

Morrison Planetarium

2010 Pocket Almanac

Seasons and the Sun

Eclipses

Moon Phases

Planet Watching

Meteor Showers



California Academy of Sciences

The Alexander F. Morrison Planetarium

Since 1952, the 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.

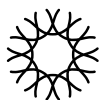
The California Academy of Sciences

Home to Steinhart Aquarium, Kimball Natural History Museum, Morrison Planetarium, and world-class research and education programs, the California Academy of Sciences is one of San Francisco's must-see destinations. Daily interactions with animals, educators, and biologists within immersive, hands-on exhibits offer discovery and wonder for guests of all ages. 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.

For **monthly skywatching tips**, call 415.379.8000.

The Planetarium provides daily skywatching information to many publications nationwide and sponsors the "**StarDate**" radio program on KCBS 740 AM. Academy members can access an online Skyguide via LiveOnline.

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 from NASA space missions. For information, please visit www.calacademy.org/events/lectures or call 415.379.8000.



CALIFORNIA
ACADEMY OF
SCIENCES

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

Seasons and the Sun

The terms below apply to the Northern Hemisphere. South of the equator, the seasons are reversed: during spring in the north, it is autumn (fall) in the south; northern summer is southern winter; etc.

Spring Equinox	March 20	10:33 AM PDT
Summer Solstice	June 21	4:29 AM PDT
Autumnal Equinox	September 22	8:13 PM PDT
Winter Solstice	December 21	3:42 PM PST

Earth at perihelion (closest to Sun, at 91,400,760 miles)—**January 2**
Earth at aphelion (farthest from Sun, at 94,505,100 miles)—**July 6**

PST = Pacific Standard Time, 8 hours behind Greenwich Time
PDT = Pacific Daylight Time, 7 hours behind Greenwich Time

Daylight Time in most of the United States begins at 2:00 AM on March 14 (set clocks forward one hour) and ends at 2:00 AM on November 7 (reset clocks back one hour to Standard Time).

Times and dates indicated are for the Pacific Time Zone. Calendars using other than Pacific Time may list certain events as occurring on the following day. This is because the conversion to other time zones around the world occasionally crosses midnight, thus changing the date.

MORRISON PLANETARIUM 2010 POCKET ALMANAC

California Academy of Sciences | 55 Music Concourse Drive, San Francisco, CA, 94118 | www.calacademy.org

Eclipses

Earth, the Sun, and the Moon align four times in 2010, causing two solar eclipses and two lunar eclipses. **Eclipses of the sun should never be viewed without proper eye protection!** Lunar eclipses, on the other hand, are perfectly safe to observe without precautions.

January 15—Annular solar eclipse

The new Moon blocks out most of the Sun but leaves the outer edge of the solar disk visible; observable from the Indian Ocean & southern Asia; longest annularity until 3043.

June 26—Partial lunar eclipse

The northern half of the full Moon passes through Earth's shadow, turning a reddish color; centered over the Pacific Ocean and favoring observers in Hawaii, only partly visible from the U.S. West Coast before dawn.

July 11—Total solar eclipse

The New Moon completely blocks the Sun's disk from view, but most of the path of totality falls across the open waters of the South Pacific, touching land only at Mangaia (the most southerly of the Cook Islands), Easter Island, the rugged Chilean Archipelago, and El Calafate in southern Argentina.

December 20—Total lunar eclipse

The full Moon passes entirely through Earth's shadow, turning a rusty, reddish-brown color. This eclipse is visible from beginning to end from the United States during the evening of Dec 20–21.

Planet Watching

Five planets can be seen in the heavens 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.

Planet	Morning sky	Evening sky
Mercury	Jan 5–Mar 13	Jan 1–3
	Apr 29–Jun 27	Mar 15–Apr 27
	Sep 4–Oct 15	Jun 29–Sep 2
	Dec 20–31	Oct 17–Dec 18
Venus	Jan 1–7	Feb 7–Oct 14
	Nov 11–Dec 31	
Mars	Jan 1–29	Jan 29–Dec 31
Jupiter	Mar 3–Sep 21	Jan 1–Feb 26
		Sep 21–Dec 31
Saturn	Jan 1–Sep 20	Oct 15–Dec 31





Conjunctions with the Sun (planet aligned with the Sun and not visible in the glare for roughly 2 weeks before and 2 weeks after): Mercury—Jan 4, Mar 14, Apr 28, Jun 28, Sep 3, Oct 16, Dec 19; Venus—Jan 11 & Oct 28; Mars—no conjunction in 2010; Jupiter—Feb 28; Saturn—Sep 30.

Oppositions (planet opposite the Sun, rising at sunset and visible all night long): Mars—Jan 29, Jupiter—Sep 21, Saturn—Mar 22.

Planet watcher's alert: From Aug 1–14, see naked-eye planets Mercury, Venus, Mars, and Saturn cluster together low in the west just after sunset! Mercury will be lowest, but on the evening of Aug 11, the thin crescent Moon is very nearby, moving up to join the other three planets on Aug 12. Two hours after sunset on these evenings, the planet Jupiter rises, making all five naked-eye planets visible on the same night, though not at the same time.

Moon Phases

Watch the angle of illumination on the Moon's face gradually move from one side to the other as the Moon circles Earth every 29½ days.

Month	 New Moon	 First Quarter	 Full Moon	 Last Quarter
January	14	23	29	7
February	13	21	28	5
March	15	23	29	7
April	14	21	28	6
May	13	20	27	5
June	12	18	26	4
July	11	18	25	4
August	9	16	24	2
September	8	14	23	1, 30
October	7	14	22	30
November	5	13	21	28
December	5	13	21	27

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, at least four to six sporadic meteors can be seen as tiny particles of space dust burning up in Earth's atmosphere. When Earth passes through the dust trail left behind by passing comets, 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 the brightness of the Moon. Best bets in 2010 are the Perseid & Geminid displays.

Peak Date	Shower	Hourly Rate	Moon Phase
January 3–4	Quadrantids	40	Waning gibbous
April 22	Lyrids	15	First quarter
May 5	Eta Aquarids	20	Last quarter
August 12	Perseids	60	Waxing crescent
October 20	Orionids	30	Waxing gibbous
November 17	Leonids	20	Waxing gibbous
December 13–14	Geminids	60–80	First quarter
December 22–23	Ursids	10	Full

Peak rates are for dark observing sites. Some showers may show enhanced activity for a day or two before and after the peak date. In addition to those listed above, many minor meteor showers occur during the year, usually averaging fewer than 15 meteors per hour. Some, however, may surprise observers with unpredictable outbursts.