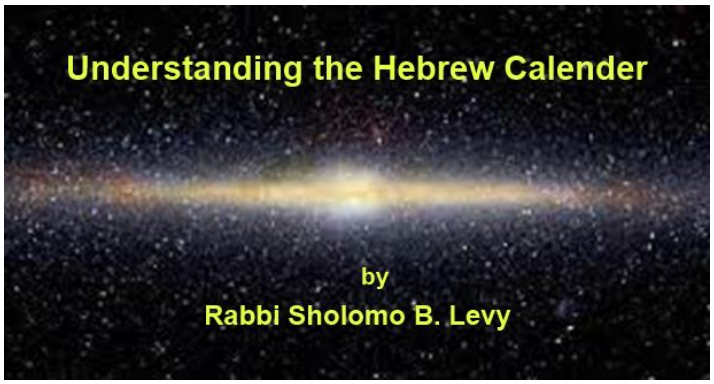

עשה ירח למועדים

"***He made the moon to mark seasons***" Psalm 104:19

One of the keys to understanding God's word is unlocking the mysteries of the heavenly bodies. These rotating orbs determine our months, years, and those holy days that are mentioned in the Bible. Just as it is impossible to read music without knowing what the various notes represent and just as it is nearly impossible to read a map without knowing that the symbols on a compass refer to the four cordial directions, it is likewise necessary to understand how the Hebrew calendar works in order to properly understand scripture. As obvious as this may appear, there are many people who will read a Biblical passage such as ""This month is to be for you the first month, the first month of your year." (Exodus 12:2) and assume that God was referring to a month called January in the middle of winter rather than a warm month in the Hebrew calendar called "Aviv" because it means spring.[1] Notice how ones understanding of such Bible passages is clarified or confused depending on how well the reader understands the Hebrew calendar.

This essay will briefly explain the astronomy, mathematics, history, and rabbinic traditions that together shaped how the Jewish people measure time. Let's start at the beginning. In the first chapter of Genesis God said, "Let there be lights in the heavens to separate the day from the night, and let them be for signs and for festivals, and for days and years."[2] Hence, these celestial objects were created to make distinctions, demarcations, designations of specific moments in the unfolding of eternity. Moreover, God established the correct order of things. This is why the constellations travel in their assigned orbits and according to very exact timetables. A close reading of this passage reveals that on each day of creation God said "there was evening and morning". This combination of evening and morning made the first day and every day that has followed. For this reason, in the Hebrew calendar all days and all festivals start in the evening and continue until the sun sets. Contrary to this divine order, most people in our society start their day in the morning and end it in the evening—the exact opposite of the way in which God created the universe. Hence, the Sabbath begins on Friday evening and continues until the setting of the sun on Saturday. This is a subtle but very important point. From darkness came

[1] This examples also illustrates how using our common civil calendar can not only lead a person astray, it could lead them to the opposite meaning of what God intended. Later in the essay I will explain how names such as "Aviv" changed over time.

[2] Genesis 1:14

light and this cycle is continuous and unbroken even if we should sleep and then awake during this interval.[3]

Although all days occupy the same length of time (twenty-four hours), they are not equal. God said, "Thus the heavens and the earth were finished, and all their hosts. *Then God blessed the seventh day and made it holy*, because it was the day when he ceased this work of creation."[4] Therefore, of all the days that constitute a week, only the seventh day was blessed by God as a holy day of rest. Later, at Mount Sinai, God would command the Children of Israel to become one with him in the solemnity of this day: "Remember the Sabbath day to sanctify it. Six day shall you labor and accomplish all your work; but the seventh day is the Sabbath to Hashem[5], your God; you shall not do any work—you, your son, your daughter, your manservant, your maidservant, your animal, and the stranger within your gates."[6] If God abstained for work on the seventh day, why did He command the Israelites to do the same? Our rabbis teach that since man was created in the image of God, when we follow God's example we enhance our divine nature. Today, man's urge to create and to destroy continues without pause. Violation of the Sabbath means that man has not set aside a fixed time in which to give thanks, to reflect on his activities, and to commune with his Creator.

Can the Sabbath be moved to Sunday? History records that on March 7, 321 A.D., the Roman emperor Constantine issued a proclamation making Sunday a day of rest. Following this, approximately thirty leaders of the Catholic Church met at what became known as the Council of Laodicea, in modern-day Turkey. They issued cannon #29 which states: "Christians must not judaize by resting on the Sabbath, but must work on that day, rather honouring the Lord's Day; and, if they can, resting then as Christians."[7] Thus, by this decree, Christians were forbidden to keep the Sabbath and ordered to substitute Sunday as the "Lord's Day." Following the Protestant Reformation, some Christian dominations, such as the Seventh-day Adventist, returned to the Sabbath as the day that God chose. Most Christians still claim adherence to the Ten Commandments—despite the fourth commandment to observe the Sabbath on the seventh day of the week.

