Laws of Sanctification of the New Month, Chapter 14 (Auto Translated)

English

Auto Translated

Shiur Overview

Summary of Shiur on Rambam Hilchos Kiddush HaChodesh Chapter 14

General Introduction to Chapter 14 — The Course of the Moon

The Rambam's Words: Chapter 14 is the first of three chapters (14–16) that deal with the meholach halevana (course of the moon).

Simple Meaning: The chapter teaches how to calculate where the moon is located on the galgal hamazalos (zodiac wheel).

Insights and Explanations:

1. **The Central Goal of Chapters 11–17:** All the chapters from 11 to 17 come to answer **one question**: can we **see the new moon tonight**. In order to know this, one needs to know where the **sun** is and where the **moon** is — meaning at which degrees of the galgal hamazalos (360 degrees, every 30 degrees = one mazal/constellation) they are located. If one knows both positions, one can determine with one hundred percent certainty whether the moon can be seen.

2. **Practical Use for Beis Din:** The calculation is not only to know where the moon is, but also for beis din — if a witness says he saw the moon in a certain place, beis din can know if this is even possible according to the calculation, and if not — one knows that the witness made an error.

3. **Review — The Course of the Sun (Chapters 11–13):** By the **sun** we already learned in the previous chapters: one takes the **meholach ha'emtza'i** (average/mean speed of the sun, which is constant), and then one adds to it the **govah hashemesh** — this is the correction factor that comes from the fact that the circle of the sun is not centered exactly around the earth (eccentric circle). Through this one gets the **shemesh ha'amiti** — the true position of the sun. By the sun this is **very simple** — only **one correction** (govah hashemesh).

4. **The Moon is Doubly Complicated — First Complication:** Just like the sun, the moon doesn't travel every day at the same speed. Certain days of the month it travels faster, certain days slower. This alone would still be simple — one could make a correction like by the sun.

5. **Second Complication — The Cycle of Faster/Slower is Itself Not Fixed:** By the **sun** the cycle of faster/slower is tied to the **year** — every year is the same cycle. But by the **moon** the cycle of faster/slower is **not** the same every month. The cycle of when it travels faster/slower has its own period (a bit less than 27 days — a different number than the sidereal month). This means that one needs **two corrections** instead of one.

6. **The Rambam's Method:** The Rambam didn't want to make things crazy with explanations of why everything is so. He went **step by step** with **charts** to calculate what one needs to add and subtract, in order to be able to answer the practical question.

7. **Basic Facts About the Moon:** The moon travels through all the mazalos (360°) in approximately **27 days** (sidereal month). The **conjunction** (kibbutz/molad) with the sun takes approximately **29½ days**, because the sun itself also moves — approximately 2 degrees a month — and the moon must "catch up" to that.

8. **[Digression: Philosophical Assumptions of Ancient Astronomy]:** Until Kepler (not Copernicus) there was a fundamental assumption in astronomy: all celestial bodies travel in **perfect circles** with **constant speed**. A circle was considered a "perfect motion." But since one clearly sees that the speed is **not** constant, one needed a model that explains this through combinations of perfect circles. The Rambam himself says in **Moreh Nevuchim** that the explanations (like epicycles, eccentrics) are not necessarily true — it could be that the reality is different — but the **calculation** still works. One can calculate **as if** it is so, even if the physical explanation is not correct.

Halacha 1 — Two Average Courses: Emtza HaYarei'ach and Emtza HaMaslul

The Rambam's Words: The moon has two average courses... the moon goes and revolves in a small circle that does not encompass the world... and its average course that the small circle makes is called emtza hamaslul... and the small circle revolves in a large circle that encompasses the world... and the average course of this large circle is called emtza hayarei'ach.

Simple Meaning: The moon has two separate courses (movements). First, it revolves around in a small circle (epicycle) that doesn't go around the entire world. Second, the small circle itself revolves around in a large circle that goes around the world. The average course of the small circle is called "emtza hamaslul", and the average course of the large circle is called "emtza hayarei'ach".

Insights and Explanations:

1. **Why Does One Need Two Circles by the Moon, While by the Sun One Only Needed One Circle with an Offset Center:** By the sun one explained the uneven movement through the fact that the circle of the sun doesn't have the same center as the earth (eccentric model). By the moon, however, this wasn't enough to explain the observations, therefore one comes with a "new patent" — two circles (epicycle model). In truth there are even more than two corrections, but one begins with the basic model of two.

2. **How the Two-Circle Model Works:** One imagines that the world (earth) is in the middle. Around it goes a large circle that revolves once a month around the twelve mazalos. If that were everything, the moon would go at an even speed every day — but one sees that this is not so. Therefore one says that

the moon itself travels on a small circle (epicycle) that is placed in the large circle. The small circle also revolves, but in a different direction. Therefore, when the moon is at a certain place on the small circle, it looks like it's going slower (because it's going against the large circle), and sometimes faster (when it's going with the large circle). Both circles go in a perfect circle — the apparent uneven course comes only from the interplay of both.

