



MORRISON PLANETARIUM

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2024

POCKET ALMANAC

## **ALEXANDER F. MORRISON PLANETARIUM**

Since 1952, the Academy's Morrison Planetarium has served the community as a valuable resource for astronomy education and skywatching information. It was the first major planetarium in the U.S. to build its own optomechanical star projector, which was considered at the time to be the world's finest simulator of the night sky. Now updated with state-of-the-art digital technology, the planetarium immerses audiences in fulldome imagery based on actual scientific data, from the smallest living cells to the surfaces of distant planets and immense clusters of galaxies.

## **CALIFORNIA ACADEMY OF SCIENCES**

Home to Morrison Planetarium, Steinhart Aquarium, Kimball Natural History Museum, Osher Rainforest, and world-class research and education programs, the California Academy of Sciences is the world's greenest museum and one of San Francisco's "must-see" destinations. Explore the depths of a Philippine coral reef, view a rainforest canopy amid swarms of butterflies, and blast off to the outer reaches of the Universe, all under one living roof. Daily interactions with animals, educators, and biologists within immersive, hands-on exhibits offer discovery and wonder for visitors of all ages.

## SEASONS AND THE SUN

The terms below apply to the Northern Hemisphere. South of the equator, the seasons are reversed.



**SPRING  
EQUINOX**

**MAR 19**

8:06 PM PT



**SUMMER  
SOLSTICE**

**JUN 20**

1:51 PM PT



**AUTUMN  
EQUINOX**

**SEP 22**

5:44 AM PT



**WINTER  
SOLSTICE**

**DEC 21**

1:20 AM PT

### PERIHELION

(Earth closest to the Sun):

JAN 2—0.98330 AU

### APHELION

(Earth farthest from the Sun):

JUL 4—1.01673 AU

**AU** = Astronomical Unit, the average distance from Earth to the Sun (150,000,000 km or 93,000,000 mi)

### DAYLIGHT SAVING TIME

(clocks set one hour ahead of Standard Time): MAR 10–NOV 3

*Times and dates in this Pocket Almanac are given in Pacific Time. Calendars using anything other than Pacific Time may list certain events as occurring on the following day, because the conversion to other time zones occasionally crosses midnight, thus advancing the date.*

## PLANET-WATCHING

Five planets can be seen in the sky with the unaided eye. They are generally brighter than most stars and typically don't twinkle. Over time, they can be seen to change their positions against the constellations, which is why the ancients referred to them as "wandering stars."

PLANET	MORNING SKY	EVENING SKY	CONJUNCTION	OPPOSITION
Mercury	JAN 1-FEB 28 APR 11-JUNE 14 AUG 18-SEP 30 DEC 5-DEC 31	FEB 28-APR 11 JUN 14-AUG 18 SEP 30-DEC 5	FEB 28 ( <i>sup</i> ) APR 11 ( <i>inf</i> ) JUN 14 ( <i>sup</i> ) AUG 18 ( <i>inf</i> ) SEP 30 ( <i>sup</i> ) DEC 5 ( <i>inf</i> )	
Venus	JAN 1-JUN 4	JUN 4-DEC 31	JUN 4 ( <i>sup</i> )	
Mars	JAN 1-DEC 31			
Jupiter	MAY 18-DEC 7	JAN 1-MAY 18 DEC 7-DEC 31	MAY 18	DEC 7
Saturn	FEB 28-SEP 7	JAN 1-FEB 28 SEP 7-DEC 31	FEB 28	SEP 7

Visibility ranges above may vary slightly with latitude and are based on conjunction dates. A planet may become lost in the Sun's glare the closer it is to conjunction.

**CONJUNCTIONS**—A conjunction occurs when a planet is in line with the Sun as observed from Earth and is crossing from the morning to the evening sky (or vice-versa). In the case of Mercury and Venus, *inferior (inf)* conjunction is when the planet is on the same side of the Sun as Earth and located between them, while *superior (sup)* conjunction is when the planet and Earth are on opposite sides of the Sun (planets farther from the Sun than Earth never come between the two and so are never seen at inferior conjunction).

**OPPOSITIONS**—Opposition is the best time to observe an outer planet, when it's *opposite* the Sun in the sky. This means it rises at sunset and is visible all night, appearing largest and brightest in our sky. Being inside Earth's orbit, Mercury and Venus are never seen at opposition.

## APPULSES

Occasionally, two planets appear very close together in the sky—this is called an appulse. On the following dates, the planets listed will be less than  $1^\circ$  apart (easily within the same field of view in binoculars).

**FEBRUARY 22**—Venus & Mars  $1/2^\circ$  apart, morning sky

**APRIL 10**—Mars & Saturn  $1/2^\circ$  apart, morning sky

**APRIL 20**—Jupiter & Uranus  $1/2^\circ$  apart, evening sky  
(Uranus not visible without binoculars)

**AUGUST 14**—Mars & Jupiter  $1/3^\circ$  apart, morning sky

## ECLIPSES

This year, the Sun, Earth, and the Moon line up four times, producing two lunar eclipses and two solar eclipses.

