Laws of Sanctification of the New Moon, Chapter 9 (Auto Translated)

English

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Shiur Overview

Summary of Chapter 9 — Rambam Hilchos Kiddush HaChodesh (Tekufos and Intercalation of the Year)

Introduction to the Chapter: Tekufa, Ibbur HaShana, and the Character of This Chapter

The Rambam's Words

Chapter 9 deals with the calculation of tekufa — that is, when the solar year's seasons fall out — because this is the foundation for ibbur hashana.

Explanation

A **tekufa** is the point when the season changes — tekufas Teves is when the days begin to get longer (winter solstice), tekufas Nisan is spring, etc. The year is divided into four tekufos. The Rambam already said earlier (Chapter 4) that **tekufas Nisan must occur before Pesach**, and this is the main sign when one must be me'aber.

Novel Points and Explanations

1) In practice, one does not need to know when the tekufa is for ibbur hashana today. Since we already have the calculation of the 19-year cycle (machzor 19 shana, guch adt), we already know automatically which years are me'uberes. The calculation of tekufa is therefore **not practically relevant for ibbur hashana**. It is only relevant for minor halachos: **Birkas HaChama** (oseh ma'aseh bereishis), **she'eilas geshamim** (60 days after tekufas Tishrei), and **the custom not to drink water at the tekufa**.

2) An important inquiry: Does ibbur hashana also have two foundations (re'iya and cheshbon) like kiddush hachodesh. By **kiddush hachodesh** the Rambam says clearly that there are **two foundations**: (a) al pi re'iya — witnesses see the moon, (b) al pi cheshbon — when there is no beis din. But by **ibbur hashana** the Rambam **never clearly stated** that there is such a two-tiered system. In Chapter 4 he only speaks of beis din ("ra'uy beis din"), not of an automatic calculation.

The reasoning why: By kiddush hachodesh there is a real change every month — the **molad hamemutza** doesn't match exactly with the true sighting, therefore re'iya is indeed better lechatchila. But by **ibbur hashana** the shnas hachama and shnas halevana are **almost 100% fixed and constant from the foundation of creation** — it essentially doesn't change. Therefore **the calculation by ibbur shana is even more fundamental** than by kiddush hachodesh.

Conclusion: By ibbur hashana **the calculation is the primary element**, and the other reasons (aviv, fruits, etc.) are only **additions** or **support** to the calculation. The Rambam himself said that **tekufa is the only sign upon which one can be me'aber alone**, and everything else is only supplementary. One can sometimes **mipnei hatzorech** change within a year, but one cannot go **against the calculation**.

3) Does ibbur hashana also require a beis din in Eretz Yisrael? By kiddush hachodesh the Rambam says clearly (also in Peirush HaMishnayos) that **without a beis din in Eretz Yisrael there are no months**. The question is: **Does the same apply to ibbur hashana?** When the Rambam concludes and says that our calculation is "al cheshbon bnei Eretz Yisrael," he only speaks of **chodesh**, not of ibbur — **not clear**.

4) Why does the Rambam bring the calculation of tekufa if it's not practically relevant? Two answers:

(a) The Rambam holds that **understanding the calculations of heaven is a mitzva** — "ki hi chachmaschem u'vinaschem le'einei ha'amim." He wants a Jew to understand the beauty of the calculations, even when it's not directly practically relevant.

(b) Le'asid lavo — if there will again be a beis din that needs to be me'aber al pi re'iya/cheshbon, they will need to know how to calculate.

5) The chapter is less practical than the previous chapters. Chapters 6-8 (calculation of molad and Rosh Chodesh) are **practically relevant** — one needs to know them to make a calendar, and they even appear in Shulchan Aruch/Tur. But **Chapter 9** (tekufa) **no one needs to know in practice**, because the 19-year cycle already provides everything. The entire chapter is only **approximate** (tekufas Shmuel), and even the second half of the chapter (how to calculate when the tekufa falls out) is only a practical "heichi timtzi" — **it doesn't teach how it truly works**, only how to calculate.

Halacha 1 — Shnas HaChama: 365 Days and a Quarter

The Rambam's Words

Shnas hachama is three hundred and sixty-five days and a quarter of a day... There are some of the sages of Israel who say it is a quarter of a day... and there are those who say it is less than a quarter of a day... and so too the sages of Greece and Persia have a dispute about this matter.

Explanation

The length of a shnas hachama (solar year) is 365 days plus a quarter day (= 6 hours). There is a dispute among the sages of Israel — one says exactly a quarter, another says a bit less. The same dispute exists among the sages of Greece and Persia.

Novel Points and Explanations

1) What is a "shnas hachama" — it's not at all simple. A normal person actually doesn't know what a shnas hachama is, and it's almost impossible to calculate it precisely. Three observable phenomena that a person can see:

- **(a) Seasons (tekufos):** Whoever lives in a region with seasons (Eretz Yisrael, Europe, America — a certain latitude,

not at the equator) can see that it repeats — summer, winter, growth, no growth, cold, hot.

- **(b) Length of days:** One notices that days become longer and shorter. **However** — this is almost impossible to measure precisely. Seasonal hours don't change (always 12 seasonal hours during the day), so one needs a clock with equal hours. The difference from day to day is so small that it can take several weeks until one notices a difference. [Digression: The story of Adam HaRishon who noticed that days become shorter/longer is mentioned.]

- **(c) Position of the sun in the sky:** Throughout the year the sun rises from different places in the east, and crosses the sky at different heights. In summer the sun is higher — the shadow of a stick is short; in winter it is lower — the shadow is longer. **This was the main method** of how they discovered how long a year is — they measured shadows. In Tanach we already see such "clocks" (shadow-measurers), and in cities they carved markings on large buildings. The Gemara's language **"keshechamah berosh kol adam"** describes the point when the sun is opposite the head.

2) Why it's so difficult to calculate precisely. To arrive at "approximately 365 days" is common knowledge — this was already known a long time ago (perhaps from Adam HaRishon). But to calculate more precisely — how much more than 365 days — is **extremely difficult**. There were cultures that thought a year is 360 days, because it's indeed hard to measure.

3) The method of calculation — average over many years. The secret of how they calculated the precise length is through **an average over tens of years**. There had to be a **institution/beis midrash/place of wisdom** where people wrote down year after year precisely where the sun was. After many years they noticed that it shifts by a day — then they divided the difference by the number of years, and thus gradually calculated more precisely the quarter day.

4) A more precise method — stars. Besides the earth-based method, they figured out a **more precise method**: looking at the sky at the stars. If the entire sky rotated on one sphere, the sun would always be in the same place relative to the stars. But **the sun moves among the stars** — each day slightly different relative to the star-groups. The sun goes from **west to east** among the stars (opposite the daily movement from east to west). They divided the sky into **twelve mazalos** (groups of stars), and when the sun returns to the same mazal — that's a year. A **tekufa** is a quarter of this cycle.

5) Mussar haskel — one should not take the sages lightly. When one learns Hilchos Kiddush HaChodesh, one immediately starts saying "Shmuel made a mistake, he didn't know." But this is **onus al gabei onus** — you're standing with a paper where everything is already calculated. Try to figure out yourself how long a year takes! It takes much more than a year, one needs to calculate over tens of years, one needs a place of wisdom with continuity. Astronomy is the longest research project in world history — thousands of years. We can calculate because we still have calculations from the ancient Babylonian astronomers, who recorded lists of eclipses.

6) The "dispute" is not a dispute in reality — it reflects that it was difficult to calculate precisely. At first they calculated "be'ofan gas" (roughly), and gradually it became more precise. This is the "real story" of the development of astronomical calculations. Even the simple calculation that a year is 365¼ days took very long to figure out — in four years one sees that one is off by a whole day, and from that one can deduce that each year is a quarter day more.

7) Sages of Israel, sages of Greece, sages of Persia — who are they?

- **Sages of Israel** — this is **Shmuel**, who says in the Gemara that a year is 365¼. But Shmuel didn't originate it — he was an astronomer who heard from others.

- **Callippus**, an ancient sage of Greece, already knew that a year is 365¼ days. The cycle of 19 years (machzor ha'ibbur) is built on this calculation.

- **Hipparchus**, two hundred years later, figured out that it's actually a bit shorter than a quarter day — this is the "yesh mi she'omer shepachot merevi'i yom." He said it's 1/300 of a day less than a quarter. He figured this out by calculating from hundreds of years and seeing that the calculation with a full quarter led to a result that was already too late.

- **Sages of Persia** — not clear whom the Rambam means specifically. The sages in Bavel probably heard more from the sages of Persia than from the sages of Greece, because they lived among them. Perhaps the Rambam means the circle of Shavor Malka and the like.

8) Jewish year vs. shnas hachama. No single Jewish year is 365 days — it's always either more or less (354, 355, 383, 384, 385 days). Only over a 19-year cycle must the total match. In the Gemara (Pitum HaKetores) it says 365 corresponding to shnas hachama, but this is a general calculation.

9) Approximately 12 lunar months = a year. As a primitive estimate people said that approximately 12 times the moon goes around is a year — but this is **very approximate**.

Halacha 1 (Continued) — The Remainder from Each Cycle

The Rambam's Words

One who says it is 365 days and a quarter day, there will remain from each cycle of nineteen years one hour and 485 parts...

Explanation

According to the calculation that a shnas hachama is 365¼ days, there remains after each cycle of 19 years an hour and 485 parts — that is, the sun advances by this much time against the moon.

Novel Points and Explanations

1) The entire "remainder" (one hour and 485 parts per cycle) is built on the calculation that shnas hachama = 365.25 days. If it's a bit less (as Hipparchus says), the remainder will be different — a bit less.

2) Tekufa = 91 days, 7½ hours. This is simple mathematics: 365.25 ÷ 4 = 91 days and 7½ hours. Each tekufa is equal.