3. **What "Average" Means by Both Courses:** The Rambam calls both courses "average" because neither of them alone tells where the moon truly is. Only when one calculates both together does one arrive at the true position. The order of all calculations is: first one calculates the average, afterwards one adds corrections.

4. **Why the Small Course is Called "Emtza HaMaslul" and the Large One "Emtza HaYarei'ach":** "Emtza hamaslul" is called the small one because it describes how the moon goes around on its own orbit (small circle), not around the world. By the sun the name "maslul" made more sense because it described the distance from the govah (apogee). Here he also calls it so, just for consistency. "Emtza hayarei'ach" is called the large one because it is more directly connected to where the moon is — it describes how the large circle goes around the world — but it is also only an average because one still needs to add the small circle.

5. **Both Calculations are Only "Approximate":** Both circles that one learns now are only an approximate calculation. The moon has other factors that influence its position. By the sun it was enough to add together two things; by the moon one needs to add more corrections (which will come in later chapters).

Halacha 2 — Tables of Meholach Emtza HaYarei'ach (The Large Circle)

The Rambam's Words: The course of emtza hayarei'ach in one day is thirteen degrees, ten chalakim, and thirty-five seconds. From this one calculates: 10 days = 131 degrees, 45 chalakim, 50 seconds; 100 days (remainder) = 237, 38, 23, 50; 1,000 days (remainder) = 3 degrees, 58 chalakim, 20 seconds; 10,000 days (remainder) = 329, 48, 50. A month of 29 days = 22, 56, 56. A regular year (354 days) = 344, 26, 43.

Simple Meaning: The emtza hayarei'ach (the large circle) goes through 13°10'35" in one day, of the 360° around the world. The Rambam gives ready-made tables for 1, 10, 100, 1000, 10000 days, a month, and a year, so that one can quickly calculate the meholach emtza hayarei'ach for any desired time point.

Insights and Explanations:

1. **Why the Number Gets Smaller by Larger Numbers — "Remainder of the Course":** When one calculates 10 times 270 (for example) it comes out more than 360, but the Rambam only calculates "remainder of the course" — the remainder after one throws away all full cycles of 360°. This is because the sky is a circle, and after 360° one is back in the same place. Therefore the Rambam writes "remainder" — one is only interested in how much is left over after one takes away all multiples of 360.

2. **The Rambam's Mercy on Klal Yisrael:** The Rambam had "literally mercy on Jews" — he calculated all the tables ready so that one shouldn't have to do multiplications oneself. In the Rambam's times Jews didn't have any modern number system, no calculator, and mathematics wasn't a regular part of cheder learning. Therefore this is an act of tzedakah from the Rambam.

Halacha 3 — Tables of Meholach Emtza HaMaslul (The Small Circle / Epicycle)

The Rambam's Words: The course of emtza hamaslul in one day is thirteen degrees, three chalakim, and fifty-four seconds. From this: 10 days = 139 degrees (etc.); 100 days (remainder) = 226, 29, 53; 1,000 days (remainder) = 104, 58, 56; 10,000 days (remainder) = 329, 48, 50; 29 days = 18 degrees, 3 chalakim, 54 seconds; regular year = 305 degrees, 13 seconds (no chalakim).

Simple Meaning: The emtza hamaslul (the small epicycle) goes a bit slower than the emtza hayarei'ach — 13°3'54" per day versus 13°10'35".

Insights:

1. **"Emtza HaMaslul" Means the Small Circle:** It is explicitly clarified that "emtza hamaslul" refers to the small epicycle, not to the large deferent. The meholach hamaslul is how much the moon travels on the small circle each day.

Halacha 4 — The Ikar (Base Point) for Emtza HaYarei'ach and Emtza HaMaslul

The Rambam's Words: At the beginning of Thursday night (the ikar of all calculations) the emtza hayarei'ach was **in mazal Shor, one degree, 40 chalakim, 43 seconds** (= 31°40'43" from the beginning of Taleh). The emtza hamaslul was **84 degrees, 28 chalakim, 42 seconds**.

Simple Meaning: The Rambam establishes the starting point for both calculations. From there one adds the course for each day/month/year, just like by emtza hashemesh.

Insights:

1. **Mazal Shor = More than 30°:** Mazal Shor is the second mazal, therefore it begins at 30°. "One degree in mazal Shor" means 31° from the beginning of mazal Taleh (plus the chalakim and seconds).

2. **The Method is Identical to Emtza HaShemesh:** The Rambam says explicitly "in the manner that you did by emtza hashemesh" — one takes the ikar, adds to it the course for the number of days, and one gets the makom emtza hayarei'ach for any desired day.

Halacha 5 — Correction According to the Mazal of the Sun: The Emtza Orech LiShe'as HaRe'iyah

The Rambam's Words: After one has the emtza hayarei'ach, one needs a correction according to where the sun stands:

- **From half of mazal Dagim until half of mazal Taleh** — leave the emtza hayarei'ach as it is (no correction).

- **From half Taleh until the beginning of Te'omim** — add 15 chalakim.

- **From the beginning of Te'omim until the beginning of Aryeh** — add 30 chalakim.