For us, the Sabbath is one of the most important days in our calendar. It was ordained by God and written in stone by the hand of God.

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[3] There is a blessing that we recite in the morning immediately upon awaiting and becoming cognizant of our existence. This blessing thanks God for "restoring my souls unto me". By this we acknowledge that God has mercifully allowed us to continue in a day that has already begun. And just as God restores life to us each day in this realm of existence, so, too, will he restore us to everlasting life in the world to come.

[4] Genesis 2:1-3. Many translations say that God "rested" on the seventh day, which might imply fatigue. We prefer "ceased," which implies a divine choice to stop creating.

[5] The Torah uses several names to refer to the Creator. Most English versions of the Bible translate these names as "God." In this verse the actual Hebrew words are אל and יהוה. If they were both translated the same way here it would read "God God." Therefore, we use the convention of referring to the Tetragrammaton as "Hashem," which literally means "The Name". A seperate essay is envisioned to explain the sacred names of the Creator.

[6] Exodus 20:8-11.

[7] Samuele Bacchiocchi, *From Sabbath to Sunday : A Historical Investigation of the Rise of Sunday Observance in Early Christianity* (Biblical Perspectives, 2000). This book, written by a Christian scholar, is the most thorough account of how Sunday came to replace the Sabbath as the principle day of worship for most Christians.

The prophet Daniel warned us that a wicked kingdom would arise whose leaders would attempt to change God's appointed times: "He will speak against the Most High and oppress His holy people and *try to change the set times and the laws*. The holy people will be delivered into his hands for a time, times and half a time."[8]

The Months and Years

Having considered the origins of days and the structure of our week, let us now turn our attention to the ways that months and years are calculated in the Hebrew calendar. From the dawn of man humans have gazed at the heavens and developed calendars based on their understanding of the movement of these bodies. The easiest object to see and track is the moon. Interestingly, in Hebrew the same word "חדש" can mean moon or month. And, if we investigate further, we find that even the English word "month" and "Monday" both derived from the word moon. The Israelites obtained much of their knowledge about calendars from the ancient Sumerians, Babylonians, and Egyptians. Abraham, the first Hebrew, was born in Ur, a city in Sumer which had advanced cosmology.[9] The Babylonian influence is evident in several ways; the most striking is that fact that the Israelites retained the names of many Babylonian months that are used in the Hebrew calendar today. (see figure #1) When Joseph told pharaoh that Egypt would experience seven years of plenty followed by seven years of famine,[10] the unit of measure was the Egyptian year. The Egyptians were the first people to develop a calendar which had 365 day that were divided into 12 equal months.[11]

Hebrew Months with Babylonian Names

Number	Babylonian Name	Hebrew Name	Gregorian Months
1	Nissan	נִיסָן	March - April
2	Iyar	אִיָיר	April - May
3	Sivan	סִיוָן	May - June
4	Tammuz	תַמוּז	June - July
5	Av	אָב	July - August
6	Elul	אֱלוּל	August - September
7	Tishri	תִשְׁרִי	September - October
8	Cheshvan	חֶשְׁוָן	October - November
9	Kislev	כִסְלֵו	November - December
10	Tevet	טֵבֵת	December - January
11	Shevat	שְׁבָט	January - February
12	Adar	אֲדָר א	February - March

Figure 1

[8] Daniel 7:25. We are living in the times that Daniel foretold. We have seen attempts to change the Sabbath and abolish God's laws.

[9] Genesis 11:27-29. According to Rabbinic tradition, Nimrod, a descendant of Ham, founded the first cities of Sumer. Abraham trances his lineage from there. The Talmud teaches that Abraham's father, Terah, was one of their priests. For more on their technology, see Samuel Noah Kramer, *History Begins at Sumer.* (Doubleday, 1973).

[10] Genesis 41:28-30.

[11] W. V Davies and Renée F Friedman, *Egypt Uncovered* (New York: Stewart, Tabori & Chang, 1998), 13; W. A. Heidel, "The Calendar of Ancient Israel," *Proceedings of the American Academy of Arts and Sciences* 61, no. 2 (December 1, 1925): 45, doi:10.2307/20026134.. Dr. Heidel argues that the Egyptians provided the "model" for the early Hebrew Calendar, which began in the Spring and listed months by number instead of name. Similar structures are found in the Hebrew calendar and in scripture.