3) Practical calculation: If one knows when one tekufa is (which day, which hour), one can calculate every coming tekufa until the end of the world — one simply adds 91 days and 7½ hours.

Halacha 10 — Tekufas Nisan and the Mazalos

The Rambam's Words

Tekufas Nisan is the hour and part when the sun enters the beginning of mazal Taleh. Tekufas Tamuz – at the head of mazal Sartan, tekufas Tishrei – at the head of mazal Moznayim, tekufas Teves – at the head of mazal Gedi.

Explanation

Tekufas Nisan is the moment when the sun enters mazal Taleh. Each tekufa corresponds to the beginning of a specific mazal.

Novel Points and Explanations

1) The Rambam already said in Hilchos Yesodei HaTorah that we divide the sky into twelve parts (mazalos), with the sign **tashad se'ab akdad** (Taleh, Shor, Te'omim, Sartan, Aryeh, Besulah, Moznayim, Akrav, Keshes, Gedi, Deli, Dagim). Each three letters represent a quarter year (a tekufa).

2) "Berosh" mazal means at the beginning — at the start of that mazal, just as "techila" which the Rambam says by tekufas Nisan.

Halacha 10 (Continued) — The First Tekufas Nisan and the Foundation of Calculation

The Rambam's Words

The tekufa of shnas hayetzira according to this calculation was 7 days, 9 hours, 642 parts before the molad of chodesh Nisan. Sign: zayin tes tarmav.

Explanation

To calculate tekufos one needs a starting point. The calculation establishes that the first tekufas Nisan was 7 days, 9 hours, 642 parts **before** the molad Nisan of shnas hayetzira.

Novel Points and Explanations

1) The calculation is not necessarily a claim that this is how it actually was at creation. It's a calculation that was decided to calculate with — "lefi cheshbon zeh." When creation actually was is a separate inquiry. The calculation is a **mathematical foundation**, not a historical claim.

2) The entire problem why one needs a special calculation for tekufos: If we only had a shnas hachama (like the non-Jewish calendar), we would immediately know when tekufas Nisan is — it's always the same day of the year. But the Jewish calendar is a combination of shnas hachama and shnas halevana (luach ha'ibbur), and therefore the tekufa shifts from the beginning of our year.

3) Every 19 years (machzor) there remains an hour and 485 parts that the sun advances beyond the moon. Since creation approximately 7 days of such drift have accumulated. And every 24 cycles (almost 456 years) adds up to a whole day.

Halacha 11 — How to Calculate Tekufas Nisan of the First Year of a Cycle

The Rambam's Words

Take for each complete cycle 1 hour and 485 parts. Subtract 7 days 9 hours 642 parts. Add the remainder to the molad Nisan of the first year of that cycle — you will know when tekufas Nisan is, and from there calculate 91 days 7½ hours for each tekufa.

Explanation

The calculation for the first year of a cycle: (1) count how many complete cycles have passed since shnas hayetzira, (2) multiply by 1 485, (3) subtract 7 9 642, (4) convert parts to hours and hours to days, (5) add to the molad Nisan of that year — this is tekufas Nisan. From there calculate all 4 tekufos of that year (each 91 days 7½ hours).

Novel Points and Explanations

1) The calculation gives only the 4 tekufos of **that year** (first year of cycle) — not "forever," only 4 tekufos.

Halacha 12 — Tekufas Nisan of a Year in the Middle of a Cycle

The Rambam's Words

If you want to know tekufas Nisan of this year which is year such-and-such in the cycle — take for all complete cycles one hour and 485, and for all complete years that have passed from the cycle take 10 days 21 hours 874 parts for each year. Gather everything, subtract 7 days 9 hours 642 parts. And the remainder complete with lunar months of 29 12 793. And what remains (less than a lunar month) add to the molad Nisan of that year.

Explanation

For a year in the middle of a cycle one needs to add another component: for each past year in that cycle add **10 days, 21 hours, 874 parts** (this is the difference between shnas hachama and shnas halevana). Then divide the result by lunar months (29 12 793), and what remains (less than a lunar month) add to the molad Nisan of that year.

Novel Points and Explanations

1) The difference from the previous calculation (halacha 11) is only one thing: one must add the excess of shnas hachama over shnas halevana for the years that have already passed in that cycle.

2) The step of "complete lunar months" is explained: In the middle of a cycle one has already accumulated a sum of excess (because each year adds 10+ days), and part of it has already been "used up" through ibbur months. By dividing by lunar months one eliminates the whole months (which were already ibburim), and only the remainder is left to add.

3) If the remainder is a whole lunar month or more, it means there was already an ibbur month — therefore one only takes what is less than a lunar month.

Halacha 13 — The Possible Times of Tekufos (Intervals)

The Rambam's Words

Tekufas Nisan only falls at 4 times — at the beginning of night, at midnight, at the beginning of day, at midday. Tekufas Tamuz — at 7½ hours of day, at 7½ hours of night, at 1½ hours of day, at 1½ hours of night.

Explanation

Because the first tekufas Nisan was at the beginning of night (Wednesday night), and a year is exactly 365¼ days, each tekufas Nisan shifts by 6 hours. Therefore tekufas Nisan can only fall at 4 times: beginning of night (0 hours), midnight (6 hours), beginning of day (12 hours), midday (18 hours).

Novel Points and Explanations

1) The foundation: Because a year = 365 days + 6 hours, each tekufa shifts from year to year by exactly 6 hours. Therefore tekufas Nisan can only fall at 4 points in a 24-hour cycle.

2) Tekufas Tamuz, which is 91 days + 7½ hours after tekufas Nisan, falls at different intervals: 7½ hours, 1½ hours (of day or night). This is because 7½ hours added to the 4 points of tekufas Nisan gives new 4 points.

Halacha 5 (Continued) — The 28-Year Cycle of Tekufas Shmuel and Birkas HaChama

The Rambam's Words

To know on which day of the week and at which hour the tekufa will be — divide the complete years that have passed from shnas hayetzira by twenty-eight, and for the remainder less than twenty-eight, take for each year one day and six hours.

Explanation

One must divide the years since creation by 28, and for the remainder take for each year a day and six hours (1¼ days), add 3 days (because the first tekufas Nisan was from the beginning of Wednesday night), and divide by 7 — the remainder shows which day of the week tekufas Nisan falls.

Novel Points and Explanations

1) Why specifically 28 years? Tekufas Nisan can only fall at four time-points in each day — beginning of day, midday, beginning of night, midnight (i.e. 6:00, 12:00, 18:00, 0:00). Each year tekufas Nisan shifts by a day and a half (because shnas hachama = 52 weeks + 1½ days). There are 7 days in a week × 4 time-points per day = 28 possible combinations. After 28 years tekufas Nisan returns to the same hour on the same day of the week. **This is the cycle of Birkas HaChama.**

2) What does the cycle actually mean? The 28-year cycle is **not astronomical at all** — it's only a calculation of days of the week. The days of the week are not "real things" on the level of the mazalos. It's plainly a calculation tool, not a description of how the sky works.

3) The Rambam's example: For year 4930 (4930 to the count of creation): 4929 ÷ 28 = 176 with a remainder of 1. This means we're in the second year of the cycle. One year × 1½ days = 1½ days, plus 3 days (for Wednesday night) = 4½ days. 4½ ÷ 7 = remainder 4½, which means tekufas Nisan is **on Thursday night, 6 hours into the night**. From there calculate further: tekufas Tamuz = Thursday 1½ hours into the day; tekufas Tishrei = Thursday 9 hours into the day; tekufas Teves = Friday night 4½ hours; next tekufas Nisan = beginning of Friday — a whole day and a half shifted.

4) Adding 3 days — the reason: Because we count the week from Sunday, but the first tekufas Nisan was from the beginning of Wednesday night. If we counted from Wednesday to Wednesday, we wouldn't need to add.

Halacha 6 — A Shortcut to Know Which Day in Chodesh Nisan the Tekufa Is

The Rambam's Words

If you want to know on which day of the month tekufas Nisan of this year will fall… take for each year eleven complete days… and add seven days at these times… and cast out everything by thirties…

Explanation

A simplified calculation: Take 11 days for each year in that cycle, add 7 days (in the Rambam's time), divide by 30, and the remainder shows which day in chodesh Nisan the tekufa is. This is not precise, but the error is limited to less than a week — and because we already know which day of the week it must be (from halacha 5), we can correct the error.

Novel Points and Explanations

1) What are the "11 days"? The difference between shnas hachama (365.25 days) and shnas halevana (354 days) is approximately 11 days. The Rambam makes an easier calculation with round 11 days instead of the precise difference.

2) Why add 7 days "at these times"? This is a key point: The entire reason why complicated calculations are needed is because after each 19-year cycle there remains a difference of 1 485 parts between sun and moon. The Rambam calculated that in his time (approximately cycle 260) approximately 7 days of difference had already accumulated. **The Rambam's 7 days is a constant for his period.**

3) Current times: The commentators say that today one must add **11 days** instead of 7, because we are much later after the Rambam, and the difference has further accumulated.

4) How does one correct the error? The calculation is not precise — there can be a difference of several days, but **not more than a week**. Because we already know from halacha 5 which day of the week tekufas Nisan must fall, we can adjust the imprecise result to the correct day.

5) The connection between halacha 5 and halacha 6: Halacha 5 gives the day of the week (precisely), halacha 6 gives the day of the month (approximately). Together they give a complete picture. The Rambam notes that technically one already knows everything from the previous calculations (from chapter 9), because those calculations already assumed that one knows when chodesh Nisan is — but halacha 6 gives an **easier, quicker** way to arrive at the same result.

Halacha 6 (Continued) — The Example and Limitations

The Rambam's Words

The Rambam brings an example for year 4930 and says that one will never need to add more than 1, 2, or 3 days. If one needs to add more — "know that you erred in calculation and return and calculate precisely."