- **From the beginning of Aryeh until the beginning of Besulah** — add 15 chalakim.

- **From the beginning of Besulah until half Mo'znayim** — leave as it is.

- **From half Mo'znayim until the beginning of Keshes** — subtract 15 chalakim.

- **From the beginning of Keshes until the beginning of Deli** — subtract 30 chalakim.

- **From the beginning of Deli until half Dagim** — subtract 15 chalakim.

This result is called **emtza orech lishe'as hare'iyah**.

Simple Meaning: The correction compensates for the difference in sunset time throughout the year. In summer (longer days) one needs to add because sunset is later, in winter one subtracts because sunset is earlier, and at the equinoxes (Nisan/Tishrei) no correction is necessary.

Insights and Explanations:

1. **The Problem with the Beginning of Night in Summer/Winter:** The entire calculation works with equal hours, which means that "the beginning of night" is always 6:00 PM. But in truth, in summer the sun sets two-three hours after 6:00, and in winter earlier. Therefore, when one wants to know where the moon is at the beginning of night (sunset) of a summer day, one needs to add extra degrees for the extra hours.

2. **The Foundation of This Correction:** The beginning of mazal Taleh = 0° = the vernal equinox (Nisan), when day and night are equal. Then sunset is approximately 6:00, and one doesn't need any correction. But in summer (Te'omim–Aryeh) sunset is later, therefore by she'as hare'iyah the moon has moved more — therefore one adds. In winter (Keshes–Deli) sunset is earlier, the moon has moved less — therefore one subtracts. The maximum correction (30 chalakim = half a degree) is at the solstices (Te'omim–Aryeh = summer; Keshes–Deli = winter), and the midpoint (15 chalakim) is at the in-between times. This works because "summer" and "where the sun is" is approximately (actually precisely) the same thing — the mazal of the sun determines the length of day.

3. **She'as HaRe'iyah = Approximately 20 Minutes After Sunset:** The Rambam defines "she'as hare'iyah" as "approximately one-third of an hour" after sunset. This is the moment when one can theoretically first see the new moon, if it is visible.

4. **"Emtza" Means Still Not "Emes":** The "emtza orech" is still not the true position of the moon. "Emtza" means the midpoint — without the complicated corrections of the moon's irregular movement. In order to know the true position (and to determine whether one can actually see the moon), one still needs to add further corrections that come in the following chapters.

5. **The Emtza HaMaslul is Not Yet Used in This Chapter:** Although one calculated the emtza hamaslul, it is only used in the next chapter. The current chapter only uses the emtza hayarei'ach.

6. **The Chapter is "Simple Matters":** The entire chapter is mainly simple tables and basic calculations, and the real complications only begin in the following chapters.

Structure of the Chapter — The Rambam's Order

The Rambam goes in this chapter: (a) telling the fact of two courses, (b) giving precise numbers of how much the moon travels in one day on each circle, with charts for 10 days, 100 days, etc. — he has "done for free" the work for you, (c) saying where both courses were at the yom ha'ikar (start date), so that one can calculate from there, (d) in halacha 5 — giving a method to correct for the time difference between equal hours (6 o'clock) and the beginning of night (sunset).

Full Transcript

Chapter 14: The Motion of the Moon — Introduction and Explanation of the Astronomical Model

General Introduction to Chapter 14

Well, rabbosai (gentlemen), today we can learn Chapter 14 of Hilchos Kiddush HaChodesh (Laws of Sanctifying the New Month), and we're going to show a nice picture, a video of how it works, just so we should have some idea in our heads of what's going on here.

The Central Goal: To Be Able to See the Moon

So the thing is like this: We remember, yes? In the previous chapters we discussed how the sun moves, and now we're going to discuss the more important one, because the main thing we want to know is how the moon moves, because it's about kiddush hachodesh (sanctifying the new month), and the next two chapters he's going to explain how we can calculate where the moon will be.

Yes, I want to be more precise. Both are equally important, because what we want to know is only one question. All these chapters from 11 to 17 all come to answer one question: **Tonight, Rosh Chodesh (the new month), perhaps it is Rosh Chodesh, can we see the moon**. And in order to know if we can see the moon, one needs to know both where the sun is and where the moon is.

What Does "Where" Mean?

And where? What does the word "where" mean? The word "where" means as simple as possible: at which degree of the sky is the moon and the sun. Afterward, when one calculates these two things, one will know one hundred percent whether we can see the moon today.

Galgal HaMazalos (The Zodiac) — The Previous Foundation

So, we learned in the previous chapters we saw like this: that the sun travels through, the sun, and also the moon, all the planets, travel through what? The galgal hamazalos (zodiac), which is another way of saying the 360 degrees of the sky, every 30 degrees is one mazal (constellation). They travel through backwards, that is from west to east, throughout the year. That's the sun, and not necessarily throughout the year, the sun also travels.

So one knows where the sun and moon are, where something is in the sky means where it is in relation to the galgal hamazalos.

