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Week

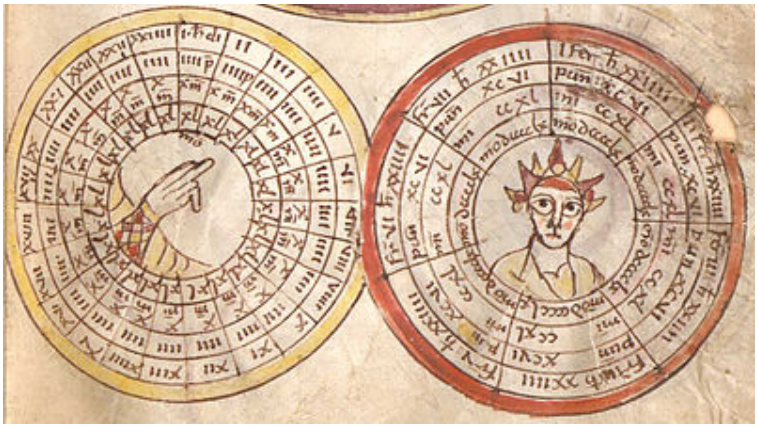
A **week** is a time unit equal to seven days. It is the standard time period used for cycles of rest days in most parts of the world, mostly alongside—although not strictly part of—the Gregorian calendar.

The days of the week were named after the classical planets (derived from the astrological system of planetary hours) in the Roman era. In English, the names are Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday.

ISO 8601 includes the ISO week date system, a numbering system for weeks within a given year – each week begins on a Monday and is associated with the year that contains that week's Thursday (so that if a year starts in a long weekend Friday–Sunday, week number one of the year will start after that). ISO 8601 assigns numbers to the days of the week, running from 1 to 7 for Monday through to Sunday.

The term "week" is sometimes expanded to refer to other time units comprising a few days, such as the nundinal cycle of the ancient Roman calendar or the "work week" or "school week" referring only to the days spent on those activities.

An Italian cameo bracelet representing the days of the week by their eponymous deities (mid-19th century, Walters Art Museum)



Circular diagrams showing the division of the day and of the week, from a Carolingian ms. (Clm 14456 fol. 71r) of St. Emmeram Abbey. The week is divided into seven days, and each day into 96 *puncta* (quarter-hours), 240 *minuta* (tenths of an hour) and 960 *momenta* (40th parts of an hour).

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Name

The English word *week* comes from the Old English *wice*, ultimately from a Common Germanic **wikōn-*, from a root **wik-* "turn, move, change". The Germanic word probably had a wider meaning prior to the adoption of the Roman calendar, perhaps "succession series", as suggested by Gothic *wikō* translating *taxis* "order" in Luke 1:8.

The seven-day week is named in many languages by a word derived from "seven". The archaism **sennight** ("seven-night") preserves the old Germanic practice of reckoning time by nights, as in the more common *fortnight*.[1] **Hebdomad** and **hebdomadal week** both derive from the Greek *hebdomás* (ἑβδομάς, "a seven"). The obsolete **septimane** is cognate with the Romance terms derived from Latin *septimana* ("a seven").

Slavic has a formation **tъ(žь)dьnь* (Serbo-Croatian тједан, Ukrainian тиждень, Czech *týden*, Polish *tydzień*), from **tъ* "this" + **dьnь* "day", in some cases alongside *nedělja* (OCS нєдѣлꙗ), a loan-translation of Latin *feria* and *sedmitsa* (седмица), as ἑβδομάς derived from "seven". Chinese has 星期, as it were "planetary time unit".

Definition and duration

A week is defined as an interval of exactly seven days,[2] so that technically, except at daylight saving time transitions or leap seconds,

1 week = 7 days = 168 hours = 10,080 minutes = 604,800 seconds.