Explanation

The Rambam gives a simplified method that uses the fact that one already knows Rosh Chodesh Nisan and the weekday of the tekufa. Instead of precise parts, one calculates with whole days.

Novel Points and Explanations

1) The example of year 4930: Year 4930 is the 19th year of the 260th cycle. Rosh Chodesh Nisan is Thursday, and tekufas Nisan is also Thursday (both facts already shown earlier). One takes 18 years (because it's the 19th year, meaning 18 years have already passed), times 11 = 198, plus 7 = 205, divided by 30 = remainder 5. One counts 5 days from Rosh Chodesh Nisan (Thursday), arrives at Monday. But we know the tekufa is Thursday, so we add days until Thursday — comes out tekufas Nisan is **8 Nisan**. This is the entire benefit of the

approximate calculation — simple arithmetic instead of complicated parts.

2) The limitation of adding days: The Rambam says one will never need to add more than 1, 2, or 3 days (because the approximate calculation must be in the same week). **A novelty is that the Rambam himself calculated that sometimes one needs to add 4 days** — this is already a wonder, but it can happen. If one needs to add more than 4, the Rambam says: **"know that you erred in calculation and return and calculate precisely"** — one must return to the precise calculation. "Bedikduk" apparently means the precise calculation from earlier, and it may be that after many years the approximation becomes more off.

The Great General Matter — The Drift of Tekufas Shmuel and the Necessity of Mashiach

Novel Points and Explanations

1) The foundation of the entire chapter: The entire chapter 9 is built on tekufas Shmuel, which is only an approximate calculation. The Rambam himself will say in chapter 10 that it's not precise, and it wasn't used for the true ibbur. The entire practical use is only for the few halachos that follow tekufa (like Birkas HaChama, she'eilas geshamim, etc.).

2) The "drift" of our calendar: The machzor ha'ibbur of 19 years is not perfect — it's missing 1 485 parts from each cycle. This means that over time the tekufa (the true equinox) constantly shifts later compared to the calendar. **In the Rambam's time it was already 7 days off; today it's already almost 11-12 days off.** This means that the true spring equinox today falls almost two weeks earlier than tekufas Shmuel calculates.

3) "Shamor es chodesh ha'aviv" — Pesach becomes "early": If the entire reason for chodesh ha'ibbur is "shamor es chodesh ha'aviv" — that Pesach should fall in spring — a serious question arises: Because the calendar drifts, Pesach constantly becomes earlier compared to the true equinox. **Today the tekufa (true) is still before erev Pesach, but it's constantly shifting.** After several hundred years it will turn out that the true tekufa will already be after Pesach — perhaps in chodesh Iyar — and Pesach will no longer be in "chodesh ha'aviv."

4) Mashiach must come to fix the calendar: All commentators (the commentator on the Rambam and others) answer that **for this Mashiach Tzidkeinu must come.** Mashiach will bring back a Sanhedrin, and the Sanhedrin will make a takana — **remove one chodesh ha'ibbur** — which will shift back the calendar and fix the drift. **Even with the most precise calculation it doesn't match one hundred percent**, because the cycle of 19 years has a small remainder. Therefore, over time, Pesach constantly becomes early (i.e. the calendar shifts forward against the sun), and only a Sanhedrin can fix it by actively being me'aber.

5) Bederech tzachus: Mashiach must come to make a Sanhedrin, all Jews must agree (at the very least), and for this one needs to have a Mashiach. This is a practical reason — the calendar itself demands an eventual correction that only a Sanhedrin can carry out.

Until here chapter 9.

Full Transcript

Rambam Hilchos Kiddush HaChodesh Chapter 9 — Tekufah and Ibbur HaShanah

Introduction to the Chapter: Tekufah and Ibbur HaShanah

Good Jews, we are learning the holy Rambam Hilchos Kiddush HaChodesh Chapter 9. So, first I want to acknowledge the donors of the shiur, and besides that we are learning about the year.

The Two Dinim in Kiddush HaChodesh

So, basically like this, Kiddush HaChodesh speaks about the halachah of two dinim:

1. **Kiddush HaChodesh** — that we know which day is Rosh Chodesh

2. **Ibbur HaShanah** — which is structured so that the years should align and the shnas hachamah (solar year) shouldn't become too far removed from the shnas halevonah (lunar year)

Which we already spoke about at the beginning, that Pesach shouldn't fall in winter. Yes, that's the technical reason, but in practice if there can't be a calendar, it's not like that.

The Tekufah — The Primary Sign for Ibbur HaShanah

And they learned, this is basically, I mean this is how the introduction to the chapter goes, and they learned that how do you know when you need to be me'aber (intercalate)? The first sign that the Rambam said in the previous chapter is the tekufah, that **tekufas Nissan must come out before Pesach**. That's the halachah basically. Right? Yes. So if so, you need to know what is a tekufah, and how do you know when it comes out, so that you can calculate when to intercalate the year.

I mean to explain in the simplest way how we look at tekufah today is when it begins to change. That means winter the days are shorter, and summer they are longer, and this is divided into four. For example tekufas Teves is when the days begin to become a bit longer, it already begins to shift back towards summer, and summer is when it is let's see if this is correct. Let's first understand why this falls out here. I'll just say first the halachah, the introduction, afterwards we'll see what this is.

In Practice You Don't Need to Know When the Tekufah Is

In practice however, this is important to know. In practice however, it's very interesting, because in practice you never need to know when the tekufah is for the ibbur. Why? Because we already have a calculation. It was said, the Rambam said that both kiddush hachodesh and ibbur hashanah was apparently once a beis din that sat every year.

Investigation: Does Ibbur HaShanah Also Have Two Foundations — Re'iyah and Cheshbon?

It's interesting that the Rambam didn't say by ibbur shanah that there are these two things, no? It's interesting from the Rambam. Yes, he did say it. Do you understand my question?

Regarding kiddush hachodesh we know clearly from the Rambam that there are two foundations of kiddush hachodesh. There is kiddush al pi re'iyah (by sighting), there is al pi cheshbon (by calculation), and the halachah l'Moshe miSinai, or whatever the process is, is that when there is no re'iyah you go al pi cheshbon.

He never said clearly on the topic of ibbur when it goes automatically. That means, when the Rambam... how... let's just look quickly, yes? In Chapter 6, again, Chapter 8 is also the calculation. How did he say how to be me'aber the year? In the halachah Chapter 4, right? He says everything ra'uy beis din, and he doesn't say anything about that there is once a calculation of the ibbur. Suddenly, perhaps later he speaks about this?

Suddenly now, when we begin to speak about the year, that means already by the... how did our Rambam say the calculation of nineteen years? I mean that in Chapter 1 he begins that what we knew now said that Rosh Chodesh and the ibbur was done by re'iyah and ibbur on Rosh Hashanah is mipnei hatzorech, the Sanhedrin does it, and later he says, this is as long as there was Sanhedrin, but afterwards you begin to do with calculation, and he begins to explain how the calculation works regarding the molad, so regarding Rosh Chodesh, and now he comes, and he continues like, and how does the calculation help us regarding ibbur?

But I'm just trying to understand, as if there is once when we are me'aber the year not al pi cheshbon, but al pi... regarding kiddush hachodesh, there is something of an amount of time that it takes truly each month? The truth is that they learned, they will learn later more, this is only the molad hamemutza (average molad). Truly, there are indeed variations each month, all the more so that the re'iyah changes each month. And if there is a matter that you should go al pi re'iyah, I understand why there is such a distinction of re'iyah and beis din?

The Difference Between Kiddush HaChodesh and Ibbur HaShanah

Which is not so with ibbur shanah, this is the year, you add a month, but it's not with a month. It's not a thing that changes essentially at all. Essentially it's one hundred percent, okay, almost one hundred percent, ninety-nine percent, kavu'a v'omed (fixed and established) from the beginning of creation, that this long is the year, this long is the shnas hachamah, this long is the shnas halevonah, this long is the shnas halevonah, you need to make a combination.

So essentially, it's not very hard to understand why there should be a reason that you should go against the calculation. That means, the Rambam said that there is a need, you sometimes intercalate pnei hatzorech, as the Rambam himself said at the end of the chapter, and we discussed then, that apparently this is only within a year, you can move a year within where you can still move, but you can't go against the calculation.

So, do you understand what I'm saying? So, it's not clear to me, it seems to me that by ibbur shanah the calculation is even more important, because this is more basic, there truly isn't any re'iyah here. It's not the simple understanding that lechatchilah you need... well, let's say like this, the distinction in the halachah is apparently like this:

- **Kiddush HaChodesh** — lechatchilah you need a re'iyah, that means when there is a beis din, there is also the matter of calculation

- **Ibbur HaShanah** — whatever you call it, ibbur shanah, there isn't such a thing that lechatchilah you need the reasons. On the contrary, essentially you go with the calculation. Sometimes, pnei hatzorech, the beis din can make an ibbur shanah in the appropriate year.

Discussion: The Tekufah Is Always a Calculation

Speaker 2: You mean to say that when the tekufah falls out is always a matter of calculation.

Speaker 1: Right, it's a calculation. But it did stand that the tekufah is one of three or more reasons. The Rambam however made very clear that the other reasons are more political or as if social reasons, but they are only reasons for changing. That means, on the contrary, it's not automatic. The tekufah, the Rambam said that the tekufah is the only thing that on this alone you can be me'aber the year, right? This is the essential ibbur shanah. Everything else is sometimes... the other is like additions to the main thing. On the contrary, it goes away from the main thing sometimes, or you make it a support for the year, so the people should better understand.

Speaker 2: Yes, but even then it appears that the Chachamim had to be kove'a it, the Rosh Beis Din had to say "mekudash" and so forth.

Do You Need a Beis Din in Eretz Yisrael for Ibbur HaShanah?

Speaker 1: But that too, on that the Rambam said clearly... ah, here there is indeed a question I think. The Rambam also said clearly, for example on kiddush hachodesh the Rambam says clearly here, and even more clearly in Peirush HaMishnah, that when you don't have a beis din in Eretz Yisrael, there are no months. Would also ibbur shanah not be without a beis din? It's not clear to me. Does it perhaps sound from the same "eidah zo"? Perhaps that is only "eidah zo shenitmeser lahem", only on kiddush hachodesh.

Speaker 2: It says even if the Rosh Beis Din isn't there, you need to make it al tnai im yirtzeh ploni, as long as he is here.

Speaker 1: Yes, but that's more the practical thing. For example today when we do have a calendar, when you go entirely on the calculation, is something missing? Does the Rambam need to have the Jews... let's say, the Rambam says that technically the Jews in Eretz Yisrael make kiddush hachodesh every month. Do they also make ibbur hashanah? Perhaps yes? Not sure.

When he finishes and he says that our calculation is al cheshbon bnei Eretz Yisrael, he doesn't speak of ibbur, he speaks of the month. Interesting. Automatically is also the month, because it's kove'a chodesh Adar, but... yes, but that means already in the manner of encompassing. The beis din says that it's chodesh Nissan. The beis din says that it's a new month. There is a word that now is Rosh Chodesh, yes. I don't know. Okay, so anyways.

Conclusion: In Practice You Don't Need to Know the Tekufah

So what I'm saying, in practice in current times certainly, and perhaps never, you need to know, you didn't need to. That means, sometimes, that means, once you need to know, but for the moment when we have the calculation of nineteen years, when you make seven of them, I don't remember which years anymore, guchadt, whatever, each a certain period of years, of

every nineteen years, there is no nafka minah to know when the tekufah is.

It's only a nafka minah for what they bring here, it's a nafka minah for the berachah of oseh ma'aseh bereishis to make, or it's a nafka minah for those who don't drink water by the tekufah, or it's a nafka minah for the halachah of geshamim, that you ask for rain sixty days after the tekufah, truly small things. But for the essential matter, apparently it's not relevant at all, apparently not in our time, it's not clear.

Yes, Nittel. One important thing. As that one said, I saw someone says that in Belz there is everything its own, there's its own Yoshke, another Nittel. So, no difference. So, I don't know what the secret is.

Why Does the Rambam Learn the Calculation of Tekufah?

So, in any case, with all this, so apparently you need to say two things further. First, if there will be a beis din when you will need to calculate the tekufah, the Rambam says how to calculate the tekufah. And second, the Rambam essentially wants that a Jew should understand. It can be relevant, but this is only relevant after what we will learn and explain, that if indeed Jews need to sometimes add a day to the tekufah, add another day, make one month, take away one month over, or such a sort of thing, okay, I'm just saying that regarding the halachos that stand here, this is only to know how it was calculated, or perhaps for the future when again you need a beis din, you'll be able to change, and so forth. So anyways, now. Right?

The Mitzvah of "Ki Hi Chachmaschem U'vinaschem"

So now, in order to know what is the tekufah, you need to learn. The tekufah is a din in shnas hachamah. In truth, the question isn't a real question, because the Rambam held that the calculation thereof, the beauty of understanding the workings of the heavens, is a mitzvah of "ki hi chachmaschem u'vinaschem". It won't be relevant in practice, but it is relevant in practice. Because the Rambam doesn't just tell us interesting facts about the stars, he doesn't do that. He comes to everything with what is relevant in practice. But he broadens himself, he does indeed want to show us the beauty of the calculations.

Right, but on the other hand, many calculations that we will learn here are merely heicha timtza how to make the calculation. It's his calculation, he doesn't give out the truth, in detail, the entire chapter is only approximate, as we will learn tekufas Shmuel. But even later we will learn the second half of the chapter, how we calculate in practice, when is the tekufah each year, it's only practical how to know. The calculation doesn't teach out how it truly works. It's yes, as if the Rebbe wants, you should be able to make a calendar if you would have been the beis din that needs to make it.

This Chapter Is Less Relevant in Practice Than the Previous Chapters

That means, I mean to say that it's even less than the previous halachos. The previous three chapters that we learned how you will know when is Rosh Chodesh, is in practice the halachah, what do you want when the calendar, you need to know those three chapters, therefore those three chapters stand even in Shulchan Aruch, in Tur, because you need to know how to make a calendar, and you have printed a calendar, you don't need to, but someone needs to know. What we're learning now no one needs to know, because everything that you need to know, when is the leap year we already know. From the previous calculation of the nineteen years.

Shnas HaChamah — How You Calculate the Length of a Year

Introduction: The Nature of This Chapter — Calculations That Are Only Approximate

Speaker 1:

Right, but on the other hand, many calculations that we will learn here are merely heicha timtza how to make the calculation. It's his calculation, he doesn't give out the truth, in detail, the entire chapter is only approximate, as we will learn tekufas Shmuel. But even later when we will learn the second half of the chapter, how we calculate in practice, when is the tekufah each year, it's only practical how to know. The calculation doesn't teach out how it truly works. It's yes, as if I the Rebbe wants, you should be able to make a calendar. If you would have been the best one, who needs to make it? That means, I mean to say that it's even less than the previous halachos.

The previous three chapters that we learned how you will know when is Rosh Chodesh, is in practice the halachah what do you want when the calendar you need to know those three chapters. Therefore those three chapters stand even in Shulchan Aruch in Tur, because you need to know how to make a calendar, you need printed a calendar, you don't need to, but someone needs to know. What we're learning now no one needs to know, because everything that you need to know, when is the leap year we already know from the previous calculation of the nineteen years.

Okay, so let's go learn the first halachah, and I'll explain what's going on.

Halachah 1: Shnas HaChamah — Three Hundred Sixty-Five Days and a Quarter

The Rambam's Language

Speaker 1:

Shnas hachamah, how long is a shnas hachamah?

Speaker 2:

Yes, we learned that we Jews calculate both things, we calculate the sun and the moon. But what is relevant for the seasons of the year, that the tekufah is called... seasons and tekufah is a very similar thing, no?

Speaker 1:

Yes, let's take this a secret. Okay, the four tekufos of the year, the tekufah of the... **There are from the Chachmei Yisrael who say that the length of such a year is three hundred and sixty-five days.** Three hundred and sixty-five days, everyone knows that. But it doesn't end here yet, **there is still a quarter of the day. Six hours is...** That means, a quarter day is six hours.

Speaker 2:

Yes, a quarter day is a bit more than six hours, because here it's a bit more than six hours.

Speaker 1:

But there is one who says less than a quarter day, a bit less than a quarter of the day. In short, there is a dispute. **And so...** I say the Rambam, **the dispute is not only among**

the Chachmei Yisrael, but also the chachmei Yavan u'Paras. There is among them a dispute in this matter, the sages of Greece and of... only that the Persian sages also had a dispute between this, and the sages also had the same discussion, or they had the same dispute how long the year is.

Everyone knows that there is such a thing as a shnas hachamah, and everyone also knows that it's three hundred sixty-five days, such things are known. It says in the Gemara, he says, they are by Pitum HaKetoret, yes, true, keneged shnas hachamah. Very good.

Digression: Jewish Years Are Not 365 Days

Speaker 1:

And what do you do when there are other years? We already learned. When we learned in Shekalim, we saw that it doesn't match, because there are years that are longer, and you need to make a whole piece of Torah when you make the shekalim, because that is only in a general manner. That means, at the end of the calculation, at the end of nineteen years, you need to have nineteen times three hundred sixty-five. But in between the years, no single one of our years is three hundred sixty-five days, true? It's either three hundred fifty, fifty-four, fifty-five, or three four five and eighty. Anyways, whoever wants to prepare for a year something, he needs to know that a Jewish year is never three hundred sixty-five days. It's always either more or less. Anyways, but people know that the shnas hachamah is three hundred sixty-five days.

What Actually Is a "Shnas HaChamah"? — Why It's Not Simple

No One Knows Exactly What This Is

Speaker 1:

Now, I'll say an interesting thing, that no one knows exactly, if you ask a normal person, what is a shnas hachamah? He doesn't know what this is, because it's not at all such a simple thing to figure out that there is such a thing. Or what it is, and certainly not to calculate precisely. Why?

First Observation: Seasons

The Solar Cycle: The History of Astronomical Calculations and the Methods of Reckoning

Introduction: The Long History of Astronomical Research

Why Astronomical Calculations Are So Difficult

Speaker 1:

Okay, everyone says a year, make the summer, the winter, as you say, seasons. Everyone can see that. That is, at least whoever lives in a region where there are seasons. At the equator, for example, there are no seasons, not in every region in the world are there seasons, but whoever lives in Eretz Yisrael, in America, in Europe, more or less, that is, at a certain latitude there are seasons, he can see every period of time the same winter returns, the same summer. He knows that there are seasons, whether he knows that this has seen him, I don't know. But he sees that here it grows, here it doesn't grow, here it's cold, here it's hot, and so on.

Second Observation: Length of Days — But This Is Almost Impossible to Calculate

Speaker 1:

The second thing, the Jew begins to look, and he also sees that the days become longer and shorter. Another thing, but you must know, this is almost impossible to calculate. It's very hard to calculate exactly how much longer a day is. On which day it changes, you understand?

Speaker 2:

No, in general, a week or two into the new tekufah (season), one will notice that the day is already a bit longer.

Speaker 1:

Not only that, how do you calculate how long a day is? Do you remember that we once had sha'ot zemaniyot (proportional hours), sha'ot zemaniyot never change. How must you have some clock that tells you an hour so you can calculate how much longer the day is today? It's understood that there's a great difference. There is in the Gemara. He noticed, it could be that he already noticed a few weeks into the thing that the day is longer. He sleeps, he has his daily routine, and he still had left over a... now he has an extra half hour.