The Practical Use for the Beis Din (Court)

Now, consequently, if we want to know that we'll see the moon today, one needs to know where it is, and in certain places where it is one can see it according to how close it is to the sun. In certain places where it is one cannot see it. That's basically how it is.

But the simplest thing, for example, if the court hears that he says he saw it there and there, they know he was mistaken, because it can't be there. Not necessarily there and there. The main question is whether we can see it today at night. There's basically only one place where one sees the moon. Anyway, I mean approximately one place. Ask afterward at which degree. At one time.

So, that's how it is. Now, consequently one needs to calculate where the moon will be today. That's the question we want to know in the next chapters.

Review: The Motion of the Sun (Chapters 11-13)

Now, in order to calculate this, that is, to look is very easy. Look, as one has seen it. To look, people have been able to see since the time of Adam HaRishon (the first man), there's no great wisdom in it, one can take the eyes and look.

But to calculate is very complicated. Why? Because if the world were very simple, starting from one day, the Rambam said, take a principle, the 3rd of Nissan of the year 4938, calculate how much it travels each day, add it up, and you'll know where the moon is, where the sun is, and so on.

Govah HaShemesh (The Sun's Correction) — The Correction for the Sun

But as we already learned regarding the sun, that the reality is much more complicated than that. If one does, for example, with the sun what was called the emtza (mean), emtza means average, let's say it travels each day exactly the same amount of degrees as any other day, the answer to the question of where the sun is today would be as simple as possible to add. If you know where it was on a certain day, add so many days since then, and you'll know.

Since the sun doesn't travel at the same speed every day of the year, one needs to add something that they learned, which is called by the sun govah hashemesh (the sun's correction), to figure out how much one needs to subtract or add from the emtza, from the average calculation, from the normal side, to figure out the govah. Where the sun will truly be today, right? That's what the govah explains, what gives us how to calculate where the sun will truly be today, what we called the shemesh ha'amiti (the true sun).

The Sun Is Quite Simple

Now, that's the sun. The sun is quite simple. One only needs to calculate two things. They said that the sun's circle is not exactly around the earth's circle, consequently one needs to add the govah hashemesh, which is the difference of the two circles, and then you know where the sun is. So, by the previous chapter you already know one hundred percent where the sun truly is.

The Moon Is Doubly Complicated

The moon, however, and about this we're going to learn the next three chapters truly, the moon travels much more complicatedly than the sun. The moon is like a bechinas levanah (aspect of moon). Anyway, it travels very complicatedly.

Basic Facts About the Moon

So, what does it mean it's very complicated? Everyone knows, it travels around the earth every month, or approximately every month. It meets up with the sun every month, and through the mazalos (constellations) it travels truly shorter, every twenty-seven days it travels through the mazalos.

But what we say that the conjunction with the sun takes twenty-nine and a half days, is because the sun itself travels. So the sun travels, when you do the calculation, you'll see that the sun travels in the circles every month approximately two days, as far as two days, that is two degrees approximately. It turns out, the moon needs to catch up approximately two days. Besides its own speed it needs to account for the fact that the sun moves.

That's not relevant because we can see it today.

First Complication: The Speed Is Not Constant Within a Month

But besides that, the moon, whoever looks throughout a month of the moon sees the same thing that one notices with the sun. It doesn't travel the same amount every day. Certain days it travels faster, and certain days it travels slower.

So up to here it would have been simple, one could have done like the sun, add, make some calculation why, you should imagine that there's some circle, whatever, I mean put in, they all assumed that it can't be that it shouldn't travel always at the same speed. If it's not the same speed, there's something more to the story.

Let's understand, this isn't important for us. The reality is, you look at the... from here you see one hundred percent it travels at a different speed. That's not in doubt, it travels one hundred percent at a different speed.

Second Complication: The Cycle of Faster/Slower Is Itself Not Fixed

Now, as you say very well, in order to explain this, we're already talking a bit of philosophy, it's to understand a bit better, in order to explain this, there are two things we discussed: there's explaining and there's calculating.

Digression: Explanation Versus Calculation — The Rambam in Moreh Nevuchim

The calculation is built on certain explanations, but it's not necessary, even if the explanations aren't true. It's true that you calculate as if. And the Rambam himself says in the Moreh (Guide for the Perplexed) that it's possible that the reality isn't, that for someone it's not correct, but the "as if" still works.

The Explanation: Why the Speed Is Not Constant

So, how did they calculate, or how did they explain it? So, let's say how they explained it. So, they had an assumption, and I mean it's more or less a true assumption even today. That it can't be that just one day the moon travels slower, it woke up in a bad mood today, at a certain time of the month, and it's slower. "Chukah uzman nasan lahem shelo yeshanu es tafkidam" (He gave them a law and time that they should not change their function).

Yes, okay, it's not a proof, what could be it has a law when it travels slower. Let's understand for sure. It's also, I just need to add, it's also always the same difference in speed. It's not that it just happens to be different. It has a cycle.