At first, the Egyptians were able to use this calendar to accurately predict the annual flooding of the Nile. However, over long periods of time they discovered a problem called "seasonal drift" that has plagued all calendars that attempt to use lunar months with a solar year. Three different phenomena are at work: Length of the day is determined by the rotation of the earth on its axis. The month is determined by the revolution of the moon around the earth. The year and seasons are determined by the movement of the earth around the sun. These movements are essentially independent and occur over different durations of time. (see figure #2) For example, if you took an average lunar month of 29.5 days and multiplied that number by12 you will get a year that is only 354 days long! The first year the difference of 11 days between the lunar year and the solar year would be imperceptible. However, as those days accumulate to 60 or 100 days you would notice that you months are now is a different seasons of the year. This is a very serious problem if your holy days must occur in months that correspond to specific seasons such as Passover, Shavuot, Sukkot, etc. By contrast, the Islamic calendar only uses the lunar system and as a consequence their months, such as Ramadan, can occur in different seasons of the year. Each society that uses as a lunisolar calendar has developed its own set of mathematical solutions to synchronize their months with seasons. Most require adding leap days, or, in the case of the Hebrew calendar, leap months.

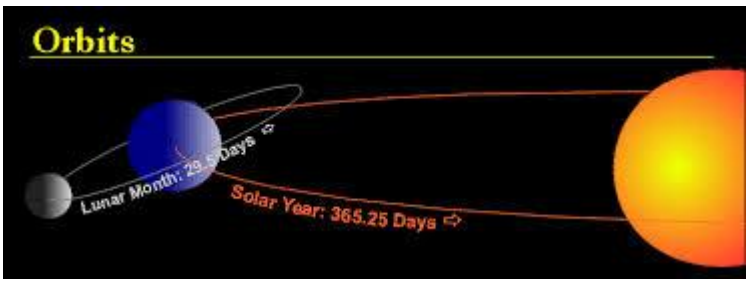

Figure 2

The earliest Israelite calendar for which there is archeological evidence was discover in Gezer and dates from the tenth century B.C.E. (see figure #4) It only lists the timing of agricultural activities such as planting, harvesting, etc. Surprisingly, the Torah does not provide us with a complete calendar. Only four months of the year are mentioned by name (Aviv, Ziv, Ethanim, and Bul)[12] and even these are of Canaanite origin.[13] During the early Biblical period, the Levites or priests in each province of Israel would reckoned the calendar on their own. Festivals would be celebrated in close proximity but not necessarily on the same day in every province. After King Solomon built the Temple, all decisions concerning the start of months and festivals were made by the Levites in Jerusalem. This produced a greater degree of uniformity. By the Second Temple period (530 BCE to 70 CE), we know that the Great Sanhedrin in Jerusalem consisting of 71 judges representing all Israel and presided over by the Cohen Gadol (High Priest) convened a special court known as the Beth Yaazek (בית יעזק). This court would declare when a new month had begun based on the testimony of two reliable witnesses.

[12] Aviv (Exodus 13:4), Ziv (I Kings 6:1), Bul (I Kings 6:38) and Ethanim (I Kings 8:2).

[13] Heidel, "The Calendar of Ancient Israel," 52; *Encylopaedia Judaica*, Second Edition, Volume 4, s.v. "Calendar".

Witnesses were asked probing questions about their sighting. The sages knew from their charts and calculations that the moon would "appear at the eastern horizon after sunrise, and will set at the western horizon after sunset; the reverse being the case with the waning moon."[14] Hence, witnesses who claimed to sight the moon at impossible times or locations in the sky were deemed to be erroneous. Fire signals would inform other Jewish communities of the official start of a new month.

When the nation split into two kingdoms, with the ten northern tribes comprising the kingdom of Israel and the tribes of Judah and Benyamin comprising Judaea, Israelites in the north established a separate priesthood. These priest of King Jeroboam are ridiculed in scripture for their faulty calculation of festivals. "Jeroboam built shrines on high places and appointed priests from all sorts of people, even though they were not Levites. He instituted a festival on the fifteenth day of the eighth month, like the festival held in Judah, and offered sacrifices on the altar. This he did in Bethel, sacrificing to the calves he had made. And at Bethel he also installed priests at the high places he had made. On the fifteenth day of the eighth month, *a month of his own choosing*, he offered sacrifices on the altar he had built at Bethel."[15] These festivals were supposed to be kept in the seventh month, but Israelites in the north observed them in the eight month because their priests did not calculate the months correctly according to the system used by the priest in Jerusalem. It is believed that the failure to observe festivals at the correct time contributed to the fall of the kingdom of Israel and the ten tribes that were "lost" during the Assyrian Exile in 722 B.C.

