

## On the Hebrew Calendar

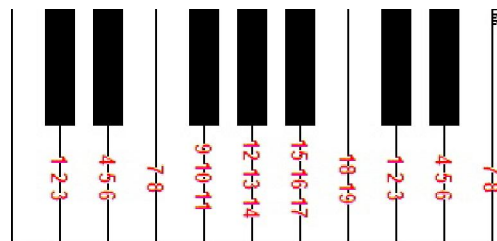
The modern Hebrew calendar is a religious calendar (as opposed to the civil Jewish calendar) that is now the official calendar of Israel. The Hebrew calendar is lunisolar, meaning that it tries to use both a solar calendar in years and lunar calendar in months. It tries to use the lunar months to approximate one solar or tropical year. This means that a lunisolar calendar attempts to keep the months closely aligned with lunar cycle, or cycle of the moon around the Earth, and at the same time keep the year closely aligned with the seasonal cycles for agricultural reasons.

In practice, the Hebrew calendar is more successful when tracking and keeping pace with the seasonal cycle in comparison with the lunar cycle. A tropical or solar year has its own months, but they have little if any connection to the lunar cycle. The seasons and years in a purely tropical or solar calendar are usually tied to astronomical systems and begin at or near a fixed point in a season such as the vernal equinox. An example of a purely solar calendar is the Gregorian calendar that is currently in use in the U.S. and many other countries.

In a lunisolar calendar, the tropical year is divided into 12 lunar months. However, the total number of days in 12 lunar months is about 11 days shorter than one solar year, so a leap or intercalary month is added about every 3rd year to keep the calendar aligned with the seasons, so that the seasons do not 'drift' backwards in the calendar. An additional reason for aligning the lunar year with the solar year is that the biblical festivals are connected to the agricultural seasons of the 365-day solar year, so the difference of 11 days between the lunar calendar and the solar calendar has to be made up. In Temple times, the additional month was added periodically, after an examination of the condition of the crops i.e. the agricultural produce, at the end of the 12th month. Later on, when the 19-year cycle of the Jewish calendar was established, the extra month was added automatically, seven times in the 19-year cycle.

The Hebrew calendar goes by a 19-year cycle that includes leap years in the 3rd, 6th, 8th, 11th, 14th, 17th and 19th years of the cycle, meaning in those years, an extra month is added to the calendar to keep it aligned with the solar calendar. The current 19-year cycle began with the Hebrew year of 5758.

If you are musically inclined, you may find it helpful to remember this pattern of leap years by reference to the major scale: for each whole step there are two regular years and a leap year; for each half-step there is one regular year and a leap year. This may be easier to remember when you examine the keyboard illustration below and see how it relates to the leap years above.



Keyboard illustrating pattern of leap years

Hebrew Year	Gregorian Year	Year in Cycle	Leap Year	Hebrew Year	Gregorian Year	Year in Cycle	Leap Year
5758	1997-1998	1	No	5768	2007-2008	11	Yes
5759	1998-1999	2	No	5769	2008-2009	12	No
5760	1999-2000	3	Yes	5770	2009-2010	13	No
5761	2000-2001	4	No	5771	2010-2011	14	Yes
5762	2001-2002	5	No	5772	2011-2012	15	No
5763	2002-2003	6	Yes	5773	2012-2013	16	No
5764	2003-2004	7	No	5774	2013-2014	17	Yes
5765	2004-2005	8	Yes	5775	2014-2015	18	No
5766	2005-2006	9	No	5776	2015-2016	19	Yes
5767	2006-2007	10	No	5777	2016-2017	1	No

So what do the Hebrew calendar years look like through the 19-year cycle? There are three types of years.<sup>1</sup> Only two months change among the three types of years:

- (1) a Deficient Year ("Haser" means "deficient" in Hebrew). This is a year in which the months of Cheshvan and Kislev both have 29 days;
- (2) a Regular Year ("Kesidrah" means "regular" in Hebrew). This is a year in which the month of Cheshvan has 29 days and the month of Kislev has 30 days; and
- (3) a Complete Year ("Shelemah" means "complete" in Hebrew). This is a year in which the months of Cheshvan and Kislev both contain 30 days.

