

WORLD OF WONDER

Exploring the realms of history, science, nature and technology

CLOCKS

Time is a great mystery. No one really knows what it is. Sometimes it seems to move too fast, and sometimes too slow. When we measure time, we are actually measuring change — the fact that “now” is different from “before.”



German pocket watch, 1590
The first pocket watch was invented in the 1520s.

Ways to tell time

Many early cultures used the moon, seasons or events to mark the passing of time. (Some cultures still use a lunar calendar.) The Egyptians replaced the lunar calendar with a solar one around 2772 B.C. Mayan mathematicians and astronomers calculated the solar year to be 365.2420 days. This is a difference of only seconds from what modern scientists have concluded.

Kinds of clocks

Calendars keep track of days, weeks, months and years. Clocks keep track of smaller units of time: hours, minutes and seconds. The earliest clocks kept track of time by measuring shadows. Shadow clocks didn't work at night or on cloudy days, so people invented other ways to measure time. Water, sand, rope and candle clocks were developed. In the mid-1300s, weight-driven mechanical clocks were invented. Early mechanical clocks were very large and often used in medieval towers. In the mid-1600s, pendulum clocks came into use. By the 1700s, clocks small enough to wear were made. The first pocket watches were handmade and expensive. In the 1800s, the discovery of electricity made accurate, electrically powered clocks possible. The digital watch was first developed in 1972. Atomic clocks are so accurate that they lose only one second every one million years. Atomic clocks keep official Earth time.

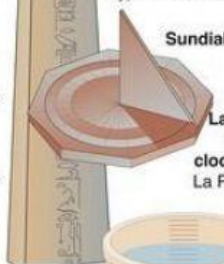
Thinking time

Many of the world's greatest thinkers have pondered the questions of time. Albert Einstein created the theory of relativity, which suggested that physical time was a fourth dimension. Some scientists think that time is a result of the universe expanding and that it may be possible for time to flow backward.

Saving time

Spring forward, fall back. The idea of daylight saving time originated with Ben Franklin — to make the best use of daylight.

The ancient Egyptians used the shadow of tall obelisks to track the sun's movement and divide the day into units. Like the obelisk, the sundial is a type of **shadow clock**.



Sundial

Late 13th-century clock tower La Rochelle, France

Egyptian obelisk

Ancient Egyptian water clock

Water clocks were used by many cultures for centuries. They eventually evolved into large, complex machines housed in special towers or buildings.

Chinese water clock



The **hour-glass** used sand instead of water to measure time.

Wristwatches were used by soldiers in WWI.



The **pendulum clock** was invented by **Christian Huygens** in 1656.



Lantern clock, late 17th century



The first **stop-watch** was made in 1915.



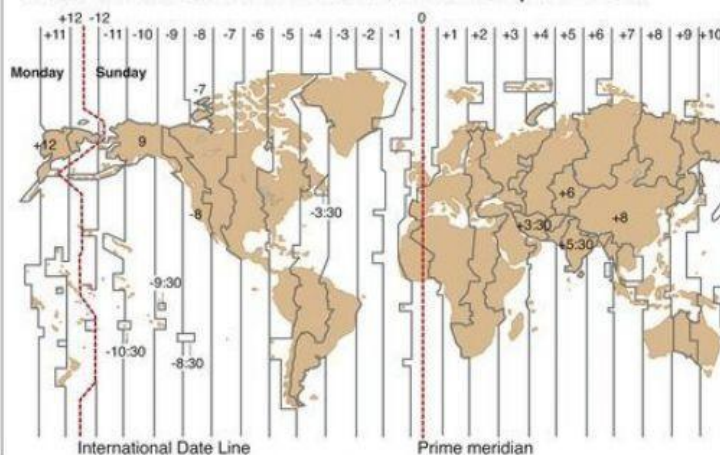
Solar atomic watch, 2007



Black Forest Cuckoo Clocks were first made in the mid-17th century as a cottage industry for farmers to help make money over the winter.

World time zones

What time it is depends on where you are. The world has been divided into 24 time zones. If you travel west, you subtract an hour for each time zone crossed. If you go east, add an hour. The time in a particular area is called local time. If you cross the **International Date Line**, you need to add or subtract a day. In 1884, the Greenwich Observatory in England was chosen as the beginning place for the world's time zones. The Greenwich meridian is also known as the **prime meridian**.



The **Vancouver Gastown Steam Clock**, was built in 1977 (based on an 1875 design).

Grandfather clocks became popular in the 1800s.

SOURCES: World Book Encyclopedia, World Book Inc.; Encyclopedia Americana, Grolier; Warman's Watches Field Guide, KP Books; www.time-for-time.com; www.About.com; www.crystallinks.com; www.time.gov; Time and Frequency Division; www.timeuseum.com

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