

# A hypothetical timeline for *The Hobbit*

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by Douglas Wilhelm Harder

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## 1. Introduction

When Tolkien wrote *The Lord of the Rings*, he used the 1941 and 1942 Almanacs to ensure that the phases of the moon and other celestial events were internally consistent throughout the story. Years earlier, when he wrote *The Hobbit*, his purpose was not to create a book that stood up to critical analysis, but rather he was writing a children's book, and in that he succeeded. Since then, however, there have been attempts to reconcile the celestial events reported in *The Hobbit* so as to make sense of them. This article will, after describing the terminology to be used, first describe an irreconcilable problem appearing in *The Hobbit*. This problem cannot be solved with any interpretation no matter how nuanced or subtle or clever, for it requires the moon to shift from an almost new moon to an almost full moon within one day. In order to correct this, this requires changes to the story. Consequently, we will continue by giving criteria by which any amendments or interpretations are to be judged. Following this, we will list three constraints that must be satisfied by any proposed amendments or interpretations. Finally, we propose a solution that requires a minor amendment to the text, and while that amendment is significant, we proceed to show that the amendment does not significantly affect the storyline in any way, that the amendment satisfies the constraints given, and that the amendments do not force an unreasonable interpretation of other events within the storyline. This article then ends with a summary of the problem, the proposed solution and how well the solution satisfies our criteria and constraints. To begin, however, we begin with a disclaimer and then we cover some required some terminology.

## 2. Disclaimer

This author does not suggest in any way that any of this is what Tolkien meant. He meant to write a good children's novel, and in that he succeeded. He was not interested in more mundane features such as ensuring that, for example, the cycles of the moon were correct. Later, he devoted more time to such nuances in *The Lord of the Rings*, but *The Hobbit* was left relatively undisturbed. The only point of this article is to demonstrate that while the text is irreconcilably flawed, and that's okay. The only objective here is to see whether or not there exist a minimal number of amendments and interpretations that do allow the text to make reasonable sense. This author does not suggest that anything here is actually what Tolkien meant, but rather, it is simply an exercise in observation and imagination. It is no different than reading the book of Revelations or Nostradamus and attempting to retrospectively interpret modern-day events in light of these texts, only this author will also attempt to describe specific weaknesses, as well. Thus, only think of this article as an interesting thought-experiment, and nothing else. It is not meant to present a definitive timeline.

## 3. Terminology and background

This article will refer to three different events throughout the evening: civil twilight, nautical twilight and astronomical twilight. The first ends when the sun sinks sufficiently below the horizon that humans require artificial light to distinguish terrestrial objects<sup>1</sup>, the second ends when the sun has sunk sufficiently far that navigators can begin to use the stars for navigation, and the third ends when the sun is sufficiently below the horizon that no part of the sky is still lit by the sun. In Oxford, England from approximately May 22 to July 22, astronomical twilight never ends—the sun never sinks sufficiently below the horizon so that at least some component of the sky is not lit by the rays of the sun. In December, however, the astronomical twilight ends not much past six o'clock in the afternoon—

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<sup>1</sup> See the article *Civil Twilight—Civil Dawn & Dusk* at [www.timeanddate.com](http://www.timeanddate.com).

the sun will have already gone down around four o'clock. When writing this article, this author had issues keeping the phases of the moon in the correct order: could an evening crescent moon *point* to the left, or would an evening crescent moon always point to the right? All of this can be deduced by remembering that looking at the Solar System from the direction of the North Star, both the Earth and the Moon both orbit and rotate counter-clockwise, as is shown in Figure 1.

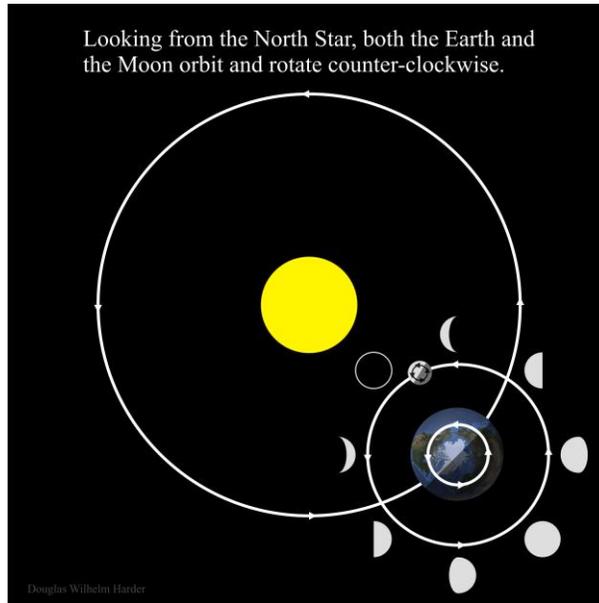


Figure 1. The orbits and the rotations of the Earth and the Moon and the phases of the moon depending on its position relative to the sun; going counter-clockwise: a new, waxing crescent, 1<sup>st</sup>-quarter, waxing gibbous, full, waning gibbous, 3<sup>rd</sup>-quarter and waning crescent.