With respect to the Gregorian calendar:

- 1 Gregorian calendar year = 52 weeks + 1 day (2 days in a leap year)
- 1 week = $^{1600}/_{6957}$ ≈ 22.9984% of an average Gregorian month

In a Gregorian mean year, there are 365.2425 days, and thus exactly $52\,^{71}/_{400}$ or 52.1775 weeks (unlike the Julian year of 365.25 days or $52\,^{5}/_{28}$ ≈ 52.1786 weeks, which cannot be represented by a finite decimal expansion). There are exactly 20,871 weeks in 400 Gregorian years, so 7 January 1618 was a Sunday just like 7 January 2018.

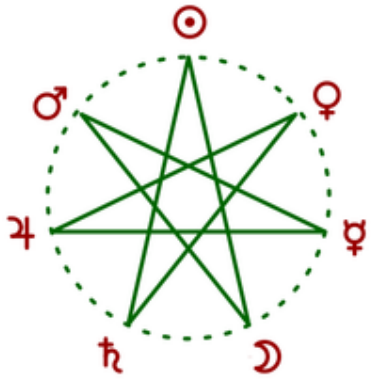
Relative to the path of the Moon, a week is 23.659% of an average lunation, or 94.637% of an average quarter lunation.

Historically, the system of Dominical letters (letters A to G identifying the weekday of the first day of a given year) has been used to facilitate calculation of the day of week. The day of the week can be easily calculated given a date's Julian day number (JD, i.e. the integer value at noon UT): Adding one to the remainder after dividing the Julian day number by seven (JD *modulo* 7 + 1) yields that date's ISO 8601 day of the week (for example, the Julian day number of 7 January 2018 is 2458126. Calculating (2458126 mod 7 + 1) yields 7, corresponding to Sunday.).[3]

Days of the week

The days of the week were originally named for the classical planets. This naming system persisted alongside an "ecclesiastical" tradition of numbering the days, in ecclesiastical Latin beginning with *dominica* (the Day of the Lord) as the first day. The Greco-Roman gods associated with the classical planets were rendered in their *interpretatio germanica* at some point during the late Roman Empire, yielding the Germanic tradition of names based on indigenous deities.

The ordering of the weekday names is not the classical order of the planets (by distance in the planetary spheres model, or, equivalently, by their apparent speed of movement in the night sky). Instead, the planetary hours systems resulted in succeeding days being named for planets that are three places apart in their traditional listing. This characteristic was apparently discussed in Plutarch in a treatise written in c. AD 100, which is reported to have addressed the question of *Why are the days named after the planets reckoned in a different order from the actual order?* (the text of Plutarch's treatise has been lost).[4]



Schematic comparison of the ordering of the classical planets (arranged in a circle) and the sequence of days in the week (forming a {7/3} heptagram within the circle).

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Planet	Sun	Moon	Mars	Mercury	Jupiter	Venus	Saturn
Greco-Roman deity	Helios-Sol	Selene-Luna	Ares-Mars	Hermes-Mercury	Zeus-Jupiter	Aphrodite-Venus	Cronus-Saturn
Greek:	ἡμέρα Ἡλίου	ἡμέρα Σελήνης	ἡμέρα Ἄρεως	ἡμέρα Ἑρμοῦ	ἡμέρα Διός	ἡμέρα Ἀφροδίτης	ἡμέρα Κρόνου
Latin:	dies Sōlis	dies Lūnae	dies Martis	dies Mercuriī	dies Iovis	dies Veneris	dies Saturnī
interpretatio germanica	Sun	Moon	Tiwaz	Wodanaz	Þunraz	Frige	—
Old English	*sunnandæg*	*mōnandæg*	*tiwesdæg*	*wōdnesdæg*	*þunresdæg*	*frīgedæg*	*sæterndæg*

An ecclesiastical, non-astrological, system of numbering the days of the week was adopted in Late Antiquity. This model also seems to have influenced (presumably via Gothic) the designation of Wednesday as "mid-week" in Old High German (*mittawehha*) and Old Church Slavonic (срѣда). Old Church Slavonic may have also modeled the name of Monday, понєдѣльникъ, after the Latin *feria secunda*.[5] The ecclesiastical system became prevalent in Eastern Christianity, but in the Latin West it remains extant only in modern Icelandic, Galician and Portuguese.[6]

	1. Sunday (Christian Sabbath)	2. Monday	3. Tuesday	4. Wednesday	5. Thursday	6. Friday (Muslim Sabbath)	7. Saturday (Jewish Sabbath)
Greek	Κυριακὴ ἡμέρα /kiriaki iméra/	Δευτέρα ἡμέρα /devtéra iméra/	Τρίτη ἡμέρα /tríti iméra/	Τετάρτη ἡμέρα /tetárti iméra/	Πέμπτη ἡμέρα /pémpti iméra/	Παρασκευὴ ἡμέρα /paraskevi iméra/[7]	Σάββατον /sáb:aton/
Latin	*[dies] dominica*; rarely *feria prima*, *feria dominica*	*feria secunda*	*feria tertia*	*feria quarta*; rarely *media septimana*	*feria quinta*	*feria sexta*	*Sabbatum*; *dies sabbatinus*, *dies Sabbati*; rarely *feria septima*, *feria Sabbati*

History

A continuous seven-day cycle that runs throughout history paying no attention whatsoever to the phases of the moon was probably first practiced in Judaism, dated to the 6th century BC at the latest.[8][9]

There are several hypotheses concerning the origin of the biblical seven-day cycle.

Friedrich Delitzsch and others suggested that the seven-day week being approximately a quarter of a lunation is the implicit astronomical origin of the seven-day week[10] , and indeed the Babylonian calendar used intercalary days to synchronize the last week of a month with the new moon.[11] According to this theory, the Jewish week was adopted from the Babylonians while removing the moon-dependency.

However, Niels-Erik Andreasen, Jeffrey H. Tigay and others claimed that the sabbath is mentioned as a day of rest in some of the earliest layers of the Pentateuch dated to the 9th century BC at the latest, centuries before Judea's Babylonian exile. They also find the resemblance between the biblical Sabbath and the Babylonian system weak. Therefore they suggested that the seven-day week may reflect an independent Israelite tradition.[12][13][14][15] Tigay writes:

> It is clear that among neighboring nations that were in position to have an influence over Israel - and in fact which did influence it in various matters - there is no precise parallel to the Israelite Sabbatical week. This leads to the conclusion that the Sabbatical week, which is as unique to Israel as the Sabbath from which it flows, is an independent Israelite creation.[14][16]

The seven-day week seems to have been adopted, at different stages, by the Persian Empire, in Hellenistic astrology, and (via Greek transmission) in Gupta India and Tang China.[17]

The Babylonian system was received by the Greeks in the 4th century BC (notably via Eudoxus of Cnidus). However the designation of the seven days of the week to the seven planets is an innovation introduced in the time of Augustus.[18] The astrological concept of planetary hours is rather an original innovation of Hellenistic astrology, probably first conceived in the 2nd century BC.[8]

The seven day week was widely known throughout the Roman Empire by the 1st century AD,[18] along with references to the Jewish Sabbath by Roman scholars such as Seneca and Ovid.[19] The seven day cycle ultimately replaced the older Roman system of the nundinal cycle, probably during the 4th century.

Ancient Near East

The earliest evidence of an astrological significance of a seven-day period is connected to Gudea, priest-king of Lagash in Sumer during the Gutian dynasty, who built a seven-room temple, which he dedicated with a seven-day festival. In the flood story of the Assyro-Babylonian epic of Gilgamesh the storm lasts for seven days, the dove is sent out after seven days, and the Noah-like character of Utnapishtim leaves the ark seven days after it reaches firm ground.[20]

It seems likely that the Hebrew seven-day week is based on the Babylonian tradition, although going through certain adaptations. George Aaron Barton speculated that the seven-day creation account of Genesis is connected to the Babylonian creation epic, Enûma Eliš, which is recorded on seven tablets. [21]

Counting from the new moon, the Babylonians celebrated the 7th, 14th, 21st and 28th as "holy-days", also called "evil days" (meaning "unsuitable" for prohibited activities). On these days, officials were prohibited from various activities and common men were forbidden to "make a wish", and at least the 28th was known as a "rest-day".[22] On each of them, offerings were made to a different god and goddess.