But what I want to say, this is the second thing I want to say, afterward we'll say the explanation. Again to review. The moon doesn't travel at the same speed every day of the month. There are certain times of every month approximately, let's say,

when it travels at a different speed. So up to here as you see it would have been simple. One adds another explanation. And it will actually be the mahalach ha'emtza'i (mean motion), will arrive at the mahalach ha'amiti (true motion).

Now, that's more or less what we're going to learn this chapter.

The Second Cycle — Not Every Month Is the Same

But afterward one will see that this itself is also not fixed. In other words, this seeing for example, in every tekufah (season) of the year, of every year it travels as fast and as slow as every other year. In other words, the cycle of where it travels faster and slower is the same as the cycle of the year, but it's different that it's not equal throughout the year, but overall for the year it's the same.

So yes, the moon is doubly complicated. Both it doesn't travel at the same speed every day, and also not every month, relative to the month, does it travel at the same state. That is, there's a cycle. That's clear, everyone agrees, it's not random, not just in 5786, the moon is tired, travels slower. That's not the way. There's a certain cycle, and when one calculates one sees that there's a cycle.

Once it was very hard to calculate, one calculated mainly from the eclipses that one can see clearly. In any case, since we've already discussed, the calculations have been kept in people's heads for thousands of years, and one knows every month where the moon was exactly for a very long time, one can calculate and see that there's a cycle, there's a motion, there's a rhyme and reason for when it travels slower and when it travels faster.

But this itself isn't the same, meaning for example there's a cycle, it takes a certain amount of time when it travels faster and slower, but this is still a bit less, I mean that it's a bit less than twenty-seven days, it's a different number. And this itself one needs to explain and be able to calculate.

So it turns out that the moon is doubly complicated to calculate.

The Rambam's Method: Making Life Easier

The holy Rambam however wanted to make life easier, he didn't make us crazy with explaining why everything and how everything and so on, and went very clearly step by step and gave charts to calculate what one needs to add and subtract, so that one should be able to answer the question whether we'll see a moon today. Right? Okay.

Up to here is the introduction to understand why.

The Epicycle Model: Explanation of Ancient Astronomy

Ah, now, what you meant is that they, now we're going to what the Rambam is in the first section, I just want to make my picture, so one should understand more or less what we're talking about.

The Fundamental Assumptions of Ancient Astronomy

Now, in ancient astronomy, the truth is, all astronomy until Kepler, this has nothing to do with Copernicus, Copernicus doesn't hold this, a second tzaddik (righteous person) who was called Kepler, the assumption was that it makes sense, as we said that it must be the same speed, and actually, it still can't be that it just stops traveling faster. Who says it can't be? I don't know, it's a sevara (logical reasoning).

The same thing they had a sevara that it's correct to understand that all the heavenly bodies travel in perfect circles. A circle is a perfect thing. They had a sevara that a circle is some kind of perfect motion, a circle, they imagined that everything travels in perfect circles.

But there is, as one can see from the moon itself, and the sun itself are circles. Yes, the idea of circle... We also hold that it's a circle but a bit.

The Ingenious Patent: Epicycles

And consequently they made calculations. Now see in the picture that I showed, very simple, a very ingenious patent actually that occurred to him. He says that it must be that the moon by itself and the sun by itself travel a perfect circle. But what? Why do we see on

Introduction: Why Does One Need Two Circles for the Moon?

Speaker 1:

For example, by the sun we explained, because the circle of the sun, the circle of the moon, and the circle of the earth are not in the middle of one another. Consequently, when you're on the side, it looks longer. That's how one explained by the sun.

By the moon this wasn't enough to explain, and one comes with a new patent. One says that there are two circles, two circles. One would have seen that there are two more, but we're still holding by basic only two.

Halacha 1: The Two Mean Motions of the Moon

I'll say one thing at once, it will be very clear. The Rambam says in the first section of Chapter 14, that the moon has two circles, yes? Does he say such a language? Two circles. And I showed how this explains to us that there are two circles. That is, he doesn't say two circles, he says shnei mahalchim ke'ilu (two motions as if). The circle is already an explanation in this. We who don't believe in circles also know that there are two motions.

Speaker 2:

Not exactly.

Speaker 1:

Let's... He says yes that there are two circles. He says... it travels with circles.

How the Two-Circle Model Works

So, what does it mean there are two circles? Very simple. If you have here a picture, here is the earth in the middle, you see the moon travels around the earth. That's one circle, the large circle let's call it. It rotates every month around the earth, around the twelve mazalos, one can see, it travels around the earth every month.

Now, if this were equal, the moon would be as fast every day. Meanwhile one sees that it's not so. So the first step to explain this, one said that the moon itself travels on a small circle. There's a small circle, which the circle itself travels around the earth, before that it travels around the earth. But besides that, the moon travels in that circle, and it travels a different way. It also travels from east to west.

Anyway, one can see the small moon here that travels a different way. Consequently, it's very easy to see that for example, when you're here, when the moon travels, you see that it goes slower, because you need to arrive from that circle to the place. But it's not slow that the large circle has changed, the large circle continues the same. But the reason why we see with the moon differently, because in the large circle there is the small ring that the moon dances around in the circle, and

the ring has changed. It hasn't changed, it travels, and both travel perfectly.

Speaker 2:

Right, right.

Speaker 1:

But the large ring hits, the moon appears. But it needs to catch up with that also, or sometimes it goes ahead and so on. According to this one can calculate.

Now, according to this this is also an explanation of how it can be that it travels in a perfect circle, and nevertheless it's different, yes? And secondly, it will help to calculate, but now you need to calculate both things. One needs to figure out how long it takes it to move a degree on the large circle, and how long it takes to move a degree on the small circle. One needs to figure out how to calculate the two things together, and it will give you the correct place where the moon truly is. That's all.

Up to here is the reasoning that's behind the chapter. So now one can learn it inside.

Structure of This Chapter: What the Rambam Is Going to Do

And what is the Rambam going to do? What the Rambam is going to do is a very simple thing. First of all, we'll describe the fact that there are these two things, and remember, let's remember, all these things, both things, both circles, both cycles that we're learning now, are both only approximate, that is they are exact regarding the circles, but the moon itself has other things that affect where it is, it's even more complicated, it won't be enough like by the sun to calculate two things together, one needs to add a few more things to calculate.

English Translation

But before we do that, there is an average, it comes out to two averages, two general categories, simple numbers to calculate what we're going to calculate for the moon. And the Rambam is simply going to tell us what he says, instead of telling us to calculate it ourselves, he will tell us exactly how much it travels in one day, and he will even give a chart for ten days and one hundred days, which will be easier to calculate. Basic math that the Rambam has simply pre-done for you. The same thing he's going to do for the motion of the second of the small things.

Afterwards he will tell you how it was in both things at the yom ha'ikar, the day that he begins his calculation from, consequently you will be able to simply do the math from there for both of the things.

Halacha 5: Correction for Techilat Halaylah

Afterwards, in halacha 5 in this perek he's going to tell you another important thing, which, I think I also showed this here, it's not going to help us much to understand, but I added the sun. Why does one need to add the sun?

Now, the Rambam says like this, a very simple thing: This is going to tell us where the moon is. And when? Techilat halaylah. Techilat halaylah, you know, means six o'clock in the afternoon, six o'clock at night, because that's the time that the Rambam begins to calculate in the month of Nissan. Always one calculates from sha'ot shavot, all the calculations here are sha'ot shavot.

Now, there's a problem. You come in the middle of the summer, and you're going to do the Rambam's calculation, you want to know where the average is, and then add other things, whatever, but you want to know where the moon is. The problem is that in the middle of summer the sun sets three hours, two hours after six o'clock. So the calculation of the entire calculation that the Rambam said to calculate from the yom ha'ikar, how he begins his calculation until today, according to the basic plus for the two calculations, won't help at all, because it will come out two hours in the middle of the day. And one needs to add a certain time, certain degrees, in order to calculate with the fact that in the summer the day is longer and in the winter the day is shorter.

And for this too the Rambam had mercy on us, he didn't want us to have to figure out exactly. He says a simple rule, like a shortcut. He says, look at the sun, look in which mazal the sun is, as is known the sun is in a different mazal, that's why I put in the sun, and see in which mazal the sun is at that time. And the Rambam gives approximate rules according to each mazal where the sun is, how many degrees one needs to add or subtract to the calculation that came to know where the place of the moon is, not at six o'clock but at techilat halaylah of that day, because it's correct, because the value is the same thing.

Speaker 2:

Sha'ot zmaniyot it had to remain, so that one could easily do the math.

Speaker 1:

Sha'ot shavot.

Speaker 2:

Yes yes, all calculate only the calculations of what one adds.

Speaker 1:

And this is very simple, he calculated, because it's the same thing. To say summer and to say where the sun is, is approximately the same thing. Not approximately, it's actually the same thing.

So until here is the introduction to the perek. Now we're going to say it plainly, because there's not much to do. If someone wants to engage in all the numbers of the Rambam, he can do that. But aside from that, there's not much to learn. It's interesting to calculate, but more than that there's nothing to do.

We'll put up the beautiful wheel that you created, and put it on the groups where the students are holding.

Speaker 2:

Okay, be'ezrat Hashem.

Speaker 1:

Says the Rambam... I didn't create the wheel, right? Re-invented the wheel.

Speaker 2:

Okay, anyways.

Limud Penim: The Words of the Rambam

Halacha 1: The Two Motions and Their Names

Says the holy Rambam, **hayare'ach**, right? **Hayare'ach**, the moon, **shnei mahalakhim emtza'im yesh lo**. There are two motions that it goes, but he calls them averages because he's just not saying now exactly how... what he means to say is, we have calculated, the order of all calculations is first one calculates the average, then one adds. The Rambam, for the calculation, one needs to calculate two, that's what the Rambam means to say.

Why is he explaining? **Hayare'ach holekh vesovaiv begalgal katan she'eino makif et ha'olam**. First there is the small wheel, which we see by the grandfather in the redemption, which that one doesn't go around the world, rather that is a small thing that the moon goes around in that wheel. **Umahalakho ha'emtza'i she'oseh hagalgal hakatan nikra emtza hamaslul**, in the middle of that emtza hamaslul. There where he made the orange line is the middle of that small wheel. And that is important, because that's how one knows next to which deed it is. Which average means how much it goes each day, in the aspect of average, not accurate, rather one divides exactly the cycle into 29 days exactly. That's called emtza hamaslul.

Why is it called emtza hamaslul? On a decree of confusion the Rambam called emtza hamaslul of the sun. Then it made a bit more sense to the name emtza hamaslul. The Rambam simply gives names for things here. So that one can calculate. The Rambam says that the average motion of the moon in the small wheel its going one will call "emtza hamaslul". Why? Because this is not the emtza hayare'ach, it's not how the moon goes around the world, it's how it goes around on its own maslul as if. Let's call it that. By the sun it made a bit more sense, because it was from the height to where it is now he called maslul. But that's what he calls it here too, it's just easier to make the names.

Vehagalgal hakatan, the small wheel itself, **mesuvaiv begalgal gadol hamakif et ha'olam**, is in a larger wheel that goes around the entire world, that goes around on the sky around all the mazalot, and the world is in the middle of the calculation. **Vehamahalakh ha'emtza'i shel zeh hagalgal hakatan ve'oto hagalgal hagadol hamakif et ha'olam hu hanikra emtza hayare'ach**. That's going to be called basically. One will call the large motion, how the large one turns around the world, "emtza hayare'ach". Because the large one still doesn't say how the moon is, because the moon still travels around in its small wheel, but when one calculates both together one knows. But this is simpler to call, it's certainly more connected to what the moon is, right?

Speaker 2:

Yes.

Halacha 2: Motion of Emtza Hayare'ach in One Day

Says now the Rambam, how much does the... what is the motion? How much does it go? Says the Rambam, **mahalakh emtza hayare'ach beyom echad**, in one day the emtza hayare'ach goes, the wheel hayare'ach goes through **shlosh esreh ma'alot**, it goes through thirteen degrees of the three hundred and sixty degrees that there are on this, **va'asarah chalakim**,

Tables of Mahalakh Emtza'i Hayare'ach

The Rambam's Words:

Mahalakh emtza hayare'ach beyom echad - shlosh esreh ma'alot va'asarah chalakim vachamesh ushloshim shniyot.

Thirteen degrees, ten chalakim, and thirty-five seconds.

Now the Rambam is going to calculate what comes out according to this, according to days. It's something he's going to say quickly. It comes out in ten days it's 131 45 50, and in one hundred it's 237 38 23 and 50 seconds.

Explanation: Why Does the Number Get Smaller?

But let's explain a small thing, people will perhaps be bothered, they did ten times 270, it came out further 200. The answer is, because after one has more than 360, we throw down. One only calculates the remainder. That's why he says, **she'erit mahalkha**, right? It's a circle, it doesn't go on. How many times it went around in a circle? The Ribbono shel Olam said earlier that one rounds up things, or one takes down. Not one rounds up, one takes down everything that's more than 360. Always calculations of this, when it's three hundred and sixty, one throws it away. We are only interested in the remainder after three hundred and sixty. A number comes, for example, two thousand and whatever, you know that by three hundred and sixty, and you take the remainder. Right? Very good.

Continuation of Tables

The same thing, **she'erit mahalkha**, ten thousand days, is 3 3 nachak, 3 degrees, 58 chalakim, 20 shniyot.

Now, as the Rambam said earlier, what's interesting to know is always ten hundred thousand, ten thousand days, because that's easy to calculate. If you will know how many days it is today from the Rambam's first day, you can easily calculate like this, or you need to know a month and a year.

Consequently, 29 days comes out total 22 56 56. And hatana sedira we learned, which is three hundred fifty-four days, comes out 344 26 43. In short, **ve'al derekh zeh tikhpol lekhol mispar yamim veshanim shetirtzeh**.

So this is the emtza hayare'ach, in other words, how long it takes for the small circle to go around in the world.

Tables of Mahalakh Emtza'i Hamaslul

And how long does it take for the emtza hamaslul, the large wheel? No, the opposite, the small one. Emtza hamaslul means the small one. How much does the moon travel in its small wheel each day?

The answer is, **shlosh esreh ma'alot shloshah chalakim ve'arba vachamishim shniyot**. A drop less than the mahalakh emtza hayare'ach. It takes a bit longer to go in the one than in the other, right? It's a bit slower.

Comes out ten days, 139. Comes out the remainder of one hundred days is 226 29 53. Comes out the remainder of one thousand days is 104 58 56. Comes out ten thousand days, 329 48 50. Comes out twenty-nine days is 18 degrees, and 3 chalakim, and 54 shniyot. And a regular year is 305 degrees and 13 shniyot, without chalakim.

The Rambam's Mercy on Klal Yisrael

Until here we know, so this is just tables. The Rambam truly had mercy on Jews that they shouldn't have to do any plus and times. It's amazing the tzaddik that the Rambam was. You get it? It's really... in the Rambam's times Jews weren't accustomed to math. It was harder, because they didn't know how, they didn't even have numbers. They didn't have, they didn't have, one didn't study in cheder how to do simple, they certainly didn't have any calculator. So it was, one struggled.