**MARCH 24–25**—The year's first alignment of the Sun, Earth, and Moon sees only the pale, outer shadow of our planet (or **penumbra**) cast onto the Moon. **Penumbral lunar eclipses** are very subtle and may not be noticed by many people unless they know what to look for. As seen from San Francisco, the **penumbra** begins creeping across the Moon's face at 9:53 PM. Pacific Time on the night of the 24th, with maximum eclipse just after midnight, at 12:12 AM on the 25th. The eclipse ends at 2:32 AM.

**APRIL 8**—The second eclipse of the year is a total solar eclipse that many skywatchers have been waiting for and have made travel plans to see. The new Moon moves between Earth and the Sun, casting its shadow onto a narrow path that begins in the Pacific Ocean, then crosses from Central Mexico and Texas up to the northeastern border between the United States

and Canada, New Brunswick, and the center of the French territory of St. Pierre and Miquelon. Observers along this path will see a **total solar eclipse** during which the entire disk of the Sun is blocked from view by the Moon's silhouette. This will darken the sky enough for bright planets to be seen and cause the Sun's faint outer atmosphere (or **corona**) to become visible. Totality can be seen from the path of the Moon's shadow, and from locations off the path, only a partial solar eclipse will be seen, the degree of partiality observed depending on the observer's distance from the path. **NEVER OBSERVE THE SUN WITHOUT USING PROPER EYE PROTECTION!**

**SEPTEMBER 17**—The third eclipse of 2023 is the year's second **partial eclipse of the Moon**—a little deeper than the one in March, but not by much. Here the full Moon grazes the southern edge of Earth's dark, inner shadow (the **umbra**), which barely takes a nibble off the top of the Moon's disk at maximum (7:44 PM Pacific Time for observers in San Francisco), intruding less than 10% of the way across the Moon's diameter.

**OCTOBER 2**—The year's fourth and final eclipse is an **annular solar eclipse** favoring ships at sea. It is visible from a narrow strip over the southeast Pacific Ocean and Rapa Nui (Easter Island), then cutting across southern Chile and Argentina into the southwest Atlantic. North of the shadow path, the southern half of South America—up to parts of Peru, Bolivia, and Brazil—and south of it to the tip of Cape Horn and across the Drake Passage to the Antarctic Peninsula will experience a **partial solar eclipse**.

## MAJOR METEOR SHOWERS

On any given night, about two to four sporadic meteors can be seen per hour and slightly more frequently toward dawn, as tiny particles of space dust burn up in Earth's atmosphere. When Earth passes through the dust trail left behind by a passing comet, more of these particles rain through the atmosphere, causing a meteor shower. Showers are named after the constellation from which meteors appear to radiate. Visibility can be affected by weather and by the Moon's brightness.

SHOWER	ACTIVE PERIOD	PEAK DATE*	RATE*	MOON PHASE
Quadrantids	JAN 1-5	JAN 3-4	40	Last quarter
Lyrids	APR 16-25	APR 22-23	20	Full
Eta Aquarids	APR 19-MAY 28	MAY 6-7	10-15	New (!)
Delta Aquarids	JUL 12-AUG 23	JUL 28-29	20	Last Quarter
Perseids	JUL 17-AUG 24	AUG 12-13	60	First Quarter (!)
Orionids	OCT 2-NOV 7	OCT 21-22	20	Waning gibbous
Leonids	NOV 6-30	NOV 17-18	15	Waning gibbous
Geminids	DEC 6-19	DEC 13-14	50-80	Waxing gibbous
Ursids	DEC 17-25	DEC 21-22	5-10	Last quarter

\*The peak date of a meteor shower is when the maximum rate of meteors is expected to be observed, but it is not the only date to watch for them. Moonlight-permitting, better-than-usual rates may also be seen during the midnight-to-dawn hours a day or two before and after the peak date. Exclamation marks (!) indicate favorable prospects. Rates given are for ideal conditions (clear sky, no Moon, observing site away from bright lights, dark-adapted vision).

## PHASES OF THE MOON

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
 New Moon	11	9	10	8	7	6	5	4	2	2	1 30	30
 First Quarter	17	16	16	15	15	13	13	12	10	10	8	8
 Full Moon	25	24	25	23	23	21	21	19	17	17	15	15
 Last Quarter	3	2	3	1	1 30	28	27	26	24	24	22	22

**DIGITAL POCKET ALMANAC** is downloadable at:  
[www.calacademy.org](http://www.calacademy.org).

**QUARTERLY SKYGUIDE**, visit:  
[www.calacademy.org/exhibits/morrison-planetarium](http://www.calacademy.org/exhibits/morrison-planetarium)

**MORRISON PLANETARIUM DAILY SKYWATCHING INFORMATION** is provided in many news publications nationwide.

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