This, however, still requires deduction, so this author devised the following aide-mémoire to help. It relies on the game of baseball, and is shown in Figure 2. Unfortunately, it is only valid in the northern hemisphere.

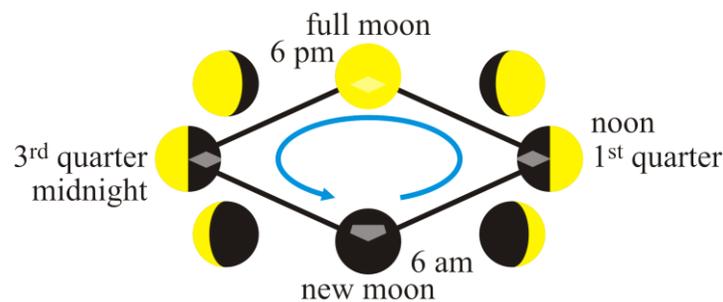


Figure 2. The lunar cycle begins at home base where the new moon rises around 6 AM; the earliest time you can reasonably expect to start playing baseball. First base is on the right, and the 1<sup>st</sup>-quarter moon is lit on the right. It rises six hours later, around noon, and set around midnight. Before the first quarter, waxing crescent moons rise in the morning and set in the evening; and after waxing gibbous moons rise in the afternoon and set at night after midnight. Second base represents the full moon where both halves are lit, and it rises around 6 PM, lights the night sky, and sets in the morning around 6 AM. Third base is on the left, and the 3<sup>rd</sup>-quarter moon is lit on the left. It rises around midnight and sets around noon, lighting the late night and morning sky. Before the third quarter, waning gibbous moons rise in the evening and set in the morning before noon; and after waning crescent moons rise before the morning and set before evening.

Additionally, each night the moon rises on average around 50 minutes later than it did the previous night, and it will be around  $12.2^\circ$  along the arc along which it moves. To visualize this,  $12.2^\circ$  is about 0.213 radians, so you could multiply the length of your arm by 0.213, or if you want a rougher approximation, divide the length of your

outstretched arm by five. Speaking in the first person, for this author, the base of my thumb is approximately 70 cm from my eyes when my hand is stretched out, so as a rough estimate,  $70 \text{ cm} \div 5 = 14 \text{ cm}$  and to be more exact,  $70 \text{ cm} \times 0.213 = 14.91 \text{ cm}$  or 15 cm. If I hold my thumb and index finger at right angles, the distance from the tip of my index finger to the base of my thumb is around 15 cm. Thus, if I hold my outstretched right arm and place the base of my thumb at the position of the moon today, then tomorrow at the same time the moon will be at approximately the tip of my index finger. This is demonstrated in Figure 3. The purpose of this exercise is for you to get a somewhat intuitive understanding of how the moon travels throughout the sky. As you may deduce, if the moon rises 50 minutes later each day, this is also the distance the moon will travel in approximately 50 minutes.

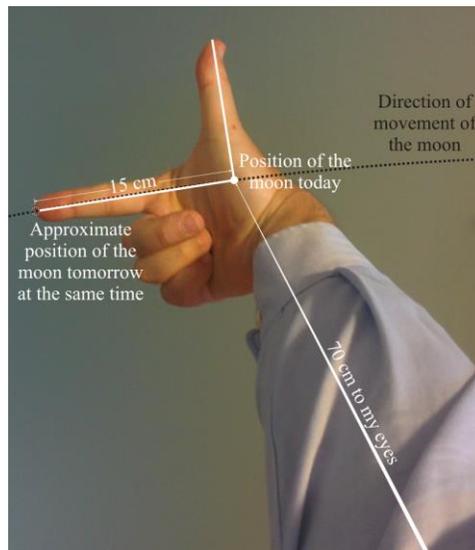


Figure 3. Technique for estimating the position of the Moon at the same time tomorrow.

This article will also refer to three different calendars: the Shire Reckoning, the Stewards' Reckoning and the Gregorian calendar. These will be abbreviated as ShR, StR and GC, respectively. Additionally, this article will restrict its terminology to that of *The Hobbit*, so, for example, term such as goblins, Wood-elves and Elvenking are used in preference to orcs, Silvan elves and Thranduil, respectively. We now proceed to the problem.

#### 4. The problem

The most significant problem, and the one that will require an amendment to the text, are two moon phases on two consecutive days. The first is the day that the dwarves and the Hobbit open the secret door. On this day, Bilbo saw a “pale and faint...thin new moon above the rim of Earth.” Thus, the sunset and the moonset will be very close: in one instance, in 2007, a New Moon occurred on October 11 and on the next day the crescent moon set at 6:12 PM, while the sun set on that day at 6:18 PM. The following day, a bare crescent moon set at 6:29 PM, just thirteen minutes after the sunset at 6:16 PM and civil twilight does not end until 6:50 PM. There is, however, not a significant amount of light from a young waxing crescent, as can be seen in Figure 4.



Figure 4. A New Moon and the phase of the moon on the two subsequent days.

