your telescope or eyepiece manufacturer.



Telescope aperture =	0	mm
Telescope focal ratio=	0	
Eyepiece focal length =	0	mm
Eyepiece apparent field =	66 degrees	~
Barlow lens =	None	~
Focal Reducer =	None	~
	Calculate	
Here is an analysis of your telescope's	performance using the parameter	ers selected above:
Focal Length: omm		
Magnification: NaNx		
True Field of View: NaN° Exit Pu	pil: NaN mm	
Theoretical Resolving Power: Infi	nity arcseconds	
Approximate Limiting Magnitude	of Telescope: +NaN (under day	rk, moonless skies)
		,

• Mars profiler: Which side is visible?

If you want to compare what you see on Mars when you look through a telescope with a map, you need to know which side of the planet you're seeing. This tool can show you that and more for any date and time. Best of all, it shows a map of Mars so that you can identify any bright and dark markings you see. Enter the tool directly from <u>here</u>.

Mars Pro This map depicts the Martian hemisph farth for the entered date, time, and the The red circle indicates the region of the directly toward us. Date: 11/25/2022 Time: 09.2 Date: 11/25/2022 Time: 09.2 (mm/dd/ywyy) Reset to current date & time Calculate entered date 1 Day 1 Hour 1 Hour Time-zone offset from UT in hours from your Web browser): 100.2	Actis actis bioscope type. Mars pointed 59 UT using and time 1 +1 Day 2	20° 40° 60° 80° 100° 120° 140° I A U S T R A L E ARGYRE Phaethontis More Erythraeum Solis s nitiler Solis CHRVSE MEMNON CHRVSE AMAZO Niliacus THARSIS AMAZO Lacus AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO AMAZO
Telescope type: Inverted view		
N Direct view E→ (Erect-image system)	N (Newtonian / Dobso	v N Mirror reversed LE (SCT/Mak/refractor+diagonal)
Basic D	ata about Mars for tele	lescopic observers:
Apparent visual ma	ignitude: -1.7	Angular diameter (arcsec): 17.1
Distance from Ear	th (a.u.): 0.55	Elongation from the Sun (°): 162
Illumina	tion (%): 0.0	Central-meridian longitude (°): 67
	lion (%). 99	Contrar monaian longitudo ().

• Satellite tracking tool: Track the ISS and Hubble

The brightest (and biggest) artificial satellite in the sky is the International Space Station (ISS). It's brighter than Jupiter and even rivals brilliant Venus as it creeps across the sky after dusk or before dawn. The Hubble Space Telescope, though more difficult to see, has taken some of the most iconic images we have of the cosmos. With this tool you can predict when and where to see the International Space Station and the Hubble Space Telescope. Enter the tool directly from here.



Satellite Tracker This program shows you where and when to see the International Space Station and Hubble Space Telescope. The current position of the selected spacecraft or satellite is shown, plus its track over the next hour at 5 minute intervals. The gray ellipse shows where the satellite is presently above the horizon.	
Satellite: ISS V Country: Select	City: V DST: V
Latitude & longitude: NaN° NaN' S NaN° NaN' E	New custom location? Save location? Load old?
Click here to display visibili	ty predictions for this location
The table shows visible nighttime passes of the selected sp any. (Select daylight-saving time [DST] only when applic visible and is listed for your time zone. Duration indicate how high the satellite will get above your horizon (90° is o direction indicated by Approach . You should see a slowly indicate where the spaceraft will be when it vanishes fro well up in the sky when the satellite emerges into sunlight o	acccraft over your chosen location during the next 5 days, able.) Local Time is the instant the satellite first become s the length of each sighting in minutes. Max. elevation verhead). To see the spacecraft, at a given Time look in th moving "star" (weather permitting). The Departure entrie m sight. Sometimes an appearance or disappearance occur r slips into Earth's shadow, respectively.

Satellite transit tool: Spot ISS transits of the Sun and Moon

Astronomers and photographers that manage to catch the instant that the International Space Station passes in front of the Sun or the Moon plan their observation very carefully. This tool can help you capture moments like these. You can calculate when the International Space Station or Hubble Space Telescope will be visible from your location, and find out what path the satellite will take across the sky. The tool will alert you if the ISS or Hubble is due to come within 10° of any naked-eye planet, the Moon, or the Sun. Enter the tool directly from here.



• The Minima of Algol

The star Algol (Beta Persei) was the first eclipsing variable star ever discovered and it's still one of the most famous. You can check on it whenever you step outdoors on nights when Perseus is



in view. Algol fades and rebrightens like clockwork every 2.87 days. You can use this tool to predict when Algol will be at mideclipse. Click "Initialize to today" to view the dates and times of Algol's minima for the next three weeks. Or you can enter any current date to see the dates and times of eight consecutive minima. The times given should be accurate to within a few minutes.

Calculate	Initialize to today
mputed dates	Corresponding local
<i>m/dd/yyyy</i>) and	dates (mm/dd/yyyy)
iiversal Times	and times of
Algol minima:	Algol minima:

