

THE LUNAR CLOCK: How to Tell Time by the Moon without Charts

by Len Smith at TheSwordbearer.org

According to the Bible God put the sun, the stars, and the moon in the heavens to be used for measuring time. (In the dictionary see “sidereal.” In the Bible see Gen 1:14-18; Gal 4:10.) It is already well known that we can tell time during the day by the sun. Many people also know we can tell the time and the season by the stars. But now for the first time in history we can also tell time – fairly accurately – at night using only the moon. This method truly shows the Bible has always been correct: the moon really is **A LUNAR CLOCK**.

In 1989 I invented this fairly simple way to use the moon as a clock. Since then I’ve learned that other methods exist...but they all rely on the use of supplemental charts rather than using the moon itself as a clock. So, here’s how you can use the moon to tell time without needing any charts. I’ll cover the **BASICS**, teach you my **METHOD**, go over **EXAMPLES** of telling time at night, and close with a review **QUIZ**.

Part One: The BASICS

The only time you do not need my method of turning the moon into a clock is when the moon is full. When the moon is full it can be used to tell time exactly the same way the sun is always used during the day. When the sun is coming up over the eastern horizon it is sunrise, or 6AM. It then takes the sun 6 hours to reach its zenith, where it boldly proclaims the time to be 12 noon. When the sun is halfway between its zenith and the western horizon, the time is 3PM. And the sun sets in the west at 6PM.



In my examples I shall always use 5 sky positions – as in the above daytime illustration. (My illustrations will always be the viewpoint of an observer in the northern hemisphere facing due south.) The 5 sky positions reveal information that can be used when telling time by the moon. For instructional purposes I am assigning 12 hours to both day and night. However, you will notice the sun and moon rise and set at *different times* depending on your *latitude*, the *season*, your *position* inside your time zone, and whether or not it is *daylight savings*. For example, the moon is higher, has a longer arc, and is in the sky longer during winter. So, to be accurate you must adjust your time estimates according to your situation, which may mean, for example, that you’ll assign more/fewer hours from midnight/noon (the southern zenith) to the eastern and western horizons than the instructional 6 hours I use from positions 1-3 and 3-5.

Position 1: The sun has just come up from the eastern horizon, so it is sunrise, dawn, 6AM. It has 6 hours until its noon zenith.

Position 2: The sun has traveled three hours up the sky from the eastern horizon. And it has 9 hours of travel before it sets on the western horizon. It is 9AM.

Position 3: This is the zenith because it is due south. It is therefore noon (or midnight if this were a full moon). Here the sun is 6 hours above the eastern horizon and 6 hours from the western horizon. (If you do not know where due south is, you will **not** know where the sky’s zenith is...which will affect your time estimate. For example, if you thought due south was halfway between positions 3 & 4 above, it would affect your time estimate by as much as 90 minutes.) How high the moon is at its zenith changes during the year (the moon is higher at night in winter), so it is important to use due south rather than how high the moon is in the sky.