In the chapter *Fire and Water*, however, the moon that lights up Smaug and reveals the weakness in his armor. First, the thrush says “Wait! Wait! The moon is rising.” Next, “[t]he dragon was circling back, flying low, and as he came the moon rose above the eastern shore and silvered his great wings.” The third moon in Figure 4 gives off only 5%

the light of a full moon, unlikely to give off sufficient light to “silver” Smaug’s wings, and indeed, if a portion of the sun is still in the sky (for civil twilight has not yet ended), it is unlikely that the moon would have any effect on the lighting of Smaug what-so-ever. Consequently, one of the two descriptions must categorically be wrong. Moving forward, we will propose a solution that amends one of these, but in Section 4 on constraints, we will see that it must actually be a waning gibbous moon that lights up Smaug.

Given the significance of the problem at hand, there can be *no correct* interpretation of the events in *The Hobbit*. Instead, this article is merely an intellectual exercise to see how close we can get to a *reasonable* timeline, and thus, we will continue to give criteria and then any constraints for any reasonable timeline. This is not to suggest that the original text ever be amended; it is only meant to demonstrate while there are issues with the text, there is nevertheless a reasonable interpretation if we allow ourselves some flexibility. Thus, we continue with some criteria by which we will judge any proposed solution to this problem.

## 5. Criteria

Given the irreconcilable problem, any proposed timeline must amend the text. The criteria for determining if an interpretation or amendment to the text is acceptable are:

1. any interpretation should be as faithful to the original text as possible, and
2. any amendment cannot significantly (if at all) impact the storyline.

For example, in reading the moon-letters on Thorin’s map, Elrond uses the light of a moon described as a “broad silver crescent”. Additionally, the next sentence goes on to say that the “white light [of the moon] shone through [the map].” There are two periods during the 29½ day lunar cycle where the moon may be described as being a broad crescent; however, while a waxing moon sets prior to midnight, a waning crescent moon does not rise until midnight. Additionally, a waning crescent moon would be obscured by the Misty Mountains in the east for at least an additional hour after moonrise. If in fact a waning crescent moon was used by Elrond to read the map, this would suggest that Elrond and others were up well after midnight, and this, too, suggests that the person who wrote the moon-letters also wrote them after midnight. While both are plausible, neither is reasonable. Additionally, following this encounter “they went down to the water to see the elves dance and sing upon the midsummer’s eve” and the next paragraph begins with “The next morning was a midsummer’s morning as fair and fresh as could be dreamed...” Neither of these suggests that they stayed up late until the early hours of the morning before they read the moon-letters. If further evidence is required, the text previously stated that “the time came to midsummer eve, and they were to go on again with the early sun on midsummer morning.” If it was the intention of the company to leave early midsummer morning, they would likely not spend the entire night in discussion. As a consequence, the only reasonable interpretation of a “broad silver crescent” is that it is a waxing moon close to a half moon, and thus any amendment or interpretation that places a waning crescent moon that evening would have to be abandoned. This describes one constraint, and we will continue by defining this constraint together with two others by which we will judge any proposed solution to the given problem within the text of *The Hobbit*.

## 6. Constraints

There are three constraints that we will list initially:

1. the timeline must place a crescent moon on midsummer’s eve,
2. Bilbo prefers to use the Shire Reckoning while the dwarves likely prefer to use the Stewards’ Reckoning, and
3. there must be a waning gibbous moon on the evening Smaug attacks Lake-town.

We will now look at each of these in detail.

### 6.1 The crescent moon on midsummer's eve

The crescent moon on midsummer's eve is, more than almost any other celestial description, is very restrictive, for only three days out of the 29½ days in a lunar cycle may be described as “broad”. For example, Figure 5 shows six waxing moons on six consecutive days. The percentage of the moon that is lit in each of these is 8%, 14%, 25%, 32%, 42% and 53%. At best, the third, fourth and fifth moons may be described as “broad...crescent[s].”



Figure 5. Six phases of the moon spanning six consecutive days.

Consequently, for any description of a moon phase in subsequent chapters must come back to this text.

### 6.2 Bilbo's and the dwarves' choices of calendar

The second constraint is that Bilbo would have, as much as possible, used the Shire Reckoning in presenting dates and days of the week. Given that the dwarves no longer use their own calendar, for when Thorin describes Durin's Day, he says “[b]ut this will not help us much, I fear, for it passes our skill in these days to guess when such a time will come again.” Thus, Dwarves have a choice between using the Stewards' Reckoning or the elven calendar. Given the animosity between dwarves and elves, it is very unlikely that the dwarves would use the elven calendar, and thus any calendrical references made by dwarves would be to the Stewards' Reckoning.