In a frequently-quoted suggestion going back to the early 20th century[23] the Hebrew *Sabbath* is compared to the Sumerian *sa-bat* "mid-rest", a term for the full moon. The Sumerian term has been reconstructed as rendered *Sapattu*^{m} or *Sabattu*^{m} in Babylonian, possibly present in the lost fifth tablet of the Enûma Eliš, tentatively reconstructed "[Sa]bbath shalt thou then encounter, mid[month]ly".[22]

Achaemenid period

The Zoroastrian calendar follows the Babylonian in relating the seventh and other days of the month to Ahura Mazda.[24] The forerunner of all modern Zoroastrian calendars is the system used to reckon dates in the Persian Empire, adopted from the Babylonian calendar by the 4th century BC.

Frank C. Senn in his book *Christian Liturgy: Catholic and Evangelical* points to data suggesting evidence of an early continuous use of a seven-day week; referring to the Jews during the Babylonian Captivity in the 6th century BC,[9] after the destruction of the Temple of Solomon. While the seven-day week in Judaism is tied to Creation account in the Book of Genesis in the Hebrew Bible (where God creates the heavens and the earth in six days and rests on the seventh; Genesis 1:1–2:3 (http://bible.oremus.org/?passage=Genesis+1:1–2:3&version=nrsv), in the Book of Exodus, the fourth of the Ten Commandments is to rest on the seventh day, *Shabbat*, which can be seen as implying a socially instituted seven-day week), it is not clear whether the Genesis narrative predates the Babylonian Captivity of the Jews in the 6th century BC. At least since the Second Temple period under Persian rule, Judaism relied on the seven-day cycle of recurring Sabbaths.[25]

Tablets from the Achaemenid period indicate that the lunation of 29 or 30 days basically contained three seven-day weeks, and a final week of eight or nine days inclusive, breaking the continuous seven-day cycle.[22] The Babylonians additionally celebrated the 19th as a special "evil day", the "day of anger", because it was roughly the 49th day of the (preceding) month, completing a "week of weeks", also with sacrifices and prohibitions.[22]

Difficulties with Friedrich Delitzsch's origin theory connecting Hebrew *Shabbat* with the Babylonian lunar cycle[26] include reconciling the differences between an unbroken week and a lunar week, and explaining the absence of texts naming the lunar week as *Shabbat* in any language.[27]

Hellenistic and Roman era

In Jewish sources by the time of the Septuagint, the term "Sabbath" (Greek *Sabbaton*) by synecdoche also came to refer to an entire seven-day week,[28] the interval between two weekly Sabbaths. Jesus's parable of the Pharisee and the Publican (Luke 18:12 (https://www.biblegateway.com/passage/?search=luke+18%3A12)) describes the Pharisee as fasting "twice in the week" (Greek δι᾽ς τοῦ σαββάτου *dis tou sabbatou*).

The ancient Romans traditionally used the eight-day nundinum but, after the Julian calendar had come into effect in 45 BC, the seven-day week came into increasing use. For a while, the week and the nundinal cycle coexisted, but by the time the week was officially adopted by Constantine in AD 321, the nundinal cycle had fallen out of use. The association of the days of the week with the Sun, the Moon and the five planets visible to the naked eye dates to the Roman era (2nd century). [29]