Note the trivia that:

- (1) Only Heshvan and Kislev vary in the number of days each month contains as the calendar varies from leap year to non-leap year, and from deficient to regular to complete months.
- (2) In general, the number of days in a regular month varies regularly: 30, 29, 30, 29, 30, 29, 30, 29, 30, 29, 30, 29.
- (3) No variation ever occurs in the number of days in the first seven months of the year, Nissan - Tishri, skip two months, or in the last three months of a non-leap year, Tevet - Adar.

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1. Deficient, regular and complete years self-select to follow the following rules:

The first day of the calendar year, Rosh HaShanah, on 1 Tishri is determined as follows:

- a. The new year starts on the day of the new moon that occurs about 354 days (or 384 days if the previous year was a leap year) after 1 Tishri of the previous year.
- b. If the new moon occurs after noon on that day, delay the new year by one day. (Because in that case the new crescent moon will not be visible until the next day.)
- c. If this would cause the new year to start on a Sunday, Wednesday, or Friday, delay it by one day. (Because we want to avoid that Yom Kippur (10 Tishri) falls on a Friday or Sunday, and that Hoshanah Rabba (21 Tishri) falls on a Sabbath (Saturday)).
- d. If two consecutive years start 356 days apart (an illegal year length), delay the start of the first year by two days.
- e. If two consecutive years start 382 days apart (an illegal year length), delay the start of the second year by one day.

Note: Rule d can only come into play if the first year was supposed to start on a Tuesday. Therefore a two day delay is used rather than a one day delay, as the year must not start on a Wednesday as stated in rule c.

(4) The leap year month of Adar II always contains 29 days.

(5) No month contains 31 days as does the Gregorian, solar calendar.

Non-Leap Year (1, 2, 4, 5, 7, 9, 10, 12, 13, 15, 17, 18)				Leap Year (3, 6, 8, 11, 14, 17, 19)			
	Deficient	Regular	Complete		Deficient	Regular	Complete
Nissan	30	30	30		30	30	30
Iyar	29	29	29		29	29	29
Sivan	30	30	30		30	30	30
Tammuz	29	29	29		29	29	29
Av	30	30	30		30	30	30
Elul	29	29	29		29	29	29
Tishri	30	30	30		30	30	30
Heshvan	29	29	30		29	29	30
Kislev	29	30	30		29	30	30
Tevet	29	29	29		29	29	29
Shevat	30	30	30		30	30	30
Adar	29	29	29		29	29	29
Adar II					29	29	29
Total days	353	354	355		382	383	384

Regarding the naming of the two months of Adar, note that some Hebrew calendars may say Adar and Adar I, some say Adar I and Adar II, some say Adar and Adar II, and some say Adar A and Adar B. These are all different ways of saying the same thing, that there are two months used for the month of Adar in a leap year. In non-leap years, the month of Adar is most often simply called Adar.

### Early Calendar

The Sanhedrin once determined the specific calendar, where the lengths of the Hebrew months were fixed and the intercalation of months were calculated on a yearly basis. But the Sanhedrin did not rely solely on calculations, but also on observations. They added the extra month of Adar if:

1. they observed that the harvest was not yet ripe (for instance, if the earing of barley was not yet ready to be harvested),
2. the winter rains had not yet stopped,
3. the fruit on the trees did not grow in the usual way,
4. the lambs were not ready to be slaughtered for Passover,

5. there was not an adequate number of lambs to be slaughtered for the Passover / Pesach festival at the Temple in Jerusalem,
6. the condition of the roads were not yet dried up for the Passover pilgrims and families to come to Jerusalem to observe the Passover / Pesach festival, and even if
7. young pigeons were not flying after a certain point in time.

In addition, the day for the new moon (known as "Rosh Chodesh" in Hebrew, meaning "head of the month") and hence new month, was determined when specially appointed eyewitnesses of the Sanhedrin, would see and report the first crescent of the new moon. The Sanhedrin was the Jewish "Supreme Court" and legislative body, composed of 71 Jewish Sages and based in Jerusalem. Among other duties, it accepted testimonies from two independent, reliable eyewitnesses of the new moon. The members of the Sanhedrin also used calculations in conjunction with the accounts of the two eyewitnesses to determine the new moon.

A special court of three members of the Sanhedrin met on the 29th of each month to await the report of the two eyewitnesses. If the two eyewitnesses arrived on the 29th day or 30th day of the month, they were individually cross-examined in order to verify their testimony. If both their accounts were consistent with each other, and if each testimony was individually correct and in agreement with the calculations made to determine the expected new moon, then the new moon would be officially confirmed and a new month would be established. If, however, the individual accounts by either or both of the eyewitnesses were either false, inconclusive, or no witnesses had arrived by the 30th day of the current month, then the new moon and hence new month was determined solely on the calculations made by the members of the Sanhedrin.