### 6.3 A waning gibbous moon during Smaug's attack on Lake-town

The chapter *Fire and Water* begins with a suggestion that it is early evening, for “a few were walking on the quays, and watching, as they were fond of doing, the stars shine out from the smooth patches of the lake as they opened in the sky.” The phrase “as they opened in the sky” suggests that it is describing a time close to nautical twilight, when the stars become visible in the sky. This is followed by a description that suggests that the next event occurred close to this time: “Suddenly it flickered back to view; a brief glow touched it and faded.” This is supported by the events described in a previous chapter: it is when “the shadows lengthened” that “Bilbo became more and more unhappy and his foreboding grew” when he finally asked them to close the door. The dwarves refuse but after some conversation and as the “[d]arkness grew deeper and he grew ever more uneasy” (suggesting it was still twilight), he finally insisted that they close the door. It is then that the dragon attacks the side of the mountain. It is only after crushing the side of the mountain that “[h]e rose in fire and went away south towards the Running River.” All of this suggests that Smaug attacks Lake-town after sunset but still well before midnight. When, however, Smaug attacks Lake-town, it is a rising moon that reveals the weakness in his armour, and a moon that rises in the evening must be a waning gibbous moon. For example, the moons shown in Figure 6 rise at 4:26 PM, 4:53 PM, 5:32 PM, 6:27 PM, 7:39 PM, 9:01 PM, 10:24 PM, 11:43 PM and 12:59 AM, respectively.



Figure 6. Waning gibbous moons from a full moon to a half moon.

The reasonable candidates for the actual gibbous moon rising during Smaug's attack will depend on different constraints; however, a waxing gibbous moon has already risen before 6:00 PM, well before the twilight required to agree with the text.

## Summary of constraints

In this section, we have looked at three reasonable constraints on any timeline of *The Hobbit*. Any attempt to either reinterpret or amend these events would have a serious impact on the story. Thus, we will continue by proposing a solution and seeing how well this proposed solution satisfies the constraints given and what interpretations or amendments to the text are required.

## 7. A proposed solution

We will build up a proposed solution to the stated problem by starting with an amendment to the definition of Durin's Day. In *The Hobbit*, the definition of Durin's Day is "[t]he first day of the dwarves' New Year" and is "the first day of the last moon of Autumn on the threshold of Winter." We will propose the following amendment:

Durin's Day is the first day of the last full moon of Autumn on the threshold of Winter.

Returning to our criteria, this amendment does not significantly affect the story, nor does it affect any other story told by Tolkien, as this appears to be the only reference to Durin's Day in all of his writings. It does not change any actions, it will simply change the descriptions of certain events on and around the day that the secret door is opened. We will see that this does not significantly impact any of the actual events in the storyline. Thus, we will proceed by

1. reexamining the statements made during the unexpected party and statements recorded in the narrative of *The Quest of Erebor*,
2. determining a reasonable interpretation of the first day of winter,
3. extrapolating from this the day upon which the door was opened, the day on which there will be a full moon (as opposed to a faint but waxing new moon),
4. determining the phase of the moon on midsummer's even, and
5. determining the impact of this amendment that redefines Durin's Day on the balance of the story and to see that there is a reasonable timeline that can be extrapolated from this amendment and interpretation of the first day of winter.

However, before we proceed, there is (at least) one serious possible objection to this, as the day we are using for the first day of winter is November 16 according to the Stewards' Reckoning, with exactly 45 days between October 1 and November 15 and 45 days between November 16 and December 30. Why, however, would Durin use the Stewards' Reckoning for the start of the dwarven new year? Recall that Thorin said that "it passes our skill in these days to guess when such a time will come again." Consequently, perhaps the division between fall and winter is exactly the midpoint of the Autumnal Equinox and the Winter Solstice. To know this day requires detailed knowledge of the exact time of the Winter Solstice approximately two-and-a-half months prior to the event. For example, in 2007 of the Gregorian calendar, the Autumnal Equinox occurred on September 23 while the Winter Solstice was December 22. Translated to the Stewards' Reckoning, this is October 3 and January 1, respectively. Consequently, there could be one additional (or one less) full moon between the November 16 of the Stewards' Reckoning and the actual midpoint between the Autumnal Equinox and the Winter Solstice. Again, this is all simply argumentation. Perhaps, again, Durin's day may be something much simpler: it is the second full moon after the Autumnal Equinox. However, we must assume that winter begins on or around November 16 so we will continue with the unexpected party.

### 7.1 The unexpected party

We will begin with the unexpected party, for there is one key here that allows us to determine a reasonable date for the opening of the secret door. There are two seemingly contradictory statements in both *The Hobbit* and the *Quest for Erebor*. In the *Hobbit*, Gandalf refers to April 25, 2941 as being a Thursday:

““And Thrain your father went away on the twenty-first of April, a hundred years ago last Thursday, and has never been seen by you since—”

The following Wednesday would therefore be six days later: April 27; however, in the *Quest for Erebor*, Gandalf says that the unexpected party was on April 26:

“It was on the morning of Tuesday, April the 25<sup>th</sup>, 2941, that I called to see Bilbo... Next day, Wednesday, April the 26<sup>th</sup>, I brought Thorin and his companions to Bag End.”