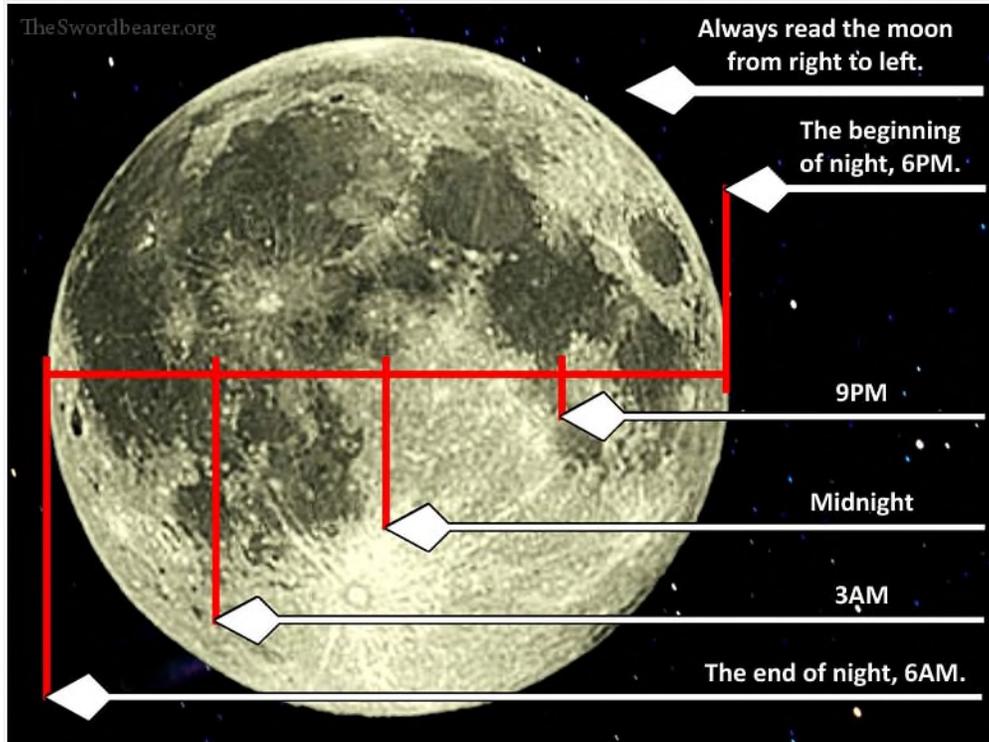
Position 4: It took the sun 9 hours to get here from the eastern horizon, and it has three hours until it sets in the west. It is 3 PM.

Position 5: The sun has been in the sky for 12 hours and is just setting. It is 6PM.

I have covered these basics about evaluating the sun’s position in the sky because this info is well known and intuitive. Evaluating the moon’s position in the sky is done the same way, but you cannot tell time just by the moon’s position like we did with the sun above (unless it is a full moon). In other words, if the moon is at position 2 it reveals the same info as the sun: the moon rose 3 hours ago and will set in the west in 9 hours. The sun’s position also told us what time it was – but with the moon we need to first “read the moon” in order to figure out the time.

Part Two: My METHOD of Reading the Moon

If you are going to successfully tell time by the moon you must master the technique of **reading the moon**, and you must do this step **before** you do the above step 2, which is **evaluating the moon's position** in the sky. The most common difficulty beginners have with using the moon as a clock is they have a strong tendency to put the cart before the horse by doing step 2 first – because that is what they've always done with the sun. So, I expect you to have no problems because you are always going to properly and methodically do step 1 – reading the moon – first. That means you must ignore the moon's position in the sky, carefully do step 1 by reading the moon, and *then* move on to step 2, which is applying what you learned in step 1 to what the moon's position in the sky tells you. Let's look at how to read the moon:



The moon is a map or picture of the night sky. It tells you what the moon will be doing that night – and when it will be doing it. The above full moon is just an example to show you, first, that the moon must be read “backwards”, from right to left. (Note: If you live in the southern hemisphere, much of this info will be backwards. For example, when you “read the moon” you must read it “frontwards”, from left to right. And the below waxing and waning moons will be reversed for you. Also, the closer you live to the equator, the more “tilted” the moon will appear – so your “reading” will be angled.) And, second, that the lunar orb is the face of a clock. The leading (right) edge represents sundown, the beginning of night, 6PM (or whatever time actual sunset is where you are). The left edge represents sunrise, the end of night, the beginning of day, 6AM. Everything in between is to be appropriately divided into the different hours of the night. Let's now look at how we apply those lunar clock positions to different phases of the moon.



The line on the moon where light and dark meet (which is called the terminator) is crucial if the moon is to become a clock. Let's analyze the different phases of the moon:

NEW: The new moon is usually represented on calendars by a black circle – no light. That is a picture of the night sky that night. It means the moon will not be up at all. If you need to know what time it is on a night with a new moon, consult your watch.

YOUNG: Reading from right to left we see that at the beginning of night, 6PM, the moon will be in the sky – because the right edge of the moon is light, not dark. But as we keep going left across the “clock” of the moon we quickly encounter the light/dark line. That line is very close to the right edge, which we'll interpolate as about 30 minutes after the 6PM right edge. That means the moon's light will disappear at about 6:30PM; the moon will set in the west. The rest of the night, as accurately represented by the major portion of the lunar clock, will be dark – moonless. So on this night we'll only be able to tell time for the short period of time the moon is visible in the sky.

