



MORRISON PLANETARIUM

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2018

POCKET ALMANAC

SEASONS AND THE SUN

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



SPRING
EQUINOX

MAR 20
9:15 AM PDT



SUMMER
SOLSTICE

JUN 21
3:07 AM PDT



AUTUMN
EQUINOX

SEP 22
6:54 PM PDT



WINTER
SOLSTICE

DEC 21
2:22 PM PST

PERIHELION (Earth closest to the Sun):

JAN 2-0.983 AU (147,098,091 KM, OR 91,402,516 MI)

APHELION (Earth farthest from the Sun):

JUL 6-1.017 AU (152,096,155 KM, OR 94,508,169 MI)

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 1 hour ahead of Standard Time):

MAR 11-NOV 4

*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.*

ECLIPSES

A year can have between four and seven eclipses, in combinations of lunar, solar, partial, total, or annular. This year's alignments of the Sun, Moon, and Earth cause three partial solar eclipses, during which the Sun's disk is never completely blocked from view and the solar corona never becomes visible. They also produce a pair of total lunar eclipses, only one of which is visible from the U.S.

JANUARY 31—The year's first eclipse is a total eclipse of the Moon, with the full Moon passing through Earth's reddish shadow and turning a deep, rusty hue. At that time, the Moon will be centered over the western Pacific Ocean, so the event will be visible along the Pacific Rim. Totality begins at 7:51:47 AM EST/ 4:51:47 AM PST. Observers farther east will see less of the eclipse before Moonset. San Franciscans will see all of totality.

FEBRUARY 15—The Moon moves between Earth and the Sun but casts its shadow south of Earth and produces a barely-perceptible partial eclipse for observers in Uruguay and part of southern Brazil. Farther south, from Chile and Argentina, the Moon will intrude across as much as a third of the Sun's disk. From parts of Antarctica ringing the Weddell Sea, eclipse-watchers will see the Moon's silhouette cross a little more than halfway across the Sun's diameter.

JULY 12-13—The year's second partial solar eclipse, like the one in February, grazes the south pole, this time causing even less of a partial eclipse. Maximum eclipse is seen from the coast of Terre Adelie and Wilkes Land in Antarctica, where the Moon intrudes across a third of the Sun's diameter. Across the Southern Ocean, from along the southern coast of Victoria, Australia and from Tasmania, the Moon takes only a tiny nibble out of the Sun's disk.

JULY 27—The year's second total lunar eclipse is centered over the Indian Ocean and so is not visible from the U.S., favoring observers in Eastern Africa, the Middle East, and India, where the entire eclipse is visible.

AUGUST 11—In none of this year's solar eclipses does the Moon's shadow fall squarely upon Earth's surface. This time, it skims the North Pole, and the year's final partial eclipse is visible across the Arctic, from the Queen Elizabeth Islands of Northern Canada to Siberia. Maximum eclipse is seen from northeastern Russia, where the Moon crosses as far as 73% across the Sun's disk.

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 slowly change their positions against the constellations, which is why the ancients referred to them as "wandering stars."

PLANET	MORNING SKY	EVENING SKY
Mercury	JAN 1-FEB 17 APR 1-JUN 5 AUG 8-SEP 20 NOV 27-DEC 31	FEB 17-APR 1 JUN 5-AUG 8 SEP 20-NOV 27
Venus	JAN 1-JAN 8 OCT 26-DEC 31	JAN 8-OCT 26
Mars	JAN 1-JUL 26	JUL 26-DEC 31
Jupiter	JAN 1-MAY 8 NOV 25-DEC 31	MAY 8-NOV 25
Saturn	JAN 1-JUN 27	JUN 27-DEC 31

CONJUNCTIONS: **Mercury:** FEB 17 (superior), APR 1 (inferior), JUN 5 (superior), AUG 8 (inferior), SEP 20 (superior), NOV 27 (inferior), **Venus:** JAN 8 (superior), OCT 26 (inferior), **Jupiter:** NOV 25, **Mars and Saturn:** do not come into conjunction with the Sun in 2018.

OPPOSITIONS: **Jupiter:** MAY 8, **Saturn:** JUN 27, **Mars:** JUL 26 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, as seen from Earth. Being inside Earth's orbit, Mercury and Venus are never opposite the Sun in the sky.

A conjunction occurs when a planet is in line with the Sun and is crossing from the morning to the evening sky (or vice-versa) as observed in the sky. In the case of Mercury and Venus, inferior conjunction is when the planet is

on the same side of the Sun as Earth and located between them, while superior 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).

Visibility ranges above may vary slightly with latitude and are based on conjunction dates.

PHASES OF THE MOON

Notice that this year, January and March each have two full Moons, while February has none.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
 New Moon	16	15	17	15	15	13	12	11	9	8	7	6
 First Quarter	24	23	24	22	21	20	19	18	16	16	15	15
 Full Moon	1 31	—	1 31	29	29	27	27	26	24	24	22	22
 Last Quarter	8	7	9	8	7	6	6	4	2	2 31	29	29

Some dates may differ by one day from those in calendars which do not correct for Pacific Time.

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 not only by weather, but also by the brightness of the Moon.

SHOWER	PEAK DATE*	APPROX. RATE PER HOUR	MOON PHASE
Quadrantids	JAN 3-4	40	Waning gibbous
Lyrids	APR 22-23	20	First quarter
Eta Aquarids	MAY 6-7	30	Last quarter
Delta Aquarids	JUL 28-29	20	Full
Perseids	AUG 12-13	60	Waxing crescent
Orionids	OCT 21-22	20	Waxing gibbous
Leonids	NOV 17-18	15	Waxing gibbous
Geminids	DEC 13-14	50-80	Waning crescent
Ursids	DEC 21-22	10	Full

**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. Rates given are for ideal, Moonless conditions (observing site away from bright lights, dark-adapted vision).*

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 star projector, considered the world's finest simulator of the night sky for its time. Now redesigned for the 21st century, the Planetarium uses state-of-the-art digital technology to immerse audiences in full-dome imagery based on actual scientific data, from the smallest flowers to the surfaces of distant planets and immense clusters of galaxies.

CALIFORNIA ACADEMY OF SCIENCES

Home to Steinhart Aquarium, Kimball Natural History Museum, Osher Rainforest, and Morrison Planetarium, and world-class research and education programs, the California Academy of Sciences is one of San Francisco's "must-see" destinations. Explore the depths of a Philippine coral reef, climb into the canopy of a Costa Rican rainforest, and fly 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.

DIGITAL POCKET ALMANAC is downloadable at: www.calacademy.org.

SKYWATCHING TIPS, call 415.379.5759 (415.379.5SKY)

QUARTERLY SKYGUIDE, visit: www.calacademy.org/exhibits/morrison-planetarium

MORRISON PLANETARIUM DAILY SKYWATCHING INFORMATION is provided in many publications nationwide and sponsors the *StarDate* radio program locally on KCBS 740 AM.

THE BENJAMIN DEAN LECTURE SERIES presents monthly talks for the general public by noted scientists in the fields of astronomy and space science, including leading cosmologists, astrobiologists, planet hunters, and principal investigators for NASA space missions. For information, please visit: www.calacademy.org/events/benjamin-dean-astronomy-lectures or call 415.379.8000.



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55 Music Concourse Drive
Golden Gate Park
San Francisco, California 94118
415.379.8000
www.calacademy.org