Now, these two contradict each other; however, they are not irreconcilable: by both the Shire and Stewards’ reckonings, each month has 30 days, and five extra day scattered throughout the calendar.<sup>2</sup> For the Shire reckoning, two are at the Yule (the winter solstice) and three are at Midsummer’s day (the summer solstice), while for the Stewards’ reckoning, two are at the Yule and one is at each of the other solstice and the two equinoxes. Thus as May falls after the Spring Equinox, May is one day in advance: April 27, while the same day would be recorded as April 26 in the Stewards’ reckoning.

Thus, we are left with both dates being on a Wednesday. In the Shire reckoning, Midsummer’s day does not belong to any day of the week, and as  $7 \times 52 = 364$ , each day of each month always has the same weekday. The problem is, April 27 under the Shire reckoning is always on a Thursday. Consequently, the only other possibility is that Wednesday must somehow refer to the day of the week of the Stewards’ Reckoning. The order of the days of the week is Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday and Friday, so Wednesday must be the second-last day of that week.

If, however, we are assuming that Bilbo does indeed always give dates and days of the week with respect to the Shire Reckoning, it follows we must have a few amendments:

“And Thrain your father went away on the twenty-first of April, a hundred years ago last ~~Thursday~~ **Friday**, and has never been seen by you since—”

He did not remember things very well, unless he put them down on his Engagement Tablet: like this: Gandalf Tea ~~Wednesday~~ **Thursday**.

Bilbo rushed along the passage, very angry, and altogether bewildered and bewuthered—this was the most awkward ~~Wednesday~~ **Thursday** he ever remembered.

“Gandalf told us that there was a man of the sort in these parts looking for a Job at once, and that he had arranged for a meeting here this ~~Wednesday~~ **Thursday** tea-time.”

If you line up June 21, the summer solstice, with Midsummer’s Day this places the winter solstice on the second Yule. Consequently, the unexpected party occurred on April 17 in the Gregorian Calendar.

## 7.2 First day of winter

The next question we must answer is when is the first day of Winter. It is certainly not the winter solstice, as is used in modern societies, and it is unlikely that Thorin would use the elvish calendar and the elven season translated as *autumn* is followed by the season translated as *fading*, and it is only after this season that comes the season translated as *winter*. More likely, Tolkien would have had a day such as St. Martin’s Mass in mind, which is celebrated on November 11; a day that in some European societies marked the first day of Winter. This day falls

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<sup>2</sup> While almost all of this document is this author’s own work, the observation that the two dates can be reconciled is the intellectual property of another; however, it is a detail that this author read a long time ago and cannot at this time recall. My deepest apologies to that individual who initially made that interesting observation.

approximately half way between the autumnal equinox and the winter solstice. In the more regular Shire and Stewards' reckonings, it would be therefore very reasonable to make winter begin on November 16 and end on February 15 (as all months having 30 days). While the equinox does not fall exactly on October 1, it is nevertheless reasonably close, and with such a regularized calendar, it is reasonable to assume that the seasons spring, summer, autumn and winter start on February 16, May 16, August 16 and November 16, respectively.

Fortunately, as Thorin would have made such a statement with the Stewards' Reckoning in mind, past the autumnal equinox, the Stewards' and Shire Reckonings again line up. If we also assume that the Wednesday as given by Gandalf in *The Quest for Erebor* is indeed the weekday of the unexpected party together with Friday being the last day of the week, we are then able to extrapolate into November to determine that the week containing the first day of winter, according to the Stewards' Reckoning, begins with November 13 and ends with November 19. Thus, the last *full* week of autumn is the previous week: November 6 through November 12.

### 7.3 Opening the door

Consequently, the day on which Thorin would have grumbled "Tomorrow beings the last week of autumn" would have been November 5 in both Shire and Stewards' reckonings and on October 25 in the Gregorian calendar, and therefore November 6 (October 26 GC) would be Durin's Day, and thus on this day would appear the last full moon of autumn.

### 7.4 Midsummer's eve

Placing a full moon on November 6 also places a broad waxing crescent moon on midsummer's eve, as is shown in Figure 7. It is when the moon is at half phase that its profile changes the most from day to day.



Figure 7. Two possible broad silver crescents that would have been visible on midsummer's eve.

This has been the most challenging aspect of this entire endeavor, for a broad crescent moon that is visible in the evening only spans three days out of its  $29\frac{1}{2}$  day cycle—it is when the moon is closest to a half moon that the phases change most rapidly.

In order to examine the time of sun and moon sets and rises, we must find a calendar that has a full moon on October 26 of the Gregorian calendar. We can find such a calendar for the year 2007:

<https://www.timeanddate.com/moon/uk/oxford?month=10&year=2007>

This site accounts for daylight savings time, but this author will subtract the extra hour when reporting celestial events. This author has chosen Oxford, England, to be the location used. Looking back at midsummer's eve, which would fall on June 20 GC—the day before the solstice—the waxing crescent moon sets at 11:37 PM. As stars are not mentioned, we need only note that the sun sets at 8:27 PM and civil twilight ends at 9:15 PM on the evening of June 20 GC. The altitude of the moon at this time is  $21^\circ$  and appearing WSW. As the River Bruinen flows from the east to the west as it passes Rivendell, it is not unreasonable that the moon would still be visible from within the valley.