Speaker 2:

Yes, yes, I'm just explaining. Clearly so. Certainly, that it becomes greater, that the great differences a person can notice.

Speaker 1:

Right, right. About this I say that it can perhaps last a few weeks in. The day itself, when it begins to change, to shift...

Speaker 2:

You already know too many things.

Speaker 1:

This is another thing that one notices. I'm beginning to tell the story of Adam HaRishon (the first man). He notices that there are longer and shorter days.

Speaker 2:

Okay, it seems, after you say so, he figures out that there's some cycle here.

Speaker 1:

Okay, interesting.

Approximately 12 Lunar Months = A Year — But This Is Only Approximate

Speaker 1:

Now, but it's not enough. To know how long a year is, this is not enough at all. But how will you know? You'll know approximately.

Speaker 2:

Okay.

Speaker 1:

From this, people have said, approximately twelve times what it takes for the moon to go around is a year. Approximately. It's very approximate.

Third Observation: Position of the Sun in the Sky — This Is the Main Method

Speaker 1:

So, there is essentially almost only one precise way to know, and that is that... there are two precise ways. First of all, one can calculate, and another third thing, which perhaps not everyone knows, whoever looks at the sun knows, and will see that the sun throughout the year, certainly a whole year it comes out from the east, it rises in the east and sets in the west, but not from the same area in the east and west. That is,

throughout the year it moves to the north or to the south, the sun. And also, it crosses the sky in a shorter or longer time. As if the sky is a large plate over the world, you can go on the side as if, which takes faster, and you can cross in the middle and in the center for longer. One can even go from one side to the other side. In short, one can say it like this: throughout the year, either the sun comes out from the right or left of the east, and either it comes higher.

Speaker 2:

No, it won't help.

Speaker 1:

No, it can't help. Here is the middle, and here is when it goes from the side. In short, it can't confuse me. I'm just saying what is. Whoever wants to look and will see... can see a picture?

Speaker 2:

I think it's clear enough without the picture. I don't know, I can't be.

Speaker 1:

In short, yes, the sun is too large. You want to see how it is with your hands? Do it like this and like this, do it like this and like this.

Speaker 2:

Okay.

Speaker 1:

This is another thing. And further, this is also a certain cycle.

Measuring Shadows — The Easiest Way to Record

Speaker 1:

Now, a third thing that one can notice, one can measure, because the sun in the summer is for example higher in the sky, in the winter it's lower, in the spring or in Nisan and Tishrei it's somewhere in the middle, so it's different at midday. So in the middle of the day, when the sun is in the middle of the sky, it's always at a different angle. So it comes out that in the summer for example, if you put a stick outside in the summer, the shadow will be very short, or almost have no shadow, because the sun is directly above you. But in the winter it will be longer. So this shines from one side, automatically the thing casts a shadow.

So once upon a time, this is basically the way that was discovered how long the year is. This one can indeed record. This is the easiest thing to record. When you have a stick, it lies in the ground, you take a pen, write it down. One sees in Tanakh already such clocks. This isn't a clock, this is a calculator to know which tekufah in the year it is. When the shadow comes to the previous one, once upon a time, I read, how did one know when the winter, the summer would come? One saw, the sun comes to the... and one took the large building in the city, the synagogue, the church, whatever, one scratched out such things there. When the sun is here, **"when the sun is at the head of every person"** the Gemara calls it. About the day I'm speaking now, yes. But the tekufah one can see, because the shadow changes according to the tekufah. So this is basically what was.

How Did One Calculate the Precise Length? — Average Over Many Years

Approximately 365 Days Is Known Things — But More Precisely Is Very Difficult

Speaker 1:

Now, this is still not enough, because this is also very hard to arrive at a day. So that is, to arrive that approximately three hundred and sixty-five days it takes, this is known things. One already knew this a very long time ago, perhaps Adam HaRishon, I don't know when, one already calculated, that approximately, in order that the shadow should be so long, or the days so long, or so... and what did I say the third thing? The sun comes up at the same angle in the sky, not angle, the same latitude. This one already knew a long time, that it's approximately three hundred and sixty-five days. But to know more precisely than this is quite complicated, because less than a day is very hard to calculate. Even a day, back then, there were once cultures that thought that a year takes shorter, three hundred and sixty days, and this is because it's actually very hard to calculate. It's not people think that... eh, it's quite... look at the calendar. The calendar took hundreds and thousands of years of people to figure out basic facts of how long it takes the sun to come to the same place, or the same phenomena that we see, back then very long to calculate.

The Secret: One Calculates a Hundred Years and Makes an Average

Speaker 1:

And the secret how it was calculated is that one made an average. That is, he calculated a hundred years, and this means that he must have an institution, a beit hamidrash (study hall), a "your wisdom and your understanding," some place of wisdom where people wrote down on a paper, precisely the sun was here in such and such year in the years. One added together a bunch of years, one saw, wait, I thought it's three hundred and sixty-five days, meanwhile here we've moved off by a day. Ah, it's caught, one must divide how many years it was between this calculation and that calculation. You know, little by little more and more precisely, how it's a bit... that it's so much and so much days, plus a bit more when the day, automatically it will match why nineteen years comes out that it's off by a day or whatever.

Moral of the Story: One Should Not Make Light of the Sages

Speaker 1:

I bring this out only because today when one learns Hilkhot Kiddush HaChodesh (Laws of Sanctifying the New Moon), immediately someone begins to say, so the sage Shmuel, the Amora made a mistake, he didn't know, another one didn't know, and as if it's very easy to know. You're just an oneis al gabei oneis (one compelled circumstance upon another), you stand with a paper, it says here. You know what? Tell me how long a year takes, figure it out. First of all, there's a whole year, one must... fall asleep in the middle of the year. The first thing, it takes much more than a whole year, because one must calculate throughout tens of years or perhaps more, and this means that there must be a place of wisdom where one can

Tekufat HaChamah: The History of Astronomical Calculations and the Methods of Reckoning

Introduction: The Long History of Astronomical Research

Why Astronomical Calculations Are So Difficult

Speaker 1: There's a continuation. So, someone once said that astronomy is the longest running research project in the history of the world, which is literally throughout thousands of

years. The reason we can calculate is because we still have calculations from the ancient Babylonian astronomers, they still have lists when they wrote when there's an eclipse, which helps us to calculate many things. And certainly to make precisely to an hour, to a second, is extraordinarily difficult.

And this is the reason why there was a dispute. Dispute doesn't mean a real dispute, it's not a dispute in reality. It only means to say that it was hard to calculate. So first one calculated more roughly, more and more, little by little it became more and more precise. This is the real story.

And this is what the Rambam says, and he goes to speak about this later more, that the calculation... So, what the Rambam says that there were both the sages of Israel and also the sages of the nations of the world, this is approximately... known things in history.

How Much Time It Takes to Figure Out the Calculation

Speaker 1: Approximately, the one you go in the calculation, in the calculation, in the calculation, he already calculated the calculation that Shmuel says, that a year is three hundred and sixty-five and a quarter. That is, this is enough to calculate, because after four years you already come to a whole day. Yes, four years you figure out that this is more or less a calculation.

And our calculation, as we learned earlier, our calculation of nineteen years, which also this was already gentiles in those times. It's not only the years that they introduced.

Wait, I had a small note. That it can't once become off by a day, itself probably took very long to figure out that it goes exactly.

Speaker 2: So if in four years one sees that one is off by a day, means that every year is a quarter day. Like the first one thought.

Speaker 1: One hundred percent. It takes indeed much time to calculate. And they don't respect enough how much time is important. Not because we are smarter, because it actually takes time to figure out what's going on.

The Sages of Israel, Sages of Greece, and Sages of Persia

Callippus and the Calculation of 365 and a Quarter

Speaker 1: So, but already, at least Callippus, who was an ancient sage from Greece, already knew that a year is three hundred and sixty-five and a quarter days. And our calculation which makes nineteen years, what's it called, nineteen years of the intercalation, our cycle, is built on this calculation, as the Rambam already said earlier, except that something remains left over, but it's all built on this calculation. Something remains left over, even according to this calculation something remains left over, according to the other calculation something else remains left over, but it's built on this calculation. And this is an old calculation.

Hipparchus and the More Precise Calculation

Speaker 1: Later came people, Hipparchus was two hundred years later, and he figured out that it's actually a bit shorter. This is the "yesh mi she'omer shepachot merevi'a yom" (there are those who say less than a quarter day), and he's right. That is, it's not quite a quarter day, it's a bit less. He said that it's one three-hundredth less of a day. A three-hundredth day less than half a year. And once in several years one had to subtract one day. Right. It's a bit shorter.

And how did he figure this out further? He calculated from hundreds of years and saw that it's already a bit too late, one went too fast already, one holds already too far.

So in short, this is the sages of Greece. I don't know who are the sages of Persia that the Rambam means. Sages of Greece we know, not clear. I don't know how the Rambam meant.

Shmuel and the Sages of Israel

Speaker 1: But the sages of Israel is Shmuel. The tekufah that we calculate here, the one of three hundred and sixty-five and a half, stands in the Gemara in the name of Shmuel. But Shmuel, certainly, it doesn't mean that Shmuel originated it. Shmuel was an astronomer, he was engaged in the sciences. He heard from which... but the sages simply heard from the sages of Persia, more than from the sages of Greece, because they lived among the sages of Persia, yes, in Babylonia.

Speaker 2: Ah, perhaps this is what the Rambam means from Shmuel? The Shapur Malka with all the group.

Speaker 1: And there are those who know, we will later in the next chapters see that it's actually a bit less, and automatically one must make other calculations. But the calculation is still approximately, and it's off, as one says, by a few minutes, it's not off by much time.