The continuous seven-day cycle of the days of the week can be traced back to the reign of Augustus; the first identifiable date cited complete with day of the week is 6 February AD 60, identified as a "Sunday" (as *viii idus Februarius dies solis* "eighth day before the ides of February, day of the Sun") in a Pompeiian graffito. According to the currently-used Julian calendar, 6 February 60 was, however, a Wednesday. This is explained by the existence of two conventions of naming days of the weeks based on the planetary hours system: 6 February was a "Sunday" based on the sunset naming convention, and a "Wednesday" based on the sunrise naming convention.[30]

Adoption in Asia

The earliest known reference in Chinese writings to a seven-day week is attributed to Fan Ning, who lived in the late 4th century in the Jin Dynasty, while diffusions from the Manichaeans are documented with the writings of the Chinese Buddhist monk Yi Jing and the Ceylonese or Central Asian Buddhist monk Bu Kong of the 7th century (Tang Dynasty).

The Chinese variant of the planetary system was brought to Japan by the Japanese monk Kobo Daishi (9th century). Surviving diaries of the Japanese statesman Fujiwara Michinaga show the seven-day system in use in Heian Japan as early as 1007. In Japan, the seven-day system was kept in use for astrological purposes until its promotion to a full-fledged Western-style

calendrical basis during the Meiji era.

The seven-day week was known in India by the 6th century, referenced in the Pañcasiddhāntikā.. Shashi (2000) mentions the Garga Samhita, which he places in the 1st century BC or AD, as a possible earlier reference to a seven-day week in India. He concludes "the above references furnish a terminus ad quem (viz. 1st century) The terminus a quo cannot be stated with certainty".[31][32]

Christian Europe

The seven-day weekly cycle has remained unbroken in Christendom, and hence in Western history, for almost two millennia, despite changes to the Coptic, Julian, and Gregorian calendars, demonstrated by the date of Easter Sunday having been traced back through numerous computistic tables to an Ethiopic copy of an early Alexandrian table beginning with the Easter of AD 311.[33]

A tradition of divinations arranged for the days of the week on which certain feast days occur develops in the Early Medieval period. There are many later variants of this, including the German *Bauern-Praktik* and the versions of *Erra Pater* published in 16th to 17th century England, mocked in Samuel Butler's *Hudibras*. South and East Slavic versions are known as *koliadniki* (from *koliada*, a loan of Latin *calendae*), with Bulgarian copies dating from the 13th century, and Serbian versions from the 14th century.[34] Medieval Christian traditions associated with the lucky or unlucky nature of certain days of the week survived into the modern period. This concerns primarily Friday, associated with the crucifixion of Jesus. Sunday, sometimes personified as Saint Anastasia, was itself an object of worship in Russia, a practice denounced in a sermon extant in copies going back to the 14th century.[35]

Sunday, in the ecclesiastical numbering system also counted as the *feria prima* or the first day of the week; yet, at the same time, figures as the "eighth day", and has occasionally been so called in Christian liturgy. [36]

Justin Martyr wrote: "the first day after the Sabbath, remaining the first of all the days, is called, however, the eighth, according to the number of all the days of the cycle, and [yet] remains the first".[37]

A period of eight days, starting and ending on a Sunday, is called an octave, particularly in Roman Catholic liturgy. In German, the phrase *in acht Tagen* (literally "in eight days") means one week from today.

Week numbering

Weeks in a Gregorian calendar year can be numbered for each year. This style of numbering is commonly used (for example, by schools and businesses) in some European and Asian countries, but rare elsewhere.

ISO 8601 includes the ISO week date system, a numbering system for weeks – each week begins on a Monday and is associated with the year that contains that week's Thursday (so that if a year starts in a long weekend Friday–Sunday, week number one of the year will start after that). For example, week 1 of 2004 (2004W01) ran from Monday, 29 December 2003 to Sunday, 4 January 2004, because its Thursday was 1 January 2004, whereas week 1 of 2005 (2005W01) ran from Monday, 3 January 2005 to Sunday, 9 January 2005, because its Thursday was 6 January 2005 and so the first Thursday of 2005. The highest week number in a year is either 52 or 53 (it was 53 in the year 2004). Schematically, this ISO convention translates as follows:

Dates in January							Effect	
M	**T**	**W**	**T**	**F**	**S**	**S**	**Week number**	**Week assigned to**
1	2	3	4	5	6	7	**1**	New year
	1	2	3	4	5	6	**1**	New year
		1	2	3	4	5	**1**	New year
			1	2	3	4	**1**	New year
				1	2	3	**53**	Previous year
					1	2	**53** when leap year, **52** when normal year	Previous year
						1	**52**	Previous year

In some countries, though, the numbering system is different from the ISO standard. At least six numberings are in use:[38][39]

System	First day of week	First week of year contains			Can also be last week of previous year	Used by/in
ISO-8601	Monday	4 January	1st Thursday	4–7 days of year	yes	EU and most of other European countries, most of Asia and Oceania
(Middle Eastern)	Saturday	1 January	1st Friday	1–7 days of year	yes	Much of the Middle East
(North American and islamic)	Sunday	1 January	1st Saturday	1–7 days of year	yes	Canada, United States, India, Japan, Taiwan, Hong Kong, Macau, Israel, South Africa, most of Latin America

The semiconductor package date code is often a 4 digit date code YYWW where the first two digits YY are the last 2 digits of the calendar year and the last two digits WW are the two-digit week number.[40][41]

The tire date code mandated by the US DOT is a 4 digit date code WWYY with two digits of the week number WW followed by the last two digits of the calendar year YY.[42]

"Weeks" in other calendars

The term "week" is sometimes expanded to refer to other time units comprising a few days. Such "weeks" of between four and ten days have been used historically in various places.[43] Intervals longer than 10 days are not usually termed "weeks" as they are closer in length to the fortnight or the month than to the seven-day week.

Pre-modern calendars

Calendars unrelated to the Chaldean, Hellenistic, Christian or Jewish traditions often have time cycles between the day and the month of varying lengths, sometimes also called "weeks".

An eight-day week was used in Ancient Rome and possibly in the pre-Christian Celtic calendar. Traces of a nine-day week are found in Baltic languages and in Welsh. The ancient Chinese calendar had a ten-day week, as did the ancient Egyptian calendar (and, incidentally, the French Republican Calendar, dividing its 30-day months into thirds).

A six-day week is found in the Akan Calendar. Several cultures used a five-day week, including the 10th century Icelandic calendar, the Javanese calendar, and the traditional cycle of market days in Korea. The Igbo have a "market week" of four days. Evidence of a "three-day week" has been derived from the names of the days of the week in Guipuscoan Basque.[44]

The Aztecs and Mayas used the Mesoamerican calendars. The most important of these calendars divided a ritual cycle of 260 days (known as *Tonalpohualli* in Nahuatl and *Tzolk'in* in Yucatec Maya) into 20 weeks of 13 days (known in Spanish as trecenas). They also divided the solar year into 18 periods of 20 days and five nameless days, creating a 20-day month divided into four five-day weeks. The end of each five-day week was a market day.[45][46]

The Balinese Pawukon is a 210-day calendar consisting of 10 different simultaneously running weeks of 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 days, of which the weeks of 4, 8 and 9 days are interrupted to fit into the 210-day cycle.

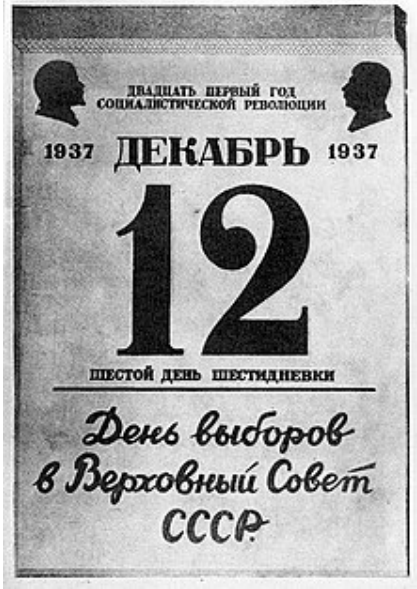
Modern calendar reforms

A 10-day week, called *décade*, was used in France for nine and a half years from October 1793 to April 1802; furthermore, the Paris Commune adopted the Revolutionary Calendar for 18 days in 1871.