## 7.5 Investigation of the impact on the subsequent timeline

Given the we have now established a reasonable estimate for the day the secret door is opened, we will now step forward in time from the previous day and determine how any celestial or seasonal events line up with this proposed timeline, one that again is based on the assumption that Durin's Day falls on a full moon. We will do so by describing the events on each of the subsequent days starting with November 5. As the Shire and Stewards' Reckonings line up, we will only include the Gregorian calendar dates in parentheses. Once again, we will always use time-and-date website referenced above.

### November 5 (October 25 GC)

The day before they open the door, Thorin says "Tomorrow beings the last week of autumn." The moon would have risen at 4:07 PM that day. With the Lonely Mountain blocking their view of the eastern horizon, they would not have seen this moon until close to 11:00 PM; however, in order to help Bilbo (and therefore to cue the astute reader), the text could be modified to include:

"Tomorrow **will be a full moon and the beginning** of the last week of autumn," said Thorin one day.

"And winter comes after autumn," said Bifur.

### November 6 (October 26 GC)

On this day, it would now be a full moon; however, the door faces west, and so there would be no hope of seeing the sun and moon together as first the Lonely Mountain would have hidden any such moon until it reached close to its zenith and second between the autumnal and vernal equinoxes, the sun and the full moon are never in the sky together. The door is opened at sunset (4:47 PM), Bilbo wanders in and steals a cup, and Smaug is awakened and angered. Only some text needs to be altered:

If he lifted his head he could see a glimpse of the distant forest. As the sun turned west there was a gleam of yellow upon its far roof, as if the light caught the last pale leaves. Soon he saw the orange ball of the sun sinking towards the level of his eyes. He went to the opening ~~and there pale and faint was a thin new moon above the rim of Earth.~~

At that very moment he heard a sharp crack behind him. There on the grey stone in the grass was an enormous thrush, nearly coal black, its pale yellow breast freckled with dark spots. Crack! It had caught a snail and was knocking it on the stone. Crack! Crack!

**Remembering the full moon,** [s]uddenly Bilbo understood. Forgetting all danger he stood on the ledge and hailed the dwarves, shouting and waving. Those that were nearest came tumbling over the rocks and as fast as they could along the ledge to him, wondering what on earth was the matter; the others shouted to be hauled up the ropes (except Bombur, of course: he was asleep).

Quickly Bilbo explained. They all fell silent: the hobbit standing by the grey stone, and the dwarves with wagging beards watching impatiently. The sun sank lower and lower, and their hopes fell. It sank into a belt of reddened cloud and disappeared. The dwarves groaned, but still Bilbo stood almost without moving. ~~The little moon was dipping to the horizon.~~ Evening was coming on. Then suddenly when their hope was lowest a red ray of the sun escaped like a finger through a rent in the cloud. A gleam of light came straight through the opening into the bay and fell on the smooth rock-face. The old thrush, who had been watching from a high perch with beady eyes and head cocked on one side, gave a sudden trill. There was a loud crack. A flake of rock split from the wall and fell. A hole appeared suddenly about three feet from the ground.

Quickly, trembling lest the chance should fade, the dwarves rushed to the rock and pushed — in vain.

“The key! The key!” cried Bilbo. “Where is Thorin?”

Thorin hurried up.

“The key!” shouted Bilbo. “The key that went with the map! Try it now while there is still time!”

Then Thorin stepped up and drew the key on its chain from round his neck. He put it to the hole. It fitted and it turned! Snap! The gleam went out, the sun sank, ~~the moon was gone~~, and evening sprang into the sky.

### November 7 (October 27 GC)

Bilbo talks to Smaug at noon. That evening, Smaug destroys the door and then attacks Lake-town. It is a moon rising after sunset that guides Bard’s eye to see the patch below his heart (a patch in his waistcoat of fine diamonds that, no doubt, Smaug’s beating heart had weakened and caused to become dislodged over the centuries since he first crafted it), so an arrow to the heart would have killed even as mighty a dragon as Smaug.

If the moon rises after the setting of the sun, it must be a waning moon. On October 27, 2007, the sun set at 4:47 PM and nautical twilight ends at 6:01 PM, after which time sailors were able to navigate by the stars. The moon rises at 4:53 PM—that is, after sunset but not before the end of nautical twilight. This matches the description where a few men were “walking on the quays, and watching, as they were fond of doing, the stars shine out from the smooth patches of the lake as they opened in the sky.” Between civil twilight and nautical twilight would be the time when the stars “opened in the sky.” It is at this time that lights are seen on the Lonely Mountain, which “flickered back to view; a brief glow touched it and faded.” It would still take Smaug approximately an hour to cover the 40 or 50 miles; thus Smaug would have arrived 6:30 PM, close to the end of astronomical twilight (at 6:40 PM), after which no part of the sky would be lit by the sun. At this time, the moon would still have been only 5° above the eastern horizon, and it is with this moon that Bard could have killed Smaug.