The Main Point: Where Was the Moon on Leil Chamishi?

Yes. So, says now the Rambam, now, where was the moon, the emtza hayare'ach, at our **techilat leil chamishi shehu ikar cheshbonot elu**? Leil chamishi, remember, come on. The Rambam earlier calculated the ikar cheshbonot elu, he established a day, from then one calculates.

Then it was **bemazal shor**. Yes. Very good. What is mazal shor? The second mazal, right? More than thirty degrees. Yes. In mazal shor it was **ma'alah achat ve'arba'im chalakim ve'arba'im veshalosh shniyot**. That's to calculate from there.

Ve'emtza hamaslul hayah, the emtza hayare'ach was there, **ve'emtza hamaslul hayah** at that time at 84 degrees, and 28 42 shniyot. In short, 84 28 42.

How Does One Calculate for Each Day?

Comes out, since you know the mahalakh emtza'i hayare'ach, you know how much one needs to add for each day, for the tenth days and so on, and you know the emtza shehu ikar she'alav tosif, right? You've now said where it was the first day, meaning, **the makom emtza'i hayare'ach bekhol yom shetirtzeh al derekh she'asita emtza hashamesh**. The same way is simply to do and then.

Now says the Rambam that one just needs to add. The Rambam has now taught how it came out emtza hayare'ach. Generally, emtza'i hamazal he's not yet going to use in this perek, rather the next perek one will use it. First he says, you know how the emtza hayare'ach is according to my basic math.

Correction According to Mazal Hashamesh — The Emtza Orekh Lish'at Hara'iyah

Afterwards you need to do like this: **Hitbonen bashamesh veda be'eizeh mazal hi**. Look where the sun is. Now the Rambam is going to make another chart that one should do according to where the sun is.

The Corrections According to the Mazalot

He says like this: If the sun is from **chatzi mazal dagim**, yes, fifteen degrees and mazal dagim, **ad chatzi mazal taleh**, then leave, **taniach emtza hayare'ach kemo shehu**. Why? The foundation is very simple. Everyone knows that techilat mazal taleh is degree zero, right? Comes out from dagim to taleh is the what month Nissan, the time when the day and night are the same. Consequently that period one doesn't need to add. That means, then there won't be any differences. One doesn't need to make a correction according to when the sun sets, because it sets approximately at six o'clock. Again, there are small differences throughout the month, but it's not enough a big difference.

But he says further, if it's from taleh to te'omim, you should add fifteen chalakim. Fifteen chalakim on the emtza hara'iyah. Fifteen chalakim means chalakim of the degree, right?

And if it's techilat mazal te'omim ad techilat mazal aryeh, you will add thirty. And understand, because te'omim to aryeh is further in the middle of the summer when it's the longest, then one needs to add thirty.

Afterwards he goes back down, you get it, there's a motion here from techilat mazal aryeh. Aryeh is Av, right? Until betulah, which is Elul, you will add only fifteen again? Yes, I say Elul, first of all, people know easily that it's not technically Elul. I will add, after chatzi moznayim is further the sun in the day and night divided. Right, Tishrei, basically, it's the same.

Afterwards it goes back up, from chatzi moznayim bitchilat keshet, you take down, right? Because now it goes already faster. The opposite, you take down fifteen fifteen chalakim? If it's... chelek is very little, you understand. But anyways, if it's from mantel keshet until dli, you will take down thirty chalakim. If it's beginning until dli until half dagim, you will take down fifteen chalakim. This is approximately the order makes sense.

What is the Emtza Orekh Lish'at Hara'iyah?

Umah sheyihyeh emtza achat shetosef levitgarem velitanucha oto kemo shehu, this is the emtza orekh. For when? After sheki'at hachamah, kemo shlish sha'ah be'oto hazman. You know when do we need to know when is the she'at hara'iyah? She'at hara'iyah is approximately a third of an hour, in other words twenty minutes, after the sunset. Then is the time that one can see the moon, if one can see it today.

Be'oto hazman tosef emtza lo, vezeh hanikra, this I'm not going to call in the next perek, **emtza orekh lish'at hara'iyah**. After you've calculated the emtza hayare'ach, and you've added the correction for the mazal where the sun is, in other words, which time of year it is, this is the time.

Emtza is Still Not Emet

At that time, the twenty minutes, one can't see the moon. No, one still can't be able to see the moon. One still doesn't see the moon so quickly. That means emtza hayare'ach lish'at hara'iyah. In order to know truly if one can see the moon, one still needs to add the amiti. Because it's only the emtza. Emtza means not the reality.

Ah, not in relation to the scribe, because the world hasn't yet turned upside down. If it would have been so simple, only two three nobles would have been so simple. But since it's even more complicated, one needs to still add in the next chapters more things to figure out what we're going to figure out in the next perek.

Summary

But more or less the perek is simple matters, and that's it. Wonderful.