The Bahá'í calendar features a 19-day period which some classify as a month and others classify as a week.[47]

The International Fixed Calendar (also known as the "Eastman plan") fixed every date always on the same weekday. This plan kept a 7-day week while defining a year of 13 months with 28 days each. It was the official calendar of the Eastman Kodak Company for decades.

Between 1929 and 1931, the USSR changed from the seven-day week to a five-day week. There were 72 weeks and an additional five national holidays inserted within three of them, totaling a year of 365 days. In 1931, after its brief experiment with a five-day week, the Soviet Union changed to a six-day week. Every sixth day (6th, 12th, 18th, 24th and 30th) of the Gregorian Calendar was a state rest day. The five additional national holidays in the earlier five-day week remained and did not fall on the state rest day. But, as January, March, May, July, August, October and December have 31 days, the week after the state rest day of the 30th was seven days long (31st–7th). This extra day was a working day for most or an extra holiday for others. Also as February is only 28 or 29 days depending on whether it is a leap year or not, the first of March was also made a state rest day, although not every enterprise conformed to this. To clarify, the week after the state rest day, 24/25 February to 1 March, was only five or six days long, depending on whether it was a leap year or not. The week after that, 2 to 6 March, was only five days long. The calendar was abandoned 26 June 1940 and the seven-day week reintroduced the next day.



Soviet calendar
"Twenty-first year of the socialist revolution"
12 December 1937
(Below 12:)
"Sixth day of the six-day week"
———————
"Election day for the Supreme Soviet of the USSR"

See also

- Names of the days of the week
- Workweek and weekend

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2. In pre-modern times, days were measured either from sunset to sunset, or from sunrise to sunrise, so that the length of the week (and the day) would be subject to slight variations depending upon the time of year and the observer's geographical latitude.

3. Richards, E. G. (2013). "Calendars". In S. E. Urban & P. K. Seidelmann, eds. *Explanatory Supplement to the Astronomical Almanac*, 3rd ed. (pp. 585–624). Mill Valley, Calif.: University Science Books. 2013, pp. 592, 618. This is equivalent to saying that JD0, i.e. 1 January 4713 BC of the proleptic Julian calendar, was a Monday.
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5. Max Vasmer, Russisches etymologisches Wörterbuch, s.v. понедельник; however, the Slavic languages later introduced a secondary numbering system that names Tuesday as the "second day".
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7. "day of preparation", i.e. the day before Sabbath, c.f. Luke 23:54 (καὶ ἡμέρα ἦν Παρασκευῆς, καὶ σάββατον ἐπέφωσκεν.)
8. Eviatar Zerubavel, *The Seven Day Circle: The History and Meaning of the Week*, University of Chicago Press, 1989 [1985], p. 11 (https://books.google.ch/books?id=Cd5ZjRsNj4sC&pg=PA11#v=onepage&q&f=false), p. 14 (https://books.google.ch/books?id=Cd5ZjRsNj4sC&pg=PA14#v=onepage&q&f=false).
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11. a month consisted of three seven-day weeks and a fourth week of eight or nine days, thus breaking the seven-day cycle every month. Consequently, there is no evidence that the days of the week were given individual names in Babylonian tradition. Pinches, T.G. (2003). "Sabbath (Babylonian)". In Hastings, James. *Encyclopedia of Religion and Ethics* (https://books.google.com/books?id=qVNqXDz4CE8C). **20**. Selbie, John A., contrib. Kessinger Publishing. pp. 889–891. ISBN 978-0-7661-3698-4. Retrieved 2009-03-17.
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