Good. So until here is the introduction why it's so hard to know.

How One Measures a Year Through Stars

The More Precise Method: Looking in the Sky

Speaker 1: Ah, there's another important thing that I didn't say, one must remember, another important thing. I told you how one sees on the earth when it's a year. Later one figured out, perhaps at the same time, I don't know, that one can also see in the sky when it's a year. This is the most precise way. I mean, even this, again, one must calculate many years to know precisely, but a bit more precise way to know the tekufat hashanah (season of the year), the calculation of the year, when it returns to the same place, is not the length of the day, or certainly not the weather, because weather is absolutely not possible to know precisely. You can know approximately, but up to a week probably it's not precise, or more.

But what one can indeed know precisely, the ancient sages already figured out that one can see in the sky.

The Movement of the Sun Among the Stars

Speaker 1: What can one see in the sky? Very simple, a Jew looks up at the sky, he sees a map of stars. Here there are the stars, here there are those stars, here there are those stars, and so on. And now the stars change every day. There's a setting and a rising of the stars from east to west every day. This is exactly like the sun comes up, it goes down, but every night the same.

But what does he indeed see? A very interesting thing. That the sun, relative to the stars, changes. The sun and all the planets, truth be told let's speak about the sun. The sun is not every day it comes up at the same point. If they would all be on the same sphere, would they be expected that they should be exactly the same, yes? And it's not so.

Speaker 2: It's noticed that I specifically took out spheres.

Speaker 1: Okay, no, I didn't mean all the books how it wasn't. I meant to say, if the whole sky would rotate the same, would always be the sun relative to the stars the same. It's not so.

But the fact is... they knew that the sun moves, that the sun goes under from other places. In other words, yes, the sun

doesn't travel with the stars, it travels... outside of the stars, it travels through the stars, and more. And it moves relative to the stars, it moves on the sky.

For the Shekels, for example, every morning, you'll see on one day, at a certain time of the year you'll see the stars there, and at another time of the year you'll see other stars there. It turns out that the sun, besides the fact that it moves every day, and the whole world truly moves every day, it also moves between which stars it is, and it goes back the way. That is, from west to east. Every day you'll look with observation, it's closer to a star that is a bit higher, as it were. That is, if one looks inside at a picture, one will see, understand simply, but the basic observation is very simple, one can see it. Whoever looks at the stars sees that the sun is not found next to the same stars a whole year, rather it changes constantly.

The Twelve Mazalot

Speaker 1: They made a star chart, and they divided the stars into twelve parts, based on pictures that one can see in the stars, no difference. They divided the sky into twelve parts. Yes, the sky, and in each part there were certain, like pictures of stars, like groups of stars, which they tried to make from such a parable, they said that this group of stars looks like a mouse, like a virgin, like so forth.

And it means that when one says the mazal is from the crab, it means to say that the sun is now next to the stars, next to the group of stars.

And now you have a bit more precise way to know that there is a year of the sun.

Speaker 2: That is, the cycle of the sun relative to the stars also takes a year?

Speaker 1: No. It means if one saw that the sun on that certain day was next to this and this group of stars, let's say next to a star group, which is called Cancer, and next time next year when it's again by Cancer, when a year has passed.

Speaker 2: Exactly.

The Definition of a Year and a Tekufah

Speaker 1: Now, this is the whole matter. This means a year, and a tekufah is plainly a quarter of a year. That is, the sun goes through the world, so when it's two opposite each other and the other two, these are the four quarters of a year. And the same thing, there are certain groups of stars, which are called in the mazalot. This is the whole matter.

So, it follows, if one will calculate how long everything takes, and one will count the quarters, one will know in which tekufah one is holding.

Halacha 2: The Calculation of Tekufat Shmuel

The Remainder of Each Cycle

Speaker 1: So, let's take. **Whoever says**, there was a dispute whether the solar year is three hundred and five and sixty and a quarter. He says, the one who says **there remains from each cycle of nineteen years one hour and four hundred and eighty-five parts. As we explained.**

What does this mean? That is, this is what we said, that it will be longer, and once in nineteen years one goes... Again, we learned that we have a cycle of nineteen years, from the cycle of intercalation. Then one adds to certain years of the cycle a month so that the sun and the moon should meet. But we learned that there still remains a remainder, that is, the moon, the sun is still longer than the whole nineteen years by an hour and 485 parts.

So, it turns out that each cycle the sun goes ahead by so much time, by the hour. This is according to the calculation. The whole remainder is built according to the calculation that the solar year is 365 and a quarter. If it's a bit less, it turns out that it's missing a bit less.

The Length of Each Tekufah

Speaker 1: It also turns out how long each tekufah lasts. **And there will be between each tekufah and the next one ninety-one days and seven hours and half an hour.** With the fact that there are four tekufot a year, each tekufah will be ninety-one days and seven hours and half an hour, will be a bit more than ninety-one days. This is basic math, three hundred five and sixty and six hours divided by four, comes out ninety-one and seven and a half hours. You'll calculate, you'll see that it's exactly right. It's not complicated.

How One Calculates the Tekufot

Speaker 1: Therefore, if we know that each tekufah has the same amount of hours, it has days and hours, **and once you know one tekufah on which day and at which hour it is**, you'll also know when the next tekufah is, and when two after that, **until the end of the world**, and you'll calculate, add another ninety-one days and seven and a half hours is the next tekufah.

And now the Rambam says,

Calculation of Tekufot – Tekufat Nisan and the Mazalot, the First Foundation of the Calculation, and the Method of Calculation for a Cycle and for a Year Within a Cycle

Halacha 10 – Tekufat Nisan and the Mazalot

Tekufat Nisan is the hour and the part when the sun enters the beginning of the sign of Aries.

And remember, but the Rambam didn't say it properly here, he's going to say it later, but we remember that they divided the sky into... The Rambam actually said in Hilchot Yesodei HaTorah. They divided the sky into twelve parts, which is called by the acronym TaShaD SaAB AKaDD, it's enough to remember, it's in Rashi Taleh Shor Te'omim Sartan Aryeh Betulah etc. So each one of the three letters is a quarter year, so Tekufat Nisan is when the sun comes into Mazal Taleh. And Tekufat Tammuz is... the second tekufah, Tekufat Tammuz, is when the sun is **at the head of Mazal Sartan**.

Yes.

And Tishrei it is in Moznayim. Rosh means at the beginning, yes?

Yes.

Just like techilah that here he says rosh. And **Tekufat Tishrei is when the sun is at the head of Mazal Moznayim. Tekufat Tevet when the sun is at the head of Mazal Gedi.**

The Foundation of the Calculation of Tekufot – The First Tekufat Nisan

He says, Tekufat Nisan... Now we said that in order to calculate the tekufot, one must calculate one tekufah after another. It's a calculation.

Yes, or every year three hundred sixty-five and a half.

One only needs to know when was the first Tekufat Nisan. He says, we make a calculation. Commentators can struggle whether it's built on reality or not. It's built on some calculation. It's not necessarily that one claims that this is how it was, but one decided to calculate with such a calculation. That is, when one calculates back to when, this is the calculation, it comes out this way. But not necessarily that the world was created then, a day before that, Nisan and Tishrei, and all the investigations. The tekufah is not. And it was the first year of creation according to this calculation, was before the molad of the month of Nisan. **Creation according to this calculation**, when the creation actually was is still an investigation, **was seven days with nine hours and 642 parts before the molad of the month of Nisan. So the sign is, the sign is 7-9-642.** Seven days, nine hours and 642 parts before the molad of Nisan.

Discussion: Why Does One Need a Special Calculation for Tekufot?

Now it turns out like this, it turns out, I'll try not to say the calculation, it turns out that a Jew wants to know this year when will Tekufat Nisan be. This is what we need to know in the matter of the calculation, and in general, all tekufot we begin calculating from Nisan. So, what would you say?

He should think how many years are now from Creation, and he should calculate.

Let's say better, if all years would have been exact, if the year would not have been only a solar year, one who has only a solar year, doesn't he have no problems at all, he calculates exactly the first day of the year, or 91 days after Tekufat Tishrei, Tekufat Tevet, is Tekufat Nisan. It wouldn't have any problem at all. What is the problem? Why doesn't a Jew know when Tekufat Nisan is? Right? If you look at a gentile calendar which is essentially only the solar year, you know immediately, Tekufat Nisan is the day. Whatever day it is according to today's calendar. But it's no difference, there's no complication.

The problem is, we don't have such a calendar. We don't have a calendar that only has the solar year. We have the best calendar that we could make, which is a solar year plus lunar year together, that is the calendar of intercalation. So we still spoke that our calendar is off every nineteen years, that is, the sun goes further from the moon by an hour and 485 parts.

It turns out that your calendar, our calendar, that is, since Creation, since when the calendar began, although who knows if they intercalated years then, but this is how we calculate, from Creation until today the tekufah has already moved from the beginning of the year, that is from the beginning of our year, by approximately seven days, as the Rebbe says later. It moves constantly, it becomes constantly later.

This doesn't completely fix the problem, because of the hour that remains over make a calculation. Every forty-four cycles comes to another whole day. Not so much time, forty-four cycles is 19x24, and it turns out nearly every four hundred years comes to a whole day. So therefore we can't calculate from the year, we must remember according to which to add to the year that we have the remainder of the cycle, what remains over from the cycle of the solar year, which is still excess, remainder over the lunar year. Right?

Yes.

Halacha 11 – Calculation of Tekufat Nisan from the First Year of a Cycle

So therefore the Rambam says very simply, you want to know what the tekufah is? You'll do like this: **You'll know how many complete cycles**, that is we're now holding in the middle of one, but how many complete ones have been from the year of Creation until the cycle that one wants to calculate. **And you'll take to add**, yes? **Add one**, besides the previous calculation that has already been said, **you'll add another 1-485. Hours and all the hours days.** From all the parts that accumulate, you'll make an hour, and from all the hours, if you're already holding by more than twenty-four hours, you'll make a day. **And you'll subtract from everything...** Now you must subtract the time, because you remember that our calendar begins at the molad Nisan, right? That is, you know the molad Nisan, but... But the first molad was a week before that. Anyway, the tekufah was a week before the molad, yes?