WAXING CRESCENT: A waxing moon is getting bigger every night. Reading from right to left we see the part of the lunar clock that is light is the right 25%. That means the first 3 hours of that night the moon will be up. The line where light changes to dark is at about the 9PM spot, so we know this moon will set in the west at 9. And from 9PM through the rest of the night the sky will be moonless, dark, just as the rest of the lunar clock indicates.

WAXING QUARTER: A quick glance tells us the moon will be up exactly half the night, or 6 hours. Reading right to left we see the clock goes dark in the middle, at midnight. That means the moon will set in the west at midnight. Notice something else about the lunar clock: When some or all of the right half of the clock (which is the earlier half of the night) is light, that tells us the moon will be in the western half of the sky. And the fact that none of the left, or later, part of the lunar clock is illuminated means the eastern half of our night sky will not have the moon in it that night.

WAXING GIBBOUS: Gibbous just means fairly full, somewhere between full and a quarter. (What we might think of as a “half” moon is actually called a quarter moon.) As you quickly notice when looking at the gibbous lunar clock, most of the night will be illuminated by a moon. Reading right to left we see that our gibbous moon won't set in the west until 3 in the morning; it will be up this night for 9 hours, from 6PM until 3AM. Also notice the gibbous part of the moon that extends over into the later part of the night (the left half of our clock) is telling us our eastern part of the sky is going to have the moon in it some of this night. How much of the night will the moon be in the eastern part of our sky? Let's read the moon and find out: The right edge is light so we know the moon will be visible somewhere in the sky at 6PM. We don't know where it will be yet; we just know it'll be up there. Continuing to read we pass 9PM and midnight and see the moon will still be visible at those hours. At 3AM we encounter the line where the moon's light stops. That means the moon will set at 3AM, which means it will set 9 hours after the right-edge, 6PM beginning of night. Let's use that 9 hours: If we point at the western horizon and sweep our arm through the sky backwards (towards the east) for an arc of about 9 hours we'll come to a spot halfway between the zenith and the eastern horizon. That spot is where our gibbous moon will be in the eastern sky when the sun goes down at 6PM. The gibbous moon will then travel west for 9 hours through the night and set at 3AM – just like our right-to-left reading of the gibbous clock told us!

FULL: The entire surface of our lunar clock is illuminated, so this moon will be up all night. It will come up in the east just as the sun sets in the west. It will reach the zenith at midnight. And it will set in the west at 6AM just as the sun is coming up in the east. It is simple to tell time by a full moon, but don't let that lull you into thinking you can ignore the all-important step 1 for all the other phases of the moon. Always begin by reading the moon.

WANING GIBBOUS: Beginning our read at the right edge of the lunar clock we see that it is dark. That's right, at 6PM this night there will be no moon in the sky. Continuing to read we pass 7PM, 8PM, and finally at about 9PM we reach the all-important line where dark changes to light. Yes, this line means the moon will rise above the eastern horizon at 9PM. Continuing to move left across our clock from the 9PM line we can imagine the moon rising with us. Three hours past the 9PM line we reach the middle of the clock that stands for midnight. That means at 12AM our waning gibbous moon will have climbed 3 hours until it is halfway up to the zenith. From the midnight spot on our clock our eyes continue left for another 3 hours to the 3AM spot. That means the moon will have climbed another 3 hours to the zenith. So if we saw this moon at the zenith at night we'd be able to figure out it was 3AM. (We'll practice this in a bit.) From the 3AM spot on our clock we move the last three hours to the left edge of the lunar clock, which is dawn. So, at dawn, 6AM when the sun is starting to come up, our gibbous moon will have traveled another 3 hours from the zenith halfway down toward the western horizon.