In the second century Rabbi Yehudah HaNasi began to use special messengers who would notify surrounding communities when a new month was proclaimed in Jerusalem. This replaced the older method of using fire signals. Communities that were too far away to see fire signals or receive messengers promptly began the custom of celebrating the new month (and other holy days) for two days to make sure that their observance coincided with those in Jerusalem.[16] The latter practice led to the custom among Jews in the diaspora to add a day to most festivals in an effort to be in unison with Jews in Israel. Reform Jews have abandoned this practice as being obsolete, since we now know exactly what time it is in Israel. The Karaite community and most Israelite congregations that follow the minhag (custom) of the Israelite Board of Rabbis, only observe the number of days as proscribed in the Torah. While we understand the reason for the tradition of adding additional days, it seems to be in violation of the commandment "*Do not add to what I command you and do not subtract from it, but keep the commands of the LORD your God that I give you.*"[17]

The secular months used in modern society, known as the Gregorian calendar, bear no astrological connection to the phases of the moon.[18] In the Hebrew Calendar a new month begins

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[14] W. M Feldman, *Rabbinical Mathematics and Astronomy* ([New York]: Hermon Press, 1978), 181.

[15] I kings 12: 31-33

[16] W. M Feldman, *Rabbinical Mathematics and Astronomy* ([New York]: Hermon Press, 1978), 184.

[17] Deuteronomy 4:2

[18] The calendar used by most of the world today is called the Gregorian Calendar because it was sanctioned by Pope Gregory in 1582. The main purpose of this calendar was to fix the date of Easter for Christians. It made minor revisions to the Julian Calendar upon which it was based. Although the Romans changed the original Egyptian names when they adopted this calendar, Christians ironically kept the names of pagan Gods for many of

when the earth, moon, and sun are in conjunction. When the moon is directly between the earth and the sun it appears blacked out against the night sky. This position is called מולד "birth" and cannot be seen from earth. Therefore, the ראש חודש "New Month" or "New Moon" (see figure #3) occurs at sunset on the day that the first phase of the moon can be sighted; it is then celebrated for one or two days depending on the month and whether it is a leap year. Sages of the fourth century devised an ingenious method that would bring the lunar and solar years into alignment. It was observed that every 19 solar years there were 235 lunations. Equilibrium could be achieved by adding 7 leap months to the Hebrew calendar over this nineteen-year period so that "at the end of the cycle, the sun and moon will have exactly the same relative mean positions in the heavens as at its beginning."[19]

These calculations essentially solve the problem of "seasonal drift" and give us a reliable way of determining months and years in the Hebrew calendar. Yet, they do not provide a fixed date in time to mark the first year of the calendar. The Gregorian calendar uses the supposed date of the birth of Jesus as the first year in their calendar. During the Biblical period historical events were used as reference points. For example, Araphaxad, the son of Shem, was born two years after the flood. (Gen. 11:10). King Solomon built his Temple in the 480th year after the Exodus (I Kings 6:1). One of Ezekiel's prophecy's is dated as the "twenty-fifth year of the Babylonian Captivity (Ezekiel 11:1).[20] The reign of kings were also used as a common reference point. For example, Isaiah dated his vision as occurring "in the year King Uzzaih died" (Isaiah 6:1). Without standard measures or common calendars determining historical dates with accuracy is nearly impossible. Therefore, the rabbis determined that the Hebrew calendar should start at the beginning, with the creation of the world as year #1.[21]

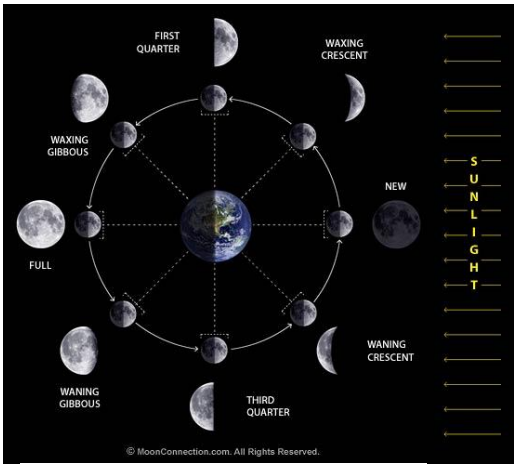

Figure 3

None of the calendars that are in use today are able to fix the days of the week within the months of the year. As a consequence, the dates of the months repeat each year, but those dates

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the days and months in their calendar. For example, Wednesday is named for the god "Woden," Thursday is in honor of the Norse god "Thor," January is for the Roman god "Janus," March is for the Roman god of war "Mars," July was created to deify Julius Caesar, etc.