I know take the amount of time, the seven...

You can subtract seven days and six hundred and forty-two parts. **And the remainder of additions you do on the molad Nisan of the first year of the cycle.** Exactly, so you make the year, plus, that is when it is, sorry, 485 times how many cycles there are, minus seven days. You add the number you get to the molad of the month of Nisan of that year, **and it will come out**, it will come out **which hour and which day of the month will be Tekufat Nisan of that first year in that cycle, and therefore you'll begin to count ninety-one days with seven hours and a half for each and every tekufah.**

That is, from the first year of the cycle you now know when Tekufat Nisan will be. From there one can calculate all tekufot forever and ever.

No, not forever and ever. From that year, from that year, four of them.

Just for, that's all. Because only every year you must add something, every year something changes, right? So, each of the years you know, 91 days from Tekufat Nisan you know, if you want to know from a year in the middle of the cycle, and not the first year of the cycle, you must add more, yes?

Halacha 12 – Calculation of Tekufat Nisan from a Year in the Middle of a Cycle

If you want to know. Because every year adds a whole ten days. The cycle, what one can only add 1-485, is only after the whole nineteen cycles one comes back to almost zero, one can only calculate one must add what we have left over. But in the middle of a cycle one is holding in the middle of the calculation. That is, the lunar year, the sun is holding much ahead in the middle of a cycle, or it depends if it's when a leap year or not. In short, the sun holds a different place in the cycle than after the cycle. Therefore, in the cycle, it's worthwhile to know the tekufah of a year in a cycle, you must do a bit differently. What must you do?

Yes.

Rabbi Eliezer says, **you want to know Tekufat Nisan of this year, which is year such and such in the cycle that you're standing in, take for all the complete cycles an hour and 485 for each cycle** – this we already said, right? **– and for all the complete years that have passed from the cycle, take ten days and 21 hours and 204 parts**

for each year – which is how much longer a solar year is than the lunar year, which is why we make once in thirty years, excuse me, once in three years, excuse me, **gather everything. And subtract from it seven days and nine hours and 642 parts** – just as you must always do, right?

Yes.

And the remainder complete lunar months 29 days 12 hours and 793 parts.

The difference of this calculation and the previous calculation is only one thing. First of all you must add the addition of the solar year over the lunar year from the years that are still in the cycle, and after you have the number you'll divide the whole thing according to the calculation of lunar months, that is 29-12-793, right? Right? And that's all. Now you're left with the number that you add to the month of Nisan, because divided by the moon you've already clarified, no difference how many leap years there were or not, because now you know how many days remained from the solar year more than the lunar year that has been meanwhile. It turns out, **and the remainder, less than a lunar month, you'll add to the molad Nisan of that year**. If it's already a whole month, there was certainly a leap month. If it's less than a lunar month, you add it to molad Nisan, and you'll know **you'll know the time of Tekufat Nisan of that year on how many days in the month it is and at how many hours**.

Halacha 13 – The Possible Times of Tekufot (Intervals)

Now, since – let's say this way – now, since the first, we have a tradition, that is this is how the calculation goes, that the first Tekufat Nisan in the world began at the beginning of the day of Wednesday night, it turns out, and since a year is exactly 365 and a quarter days, it turns out that Tekufat Nisan, according to this calculation, can never be except in a certain interval of six hours, because every year it moves by a day and a quarter day, more than a quarter day, that is, yes, because relative to the days of the week it moves by a day and a quarter. Anyway, the day is divided into four for the reason, yes.

Tekufat Nisan, which is the first, was the beginning of the day, and it moves, let's say that the next Tekufat Nisan will be, how is it called, 365 and a quarter days later, will be six hours later. Because of this it's either at the beginning of the night, or six hours later, or 24 hours later, or at the beginning of the day, or at midday. It's either six hours later, or 18 hours later, or at midday, four times a day, or 18 hours later.

And Tekufat Tammuz, which is 91 and seven and a half hours later, it turns out must be at intervals of seven and a half hours. It turns out Tekufat Tammuz is always either at seven hours and a half, or seven and a half, or one and a half of the day and the night, that is one and a half.

Tekufat Shmuel — The 28-Year Cycle and Calculations of Days of the Week

Halacha 5 (Continued) — The Four Tekufot and Their Hours

Speaker 1:

And Tekufat Tishrei, which adds another hour and a half, comes out at the nines, right? Either at nine hours, or at three hours. Three hours in the morning, three hours at night, no difference. And Tekufat Tammuz, which is another hour and a half, is further either ten and a half, or four and a half, it's from the day and from the night. Very simple. Because because it always adds a difference of seven and a half hours, you know that the tekufot, the four tekufot of the year, have certain hours in the day when they must fall, according to the calculation which is very precise in this way.

So now, this is a rule, a great rule in Torah.

Halacha 5 — Which Day of the Week is the Tekufah

Speaker 1:

Now, the next calculations will be that we want to know not which day in the month, in the month of Nisan will the tekufah be, from which you can calculate the rest of the months of the year, but which day of the week.

What is the important practical difference of the week? One would see that there are other things that are easier to calculate this way. But what I said earlier, besides the matter of Birkat HaChamah, yes, this is also a matter of Birkat HaChamah, but the Rambam doesn't say about this. Many calculations we said according to the days of the week, it's plainly easier to live this way sometimes with the days of the week, but what I said, these are calculations and in total about knowing things, it's not about how it works.

The days of the week are not real things at the level of the mazalot, it doesn't go. It's plainly a way to calculate. According to this.

Speaker 2:

Yes.

The Rambam's Calculation — Dividing by 28

Speaker 1:

Says the Rambam, what do you do? Yes, you want to know **on which day and which day of the week, at which hour, of a tekufah**, which hour and which day of the week, **so many complete years that have passed from the year of the calculation, until the desired year**, divide the years that have passed from Creation, **and add twenty-eight**, not add, divide everything, uh, divide it into tekufos of twenty-eight, twenty-eight. **And what remains less than twenty-eight, take for each and every year one day and six hours**.

Yes, again. There is a cycle of twenty-eight.

Discussion: Why Specifically 28 Years?

Speaker 2:

Why?

Speaker 1:

Because there are only twenty-eight.

Speaker 2:

What?

Speaker 1:

We discussed what?

Speaker 2:

Nu, nu, nu, continue.

Speaker 1:

Why do we need a cycle of twenty-eight?

Speaker 2:

Because the leap year is...

Speaker 1:

The leap year has nothing to do with twenty-eight. The leap year is nineteen. But the leap year says nothing about the day of the week.

The twenty-eight is a simple thing, because we just said that tekufas Nissan can only be six hours or twelve hours of the day or of the night, right? It's always the beginning or midpoint.

Now, in each year there is between one year and the next how many weeks? Fifty-two weeks, which is three hundred sixty-four days, plus one day and a half, which is the length of the solar year. It comes out that tekufas Nissan of the year, for example if the year's tekufas Nissan was on Wednesday at the beginning of the night, year zero, the first year, then the next year it was on Thursday at midnight, moved forward a day and a half. Yes?

Now, it comes out, if you calculate how many ways it can be, this is basically the simple way to say it, perhaps it's not the best way to say it, but if you calculate how many ways this can be, that is how many times in the day can the solar year be, that is each year it moves forward by a day and a half, a day and a half always, but it moves forward and forward and forward. It comes out that there are only twenty-eight ways, right? Because each day has four times that it can be, in total twenty-eight.

So, since it moves forward in order, so you can basically skip the days that it moves forward, if you want to calculate. In short, it comes out each day of the week, because it never stays on the same day, but after twenty-eight years it comes back to the same. So there is a cycle of twenty-eight years of which hour in the week tekufas Nissan begins.

This is the cycle that we celebrate in Birkas HaChamah. It's entirely this cycle, of which day in the week tekufas Nissan begins. It's nothing astronomical, it's just a calculation of days of the week.

The Mechanics of the Calculation

Speaker 1:

But in any case, I'm learning this now regarding Kiddush HaChamah, but he says, therefore, if you want to know which day in the week it will be, since in the world there have already been much more than twenty-eight years. So first of all, take away twenty-eight, because that's the period, that's how long it takes to come back to the same day of the week. So take away twenty-eight. And you're left only with the day and a half more than twenty-eight. So however much is left over from twenty-eight, give for each year a day and a half, and take everything together. Yes?

Why Add Three Days?

Speaker 1:

Now it's like this, **and add to everything three**, why should you add three? Because the year began, we calculate from the beginning of the week now, but the year began on Wednesday night, you need to add three days. And divide everything by seven, that means what remains, divide by seven, because I don't count a whole week. What remains over, start counting from Sunday, and where the calculation comes to, there will be tekufas Nissan.

Very simple. I hope it's simple enough. One needs to calculate it to see that it's simple, but it's very simple.

And why three? The Rambam says what I already said, because **the first tekufah was at the beginning of Wednesday night**. That means, if one would count the week from Wednesday to Wednesday, you wouldn't need to add three. Since we count the week from Sunday, you add three, it comes out you know when tekufas Nissan will be, that means not which day in the month, but which day in the week.

The Rambam's Example

Speaker 1:

And the Rambam gives an example, **how so?** Yes? Imagine, you want to know tekufas Nissan of a certain year, apparently this is the year that the Rambam wrote in the book, **year thirty-nine hundred and four thousand**, which means? 4930? Four thousand nine hundred thirty.

