

Morrison Planetarium

2011 Pocket Almanac

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California Academy of Sciences

Alexander F. Morrison Planetarium

Since 1952, 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, 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 guests of all ages.

For **monthly skywatching** tips, call 415.379.8000. For a quarterly SkyGuide, visit www.calacademy.org/academy/exhibits/planetarium. Morrison Planetarium provides daily skywatching information to many publications nationwide and locally sponsors the "**StarDate**" radio program 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 from NASA space missions. For information, please visit www.calacademy.org/events/lectures or call 415.379.8000.



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Seasons and the Sun

The terms below apply to the Northern Hemisphere. South of the equator, the seasons are reversed: northern spring is southern autumn (fall), northern summer is southern winter, and so on.

Spring Equinox	March 20	4:21 PM PDT
Summer Solstice	June 21	10:17 AM PDT
Autumnal Equinox	September 22	2:06 AM PDT
Winter Solstice	December 21	9:30 PM PST

Earth at perihelion (closest to Sun, at 91,400,760 miles)—**January 3**

Earth at aphelion (farthest from Sun, at 94,505,100 miles)—**July 4**

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 13 (set clocks forward one hour) and ends at 2:00 AM on November 6 (reset clocks back one hour to Standard Time).

Times and dates indicated in this almanac are for the Pacific Time Zone. Calendars using anything 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 2011 POCKET ALMANAC

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Eclipses

Earth, the Sun, and the Moon align six times in 2011, causing four partial solar eclipses and two total 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 3–4—Partial solar eclipse

The new Moon moves partway between the Sun and Earth, blocking part of the Sun's disk from view for observers in Europe, Northern Africa, and the Middle East. Maximum eclipse will be seen from Sweden, where the Moon will cover 85 percent of the Sun's diameter.

June 1—Partial solar eclipse

The Moon again moves almost directly in line between Earth and the Sun, and its shadow barely misses the North Pole. Observers in northern Siberia, most of Alaska, and northern Canada will see its silhouette cover up to 60 percent of the Sun's diameter.

June 15—Total lunar eclipse

The full Moon passes through Earth's shadow, turning a reddish color. This event is centered over the Indian Ocean, favoring observers in Africa and Asia.

July 1—Partial solar eclipse

The third partial solar eclipse of the year finds the Moon's shadow grazing Earth's South Pole, causing an eclipse so slight that it nibbles less than 10 percent across the solar diameter and is barely noticeable.

November 24–25—Partial solar eclipse





For the fourth time this year, the Moon passes between Earth and the Sun and casts its shadow over some part of our planet, this time immersing the coldest continent in shade. As seen from the Antarctic, the Moon will intrude across 90 percent of the Sun's diameter.

December 20—Total lunar eclipse

The full Moon passes entirely through Earth's shadow, turning a reddish-brown color for observers throughout most of Asia. Barely visible from the North American West Coast, the beginning of the eclipse will be seen just before dawn, as the Moon sets.

Moon Phases

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

Month	 New Moon	 First Quarter	 Full Moon	 Last Quarter
January	4	12	19	26
February	2	11	18	24
March	4	12	19	26
April	3	11	17	24
May	2	10	17	24
June	1	8	15	23
July	1, 30	7	14	22
August	28	6	13	21
September	27	4	12	20
October	26	3	11	19
November	24	2	10	18
December	24	2	10	17

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

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 1–Feb 25 Apr 10–Jun 12 Aug 17–Sep 28 Dec 5–31	Feb 26–Apr 9 Jun 13–Aug 16 Sep 29–Dec 4
Venus	Jan 1–Aug 16	Aug 17–Dec 31
Mars	Feb 5–Dec 31	Jan 1–Feb 4
Jupiter	Apr 7–Aug 4	Jan 1–Apr 6 Aug 5–Dec 31
Saturn	Jan 1–12 Oct 14–Dec 31	Jan 13–Oct 13

Conjunctions with the Sun (planet aligned with the Sun and not visible in the glare for roughly two weeks before and two weeks after): Mercury—Feb 25, Apr 9, Jun 12, Aug 16, Sep 28, Dec 4; Venus—Aug 16; Mars—Feb 4; Jupiter—Apr 6; Saturn—Oct 13.

Oppositions (planet opposite the Sun, rising at sunset and visible all night long): Mars—no opposition this year; Jupiter—Oct 28; Saturn—Apr 3; Mercury and Venus never reach opposition because their orbits are inside that of Earth and they always appear close to the Sun.

Planet watcher's alert: As they perform their slow, stately ballet against the stars, planets often seem to pass one another closely. Watch for pairings in the evening sky of Jupiter & Mercury (Mar 16), Venus & Mercury (Nov 12), and in the morning sky, groupings of Mars, Mercury & Venus (May 21).

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 2011 are the Quadrantid & Eta Aquarid showers.

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

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.