A subsequent argument that Smaug did not attack Lake-town in the early evening goes back to the end of the chapter *On the Doorstep*. Bilbo returned from his talk with Smaug when “[t]he afternoon was turning into evening” and Bilbo tells his story. Sunset is around 4:47 PM on this day. As Bilbo continues to tell his story until “the stars began to peep forth” and “the shadows lengthened.” The first reference is likely only to the brightest stars, while the second suggests the sun is still visible as it sets on the western horizon, so it is still before sunset or 4:47 PM. At this point, they carry on the conversation in the tunnel, but it is finally while the “[d]arkness grew deeper” that Bilbo finally convinces the dwarves to close the door; the phrase still suggesting that it was some point before the end of astronomical twilight. It is when the door is closed that Smaug attacks, and it would be these attacks that caused the Lake-men to see the mounting flicker “back to view.” A waning gibbous moon rises after sunset and would continue to light the evening and night sky.

To account for these interpretations, only perhaps a few subtle changes would be required for the text:

Then Bard drew his bow-string to his ear. The dragon was circling back, flying low, and as he came the moon ~~rose~~ **rising** above the eastern shore ~~and~~ silvered his great wings.

The ~~waxing~~ **waning** moon rose higher and higher and the wind grew loud and cold.

### November 8 (October 28 GC)

The dwarves and Bilbo cower in the tunnel, so there are no celestial events to report.

### November 9 (October 29 GC)

The dwarves and Bilbo journey into Smaug’s lair and reach the entrance late in the morning. They then proceed to make their way to Ravenhill, reaching it late afternoon, for the first sentence of the chapter *Fire and Water* says “Now if you wish...to hear news of Smaug, you must go back again to the evening when he smashed the door and

flew off in rage, two days before.” It was a “[f]ive hours march” to Ravenhill from the front door, and previously, they travelled up the river by boat for one day, and after disembarking, “[t]hey made their first camp on the western side of the great southern spur, which ended in a height called Ravenhill.”

#### **November 10 (October 30 GC)**

The dwarves and Bilbo are told that Smaug is dead. This is also the day that the messengers from Lake-town reach the elven host, for “[Bard’s speedy] messengers had found a host already on the move, although it was then only the third day after the fall of Smaug.” It is also on this day that Thorin sends for Dain in the Iron Hills, for on the previous day they had reached Ravenhill and the chapter *The Gathering of the Clouds* that describes these events begins with “All night one of them had watched, but when morning came...”

#### **November 11 (October 31 GC)**

It is likely that this is the day the dwarves find out about the three ponies, for there is a description of many of the actions undertaken by the dwarves (exploring the caverns, fortifying the main entrance, etc.) It then says “As they worked the ravens brought them constant tidings. In this way they learned that the Elvenking had turned aside to the Lake, and they still had a breathing space” with emphasis on the phrase “had turned aside,” for on the fifth day the elven host reaches the lake. It is reasonable that the elven host had turned aside on the third day and that it may have taken a day for this intelligence to be passed onto the dwarves.

#### **November 12 (November 1 GC)**

The elven host reaches the Long Lake, for in the chapter *Fire and Water*, it is said that “Only five days after the death of the dragon they came upon the shores and looked on the ruins of the town.”

#### **November 15 (November 4 GC)**

This is likely the day that Fili and Kili return with the ponies, for they were sent to retrieve the ponies and “[t]hey were four days gone...” This is not unreasonable—it has already been over a week since Smaug realized the cup was stolen and attacked the camp with the consequence that “[t]he ponies screamed with terror, burst their ropes and galloped wildly off.” Fortunately, the two dwarves had the birds to guide them in their search.

#### **November 16 (November 5 GC)**

The first day of winter.

#### **November 18 (November 7 GC)**

The host of elves and men reaches the mouth of the River Running flowing into Long Lake, for “It was thus that in eleven days from the ruin of the town the head of their host passed the rock-gates at the end of the lake and came into the desolate lands.”

#### **November 20 (November 9 GC)**

The host of elves and men reach Dale in the evening. It is a new moon, and thus the host reached the ruins under the cover of darkness. They were only detected by the dwarves when “[t]here came a night when suddenly there were many lights as of fires and torches away south in Dale before them.” It was on November 18 that they reached the mouth of the River Running, and from this point, it took the dwarves one day by boat and one day by foot to reach the base of the southern spur (see discussion on November 9). Balin states that “their camp is very great. They must have come into the valley under the cover of dusk along both banks of the river.” Consequently, some time must have been spent fording the River Running, so it is not unreasonable that the host may have had two camps prior to reaching Dale. Another reader may choose to have the hosts reach Dale on the evening of November 19.

### November 21 (November 10 GC)

They next day, the mountain is reconnoitred, for “[t]he morning was still pale when they saw a company approaching.” Following this, the host moved their camp “to the east of the river, right between the arms of the Mountain.”

### November 22 (November 11 GC)

This is the day that Bard and Thorin parley, for “the next morning early a company of spearmen was seen crossing the river.” That afternoon, a second messenger “declare[s] the Mountain besieged.”