[19] Feldman, *Rabbinical Mathematics and Astronomy*, 188. This "thirteenth month" is called Adar II. It is inserted on the third, sixth, eighth, eleventh, fourteenth, seventeenth, and nineteenth year of every nineteen-year period. During Biblical times leap years were inserted based on agricultural conditions related to barely cultivation.

[20] Ibid., 206. The current Hebrew calendar is attributed to Hillel II who make it official in 59 C.E.

[21] The rabbis used Biblical chronologies, lists of genealogies, known events, and other estimates to arrive at their date. Hence the year 2013 in our secular calendar corresponds to the year 5774 in the Hebrew calendar. We accept these dates as approximations using one system of measurement. It is not the same as geological time used in evolutionary theories. However, for any calendar to work there must be a starting part that is commonly understood. The problem with using a date other than creation itself is referring to time before the start of the calendar. The Hebrew calendar has the logic that nothing existed before the beginning and everything can be measured or dated from that point.

can fall on different days of the week. For example, a person's birthday will always be on the same date within a month but the day of the week on which it falls will fluctuate. One year it may fall on a Monday and another year it will be a Thursday. Similarly, a person may be paid on the first or fifteenth of each month, but the day of the week will fluctuate. For most common purposes the day of the week on which dates fall is of no real consequence. However, when it comes to the observance of God's holy festivals, the particular day of the week on which they fall is very important. The Torah says that we must not perform any "work" on God's holy festivals just as we are forbidden to work on the Sabbath.[22] If Yom Kippur fell on a Friday, there would be no time to prepare for Sabbath. Likewise, if Yom Kippur fell on a Sunday, there would be no time to prepare for the holy day. In addition, because we are forbidden to perform funerals on Sabbath or holy days, dead bodies would remain unburied for two days. The Jewish custom is to bury within 24 hour for spiritual and sanitary reasons. Sunday is also prohibited in order to prevent the seventh day of Sukkot (Hashanah Rabbah) from falling on the Sabbath. This would prevent the waving of the lulav (willow branches) which are required to observe the festival.

Many Israelites are disturbed when they learn that the Hebrew calendar prevents certain festivals from falling immediately before or after the Sabbath. They would argue that such manipulation is for the pleasure of man rather than the glory of God. However, the Israelite Board of Rabbis is of the opinion that the reasons given above are compelling. We also find sufficient justification in Torah. There it says that God fed the Children of Israel for forty years in the wilderness with manna from heaven. This manna would miraculously materialize each day except for Sabbath. All we had to do was pick it up. No planting or harvesting was required. As it is written, "The Lord has said, Tomorrow is a solemn rest, a holy Sabbath to the Lord; bake and boil what you will bake and boil today; and all that remains over put aside for you to keep until morning. They laid it aside till morning, as Moses told them; and it did not spoil, neither did it rot . Moses said, eat that today, for today is a Sabbath to the Lord. Today you shall find none in the field. Six days you shall gather it, but on the seventh day, the Sabbath, there shall be none. On the seventh day some of the people went out to gather, but they found none. The Lord said to Moses, How long do you [people] refuse to keep My commandments and My laws? See, the Lord has given you the Sabbath; therefore *He gives you on the sixth day the bread for two days*; let every man remain in his place; let no man leave his place on the seventh day. So the people rested on the seventh day."[23] When God provided for us, He gave us enough on Friday so that we could enjoy the Sabbath. Once we entered the land of Israel the manna ceased and we had to provide for ourselves; but, we continued to prepare on Friday before the start of Sabbath. Therefore, if we were prevented from preparing for the Sabbath on Friday because that day was a festival on which all work is prohibited, how could we be ready for the Sabbath? Conversely, if while enjoying the Sabbath as a day of rest, how could we get ready for a festival if it began immediately upon the conclusion of the Sabbath?