So, if you divide by twenty-eight, one year will remain. Yes, what you wrote divided, I didn't calculate correctly last time, if you divide four thousand nine hundred twenty-nine by twenty-eight, it comes out one hundred seventy-six, with a remainder of one, one year remains. Therefore you know that you only need to add one and a half days, you add three days, it comes out tekufas Nissan is basically the second year in the cycle. This is basically, there is a cycle, you just need to know which year we're holding in the cycle.

The Rambam makes it a bit more convoluted than it really is. You're holding the second year in the cycle, it comes out tekufas Nissan is **on Thursday night, and six hours at night**.

The Rest of the Tekufos

Speaker 1:

And now you can know, the rest of the tekufos, add seven and a half hours. Seven and a half hours, yes, now they don't care about the months but about days of the week. It comes out tekufas Tammuz is on Thursday, and one and a half hours of the day, seven and a half hours after that. And tekufas Tishrei will be further on Thursday nine hours in the day. And tekufas Teves will be four and a half hours of Friday night. And the next tekufas Nissan will be at the beginning of Friday, a whole day and a half moved forward. Because naturally at the end of the day, tekufah after tekufah, these are all very simple matters. Right?

Halacha 6 — A Shortcut to Know Which Day of the Month is the Tekufah

Speaker 1:

Now, in order to say dramatically another kind of shortcut, a shortcut, which I haven't calculated so well, but I'll say what he says, in halacha 6. That means, basically, until now we already know precisely how to calculate which day in the month of Nissan the tekufah will be, and also which day in the week it will be.

That means, the truth is that you know from before, you already know the... It's not one within the other, it's just a bit easier.

Speaker 2:

No, you already know.

Speaker 1:

That means, the previous calculation already assumed that you know when the month of Nissan is. So therefore you know which day in the week it is, it's not a big deal. But...

Speaker 2:

Because he already made the calendar.

Speaker 1:

The previous tekufah is already built on the calendar, which we... The tekufah calculation is already built on the calendar that we made in the previous chapter. But here he makes another slightly easier calculation.

Speaker 2:

It turns out that the previous calculation is very complicated?

Speaker 1:

He says, I'll make a slightly easier calculation for you.

The Rambam's Easier Calculation

Speaker 1:

If you want to know, says the Rambam, **on which day of the month the tekufah is in this Rosh Hashanah?** Yes? That means, someone who doesn't know for example when is... the molad, he can't calculate the molad, he only knows when it was **which day of the week it will be, and on which day**, that means, first you'll calculate the previous calculation that I just said, you know which day of the week it must be. This will help us to figure out which day it must be, this is basically how the calculation will work.

Besides this, do you know when the first day of Nissan is this year? This you need to know. Again, you'll look in the calendar or you'll do the calculation with the previous thing. And you'll also know how many complete years have remained, how many... haven't remained, how many complete years have already passed in this cycle.

After that you'll do like this: **take for each year eleven complete days**. The Rambam says eleven complete days. That means, what are the eleven complete days? Because it's approximately eleven days. Yes, the difference is a bit less than eleven days. That means, it's a bit more, but approximately eleven days. Let's call it, it's a bit less. The truth is a bit less, but the Rambam makes here an easy calculation. There is, he makes eleven days.

Adding Seven Days "In These Times"

Speaker 1:

After that **you add seven days in these times**. Why seven days in these times? This is what I said before, because I said that the whole reason why one needs to make the complicated calculations is because even after our whole cycle is over, what remains over, the sun moves from the moon by 485 parts each cycle. The Rambam calculated that in his times, which they say we're holding approximately in cycle 260, the sun is already holding approximately seven days, a bit more than seven days, but approximately seven days further from the moon.

Therefore, in the Rambam's times, we do the whole complicated precise calculation to know how far the sun is from the moon today, you can simply add seven days. And the commentators already say that in current times one needs to add eleven days, we're holding already a long time after the Rambam, many more times it has gone, and it's already later.

Dividing by Thirty

Speaker 1:

And after that says the Rambam, **and cast away everything by thirty**, we'll do the precise calculation of 29 days 12 hours 793 parts, divide it by thirty, yes, he makes the calculation simply easier, and what remains less than thirty you'll count from Rosh Chodesh Nissan.

Now, but you remember this is a very imprecise calculation, there can be a difference of several days, but the Rambam calculated that there can't be a difference of many days. Of a whole week. Therefore it's very simple, you already know which day of the week it is, right? So if the day that comes out

Chapter 9 — Tekufas Nissan: The Approximate Calculation and the Necessity of Mashiach

The Approximate Calculation of Tekufas Nissan

If it's already more approximate but, it's not enough. You need to make the calculation not from Rosh Chodesh Nissan, but from Rosh Chodesh Adar Sheni, because the calculation ignored the whole leap year with all the deficient and full months, it calculated simply thirty days a month. It comes out, you need to start from there, **"and on that day of the month the tekufah will be"**. This is the calculation, a bit of an easier calculation, which is built on the fact that we already know which day is Rosh Chodesh Nissan, and we already know which day in the week. One can make a more approximate calculation, instead of making it precise, you make seven days plus thirty, divide by thirty, and that means, eleven days for each year in the cycle, complete eleven days, add complete seven days, because that's approximately how much there is from the whole world until today, add, divide it by thirty, so it should come out within three days, and you'll know, since you already know which day of the week it is, it will work.

The Rambam's Example: Year 4930

And the Rambam gives an example how it works. **"How so, we wanted to know on which day of the month tekufas Nissan will be in year three hundred ninety"**, that means 4930 will be the year, which is the 19th year of the 260th cycle. This you already know, right? So you'll say, that the Rambam says, **"we found"**, we already know truly this, that Rosh Chodesh Nissan will be Thursday, and tekufas Nissan also Thursday. These are two things that we already said truly before.

Since the year is the 19th year in the cycle, it comes out you need to add complete 18 years of what has already been. You'll take for each one eleven days, you have 198, yes? Very simple math, 18 times 11 is 198. You add seven, it comes out 205, you divide it by 30, yes? Very simple math too. You see why the Rambam did this? Five days remain, therefore you count from 5 days from Rosh Chodesh Nissan, which is on Thursday you come to Monday. But you know that the tekufah is on Thursday, therefore you add days until you come to Thursday. It comes out that tekufas Nissan is when? On the 8th of Nissan. **In this manner** means **in every single year**.

Again, if someone wants to do it today, he needs to add more days, because today it's already become different.

The Limitation of Adding Days

And this says the Rambam, what we said that one needs to add one day, or add days until you come to the day of the tekufah, you'll never need to add more than one or two or three days. Why? The calculation must be approximately in the week. And it's a great wonder, it's a novelty if one needs to add four. Sometimes, it seems the Rambam calculated that one needs to add four according to his calculation. I haven't calculated why, but I believe him for the moment.

And says the Rambam, if you find that you need to add more, if you are... your calculation is more than four days off, **know that you erred in the calculation, and return and**

calculate precisely. You'll need to use... precisely means apparently, if you need to add four, it could be that it's already passed many years, or whatever, or there's some reason why you'll figure out how different the Rambam's approximation is from the precise one you'll see. I don't know, I haven't calculated.

The Great General Matter — The Drift of Tekufas Shmuel and the Necessity of Mashiach

But at the conclusion of this chapter one can mention one interesting thing, which comes out from the foundation that the whole chapter is built upon. Although the chapter is only to know when the tekufah is, the whole tekufah is only tekufas Shmuel, which is approximate, the Rambam will say in the next chapter that it's not precise, and we didn't use this truly for the leap year. And what else? It's just a calculation, it's not relevant to anything. It's relevant to the fact that the few halachos that go according to the tekufah, as we discussed.

[Innovation] The "Drift" of Our Calendar

And it comes out, but they said that it's built on an interesting thing, that our whole cycle of leap years is not perfect, right? There's still missing 485 parts from each cycle of 19 years. It comes out, as the Rambam said, we're already holding seven days away. The Rambam's times already held seven days, today it's already holding eleven twelve days away almost.

It comes out that in current times tekufas Nissan is already later by... complete days than it should be, as if if the years would have been one hundred percent, meeting exactly at the end of each cycle of nineteen years.

[Main Question] "Shamor Es Chodesh Ha'aviv" — Pesach Becomes "Early"

All the commentators already ask, the commentator immediately asked, and others, that it comes out, we discussed that the whole reason why one makes a leap month is because of **"shamor es chodesh ha'aviv"**, in order to catch the month of spring. And after several hundred years from now, it will come out that Pesach every year, that the tekufah will come out in the month of Iyar altogether, or almost every year it will come out... the question is not only then, the question is now. If we want that **"shamor es chodesh ha'aviv"**, that Pesach should be at the tekufah, now the tekufah is already into Pesach.

No, it's okay, the tekufah must be before Pesach, it's never in Pesach, it's always until erev Pesach. That means today, but it moves forward constantly, it becomes constantly later. So, at some point, in year I don't remember when, Pesach will already be too late, too early as it were, the tekufah will already be after Pesach. And it requires great investigation.

[Answer] Mashiach Must Come to Fix the Calendar

All the commentators say that the answer is that for this Mashiach Tzidkeinu must come, and he should bring back a Sanhedrin, and the Sanhedrin will make an enactment to remove one leap month, therefore the calculation will move back, it will be complete.

Why? Because our calculation is built on... let's say... our calculation of nineteen years, they say, is built on the fact that there's a complete half day, but there's less than a complete half day. Even if we make the precise calculation, still everything doesn't match precisely. Therefore it comes out that Pesach becomes constantly and constantly too early, little by little, because the sun goes forward already, and the leap month doesn't fix it, and for this Mashiach needs to come to fix it.

Now we know why Mashiach needs to come. Mashiach needs to make a Sanhedrin. All Jews need to agree at least, and for this one needs to have a Mashiach.

Anyway, until here chapter 9. Yes.