WANING QUARTER: Reading right to left we see that the night will start out moonless and continue that way until midnight, when the moon will rise in the east. We also note that only the left half of our clock is illuminated. That means the moon will not spend any of the night in the western sky. And sure enough, our clock not only tells us the moon will rise from the eastern horizon at midnight, but that by the time the moon climbs for 6 hours up to the zenith, it will be 6AM and time for the sun to come up. If you are just getting up at sunrise, therefore, you should still be able to see this waning quarter at the zenith before it fades from view with the increasing light of the sun.

WANING CRESCENT: Most of the night is moonless. At 3AM this moon rises in the east. By the time it climbs 3 hours halfway toward the zenith the sun comes up.

OLD: This moon won't come up until almost dawn, and the sun will shortly follow it and hide it from view.

Part Three: EXAMPLES of Reading the Moon



Step 1, we locate the moon and remember to start by reading it. We start at the right edge and see at the beginning of night, 6PM, there is no moon up. That continues all the way across the lunar clock until we get to the important line where dark and light meet. That line means the moon will rise in the east at this time. Notice the light/dark line isn't much before the end of night, dawn, 6AM. So we'll guesstimate the amount of light left on our clock before dawn to be half an hour, which means moonrise will be about 5:30AM. Armed with that info we go to step 2 and analyze the moon's actual position. It has just peeked up above the eastern horizon, so we'll pronounce the time to be 5:30AM. The farmer is in the barn milking the goats. That was easy, so let's try another.



This example is a little tougher, so let's be very methodical. Step 1, ignore where the moon is in the sky and just read its lunar clock: From right to left, the moon is already up at 6PM; it is also up at 9pm, midnight, and light meets dark at 3AM. So this waxing gibbous will set on the western horizon at 3AM. Step 2: Evaluate the moon's position: The moon is about halfway between the zenith and the western horizon, so this moon has about 3 more hours until it sets. The lunar clock told us this moon sets at 3AM. Backing up in the sky from the western horizon where it will set to where it is now is 3 hours. Three hours earlier than 3AM is midnight. Are we correct? Is it now midnight? Go back to the lunar clock. If it is now midnight, that is the center of the lunar clock, and that would, as we go left from the midnight position, put moonset at 3AM. And, yes, that checks with the moon's actual position in the sky because it looks like it has 3 hours before it hits the western horizon. The correct time in the above picture is midnight.



We ignore the fact that the moon is at the zenith and dutifully and properly begin with step 1 by reading the moon. From right to left we see that it isn't up yet at 6PM, but that it rises over the eastern horizon at about 9PM, and it's up the rest of the night. OK, it rose in the east at 9PM, so let's take that info to step 2, which is applying the moon's position to what we learned when we read the moon: The moon is now at the zenith, which means it is 6 hours above the eastern horizon. It rose from that horizon at 9PM. Adding 6 hours to 9PM we get the present time of 3AM.

OK, before I give you a quiz I'll tell you what this knowledge will do for you: It'll ruin some movies and some advertisements! You may see a sleeping pill ad with a guy fast asleep (smiling, of course) next to an alarm clock that reads 11PM. And outside the window you see a picturesque WANING CRESCENT! The alarm clock is wrong; a waning crescent doesn't come up until almost dawn!

In the movie scene a family on vacation is just about to eat supper. The dad and the kids, out on the porch, are looking at the sight of a zillion stars. And there, just above the treed horizon, is a WAXING GIBBOUS! You'll quickly scan the moon from right to left, and see that the only time of night it would be anywhere near any horizon would be before it sets at 3AM!

Part Four: IT'S QUIZ TIME!

- There will be 3 lunar clocks for you to figure out.
- The correct times will be posted at the end.
- Remember, be methodical by doing step 1 before step 2:





Congratulations, you've finished the course. You have learned how to use the moon as a lunar clock. Practice it a few times when you see the moon at night and it'll become second nature. But remember...always read the moon first. That's all there is to it.

QUIZ ANSWERS:

1. 9PM

(The waxing gibbous will set at 3AM, and it has 6 hours to go before that.)

2. Midnight

(The waxing quarter will set at midnight, and that's what it is doing.)

3. 3AM

(The waning quarter rose at midnight, and that was 3 hours ago.)

***Psalm 19:1* The heavens declare the glory of God; and the firmament sheweth his handywork.**