Since a Jewish lunar month contained either 29 days or 30 days, if the eyewitnesses arrived on the 30th of the month and testified that they had seen the first crescent of the new moon, then that day became the first day of the new month and the previous month was declared to be 29 days in length. If no eyewitnesses arrived at the Sanhedrin on the 30th day of the month, then the previous month was declared to be 30 days in length and the next month would begin on the 31st day.

Once the two individual testimonies of the eyewitnesses were accepted by the Sanhedrin court, the Sanhedrin would send out messengers to declare the date of the new month to the Jewish people. The date or dates for any Jewish holiday and/or Jewish festival that was commemorated during the new month were also announced by the messengers. Initially, the dates of the new month and any Jewish festival for that month were announced by carrying torches to light signal fires on mountaintops located near the main Jewish communities that lived beyond Israel's borders. This included the Jewish communities located west of Israel in Egypt and the Jewish communities located northeast of Israel, extending all the way to Babylon, the capital city of Babylonia (now in present-day Iraq) as well as other major Jewish communities in Babylonia.

The signal fires were first lit on the Mount of Olives in Jerusalem and extended both westward to Egypt and northeastward to distant Babylon. But the Samaritans, Sadducees, and Boethusaeans or Boethusians began to light false fires. So the Sages of the Sanhedrin chose to send messengers to first inform the people of Jerusalem of the date for the new month and any Jewish festival for that month. Then the rest of Israel was informed, and finally the outlying Jewish communities beyond Israel.

The Hebrew months which contained a Jewish festival include the Hebrew month of Nisan for the festival of Passover, the Hebrew month of Sivan for the festival of Shavuot, and the Hebrew month of Tishri for the festival of Sukkot. However, these messengers could not reach all the Jewish communities outside Israel within one day (to report the sighting of the new moon) or by the date of a festival. So in the case of the festivals, to eliminate potential uncertainty among Jewish communities outside of Israel concerning the date for the festival, the Sages of the Sanhedrin instituted a second day for celebrating the festivals for the Jewish communities outside of Israel, to ensure that no mistake would be made concerning when to start celebrating the festival. In the case of Rosh Hashanah, the Jewish New Year, since it begins on the first day of the Hebrew month of Tishri (Leviticus 23:23-25), because of the uncertainty over when the new moon and hence 1st day of the new month would be officially announced, an extra day was added to Rosh Hashanah. This action by the Sanhedrin ensured that Rosh Hashanah would be commemorated on the appropriate day, making Rosh Hashanah a two-day holiday both for Jews living inside and outside Israel. Rosh Hashanah is the only Jewish holiday that is celebrated for two days by Jews living both inside and outside Israel and has been a two-day holiday for Orthodox Jews and Conservative Jews since the late Second Temple period (1 CE until 70 CE).

In the case of Rosh Chodesh, the first day of the new month, an extra day was added by the Sanhedrin Sages for upcoming months in which the eyewitnesses did not appear at the Sanhedrin in Jerusalem on the 30th day of the previous month to report sighting the new moon.

### Calendar Year

The origin for numbering the years in the Hebrew calendar is supposed to be the Creation of the World (Genesis 1:1). This number is determined by adding up the ages of people in the Hebrew Bible since Creation. More specifically, the birth of Adam on the 6th day of Creation is the actual starting point for counting the years in the Hebrew calendar.

So given that the year 5768 AM (Anno Mundi = year of the world) corresponds to 2008 CE, this would mean that the world began in 3760 BCE.

In ancient calendars, years were generally numbered according to the year of a ruler's reign. About AD 525, a monk named Dionysius Exiguus suggested that years be counted from the birth of Christ, which was designated AD (anno Domini, "the year of the Lord") This proposal came to be adopted throughout Christendom during the next 500 years. Dionysius had referred the year of Christ's birth to other eras. Modern chronology, however, suggests that Dionysius had been off in his calculations that now firmly places the event of Jesus' Birth at about 4 BC.

CE, "Common Era," is a relatively new term that is experiencing increased usage and will probably replace AD. The word "common" simply means that it is based on the most frequently used calendar system: the Gregorian Calendar. BCE, "Before the common era," is recently often used as synonymous to BC, "Before Christ."