With modern appliances such as freezers, refrigerators, microwaves, and foods loaded with preservatives that prevent spoilage, we may be tempted to say, "Easy, if a festival falls on Friday, prepare your Sabbath meal on Thursday. No problem!" This simplistic view does not

[22] Leviticus 23:28; Numbers 28:18, Number 28:26, etc.

[23] Exodus 16:23-29

take into account the conditions of our people over the centuries when meals could not be prepared days in advance. Nor does it consider the lives of people who live in poor countries today who lack the modern conveniences of wealthy nations. There is also a sexist element to this objection because men often fail to appreciate how much work is required to prepare for Sabbath or a festival by women who traditionally do most of the shopping, cleaning, and cooking. In order to properly observe the Sabbath or a festival at least a day of preparation is required. The prophet Isaiah reminds us that the Sabbath is not only a day of rest; it should be a joy, a pleasure, and we should "call the Sabbath a delight."[24] Hence, if it possible to create a calendar that does not turn the Sabbath into a hardship or unfortunate coincidence while maximizing the unique splendor and beauty of each festival then such a calendar is permissible; indeed, it is "לכבוד יהוה" for the glory of God.

Conclusion

While the movement of heavenly bodies is a divine act, ALL calendars are created by humans based on their understanding of astronomy, mathematics, and the religious or secular traditions of their culture. As demonstrated in this essay, the Hebrew calendar evolved over time. The further back in history we go the more imprecision and variation occurred. Imagine the priests who had only his naked eye whose vision could be obscured by clouds or rain and had no knowledge of seasonal drift. Even Israelites who fear that rabbis have taken too many liberties with regard to the addition of days or postponement of festivals should consider the greater subjectivity of the Karaite priests who attempt to determine the start of months and leap years by the ripening of the barley harvest. Are they not relying on someone's opinion of the shade of grain? Whose barely field are they looking at? Can that system be calculated to within seconds and tables generated that would set dates for centuries? My colleague at the Israelite Academy, Rabbi Malcha Netanyah, has written a very scholarly article about "The Dating of Shavuot" that addresses many of these controversies.

In the final analysis, the common Hebrew Calendar—though not perfect—is the most mathematically accurate. In our opinion, it does the best job of reconciling the cycles of the moon with the movement of the earth around the sun. Beyond questions of physics and astronomy, this calendar was created for spiritual rather than secular reasons; it was designed for the purpose of observing God's holy days—which is what we use it for. Moreover, the use of this calendar creates the greatest unity among those who desire to serve the God of Israel as one people, in one voice, and at the same time.

ונגלה כבוד יהוה וראו כל בשר יחדו

"The glory of Hashem will be revealed and all flesh will see it together" Isaiah 40:5

[24] Isaiah 58:13

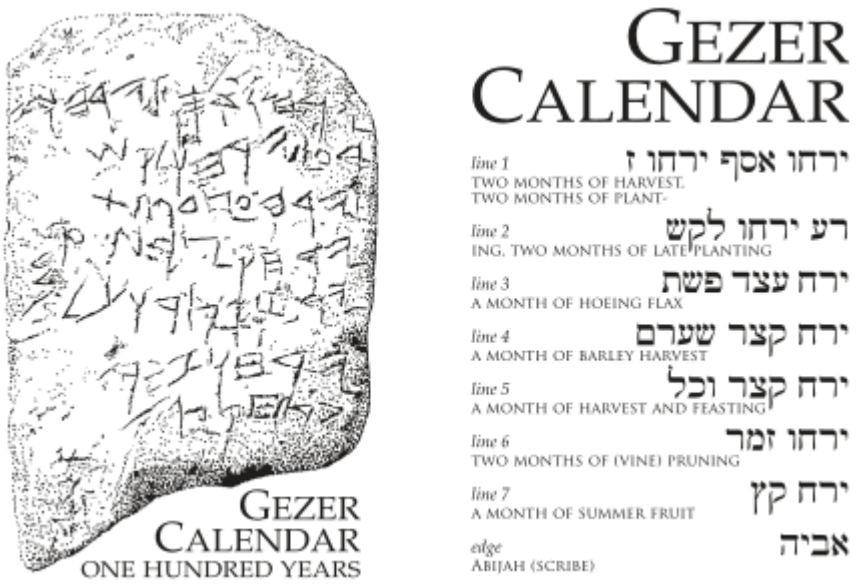

Figure 4 This table dates from the tenth century B.C.E and was discover in Gezer. It was written in Phoenician or Paelo-Hebrew. It is one of the oldest artifacts of a Hebrew calendar. It only describes the months during which various agricultural activities took place.

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