### Comment

At this point, the chapter *A Thief in the Night* begins with “Now the days passed slowly and wearily.” It is two days prior to the arrival of Dain that Bilbo decides to visit the hosts, for “the ravens brought news that Dain and more than five hundred dwarves...were now within about two days’ march of Dale, coming from the North-East.” That night sky is described as “black and moonless”, at least up until Bilbo departs. Returning to our calendar, astronomical twilight ends at between 6:20 and 6:08 between November 20 and November 30. While the moon sets before the end of astronomical twilight up until the November 24 (November 13 GC) so two days after the mountain is declared besieged (November 22), we must remember that the front gate is in a valley between two spurs, so the moon would have sunk well below the western spur ending in Ravenhill long before the actual time of moonset. Now, Bombur describes the night Bilbo steals away as “mighty cold!” and thus it was likely to be cloudless night (anyone who has ever camped in winter knows that clouds insulate the earth). Bilbo would have needed his starlight to find his way. On November 26 (November 15 GC), four days after the mountain is declared besieged, is sufficiently described by the text “the days passed slowly and wearily” before Bilbo finally decides to give up the Arkenstone and the moon is below 9° above the horizon after astronomical twilight—a moon that could easily be hidden by the western of the southern spurs of the mountain.

### November 26 (November 15 GC)

Dain is two days away, and Bilbo leaves to give the Arkenstone to Bard and is met by Gandalf. Bilbo returns by midnight.

### November 27 (November 16 GC)

Bard, the Elevenking and Gandalf parley with Thorin at noon for “[a]bout midday the banners of the Forest and the Lake were seen to be borne forth again.” Bilbo leaves the dwarves.

### November 28 (November 17 GC)

Having been eighteen days since the crows were sent to bid Dain to come, Dain and his host arrives from the Iron Hills and there is the Battle of Five Armies. Eighteen days is likely sufficient for the ravens to get the message to Dain, for Dain to muster his army, and to cross the desolation between the Iron Hills and the Lonely Mountain. The battle seems to have taken most of the day, as “[t]he morning was still early when a cry was heard in the camp... Dain had come. He had hurried on through the night” and sunrise is at 7:26 AM. It is only close to sunset, 4:12 PM, that the eagles arrived, for “[t]he clouds were torn by the wind, and a red sunset slashed the West... He gave a great cry: ‘The Eagles! The Eagles!’ he shouted. ‘The Eagles are coming!’” The battle could have easily continued to the end of civil twilight, ending thirty-eight minute after the sunset at 4:50 PM, and no doubt a waxing half-moon setting even later at 10:57 PM, too, would have helped the elves, men, dwarves, eagles and Beorn to finally crush the goblins and wargs. The text says that “[v]ictory had been assured before the fall of night” which would be astronomical twilight at 6:10 PM.

### November 29 (November 18 GC)

The day after the battle. Thorin dies.

### **Comment**

It is likely that they started their journey home sometime in the middle of December, taking perhaps two weeks to reach the home of Beorn.

### **Yule (December 22 GC)**

Beorn, Bilbo and Gandalf reach Beorn's home and celebrate the Yule.

### **Comment**

Bilbo and Gandalf stay with Beorn over the winter, for the mountain passes are likely snowed in, and they do not leave until late into spring, for "[i]t was spring...before Bilbo and Gandalf took their leave at last of Beorn." It likely took less than ten days to journey back across the Misty Mountains and back to Rivendell, so they likely left around April 20.

### **May 1 shr (April 21 GC)**

Gandalf and Bilbo reach Rivendell. You can confirm this, for following November 6, there are 24 days in November, and thirty in each of December, January, February, March and April, and counting the two Yule days and May 1, this totals 177 days which is just under  $6 \times 29.53 = 177.18$ , or almost exactly six lunar months after the full moon upon which they opened the secret door.

### **May 2 shr (April 22 GC)**

Bilbo awakes in bed and it is the day after a full moon, so it is quite reasonable that Bilbo would have "woke to find...the moon shining through an open window."

### **May 8 shr (April 29 GC)**

Bilbo and Gandalf leave Rivendell, for "[a]fter a week...he said farewell to Elrond."

### **June 22 shr (June 12 GC)**

Gandalf and Bilbo reach Bag End. This journey took forty-five days, although this may have been much longer than the journey out, for they collected the troll's gold which they had buried and "put the gold in bags and slung them on the ponies, who were not at all pleased about it. After that their going was slower, for most of the time they walked." On the journey out, the dwarves "were on ponies" and "[t]here was a very small pony, apparently for Bilbo" with "Gandalf...on a white horse."

### **Summary of the investigation**

The above sequence of events quite reasonably matches all of the celestial descriptions that occur in *The Hobbit*. The timelines are plausible and the phases of the moon are reasonable in all cases. The greatest weakness is the day that Bilbo gives up the Arkenstone, for the night is described as "moonless", although a low moon may have been hidden by clouds that evening. However, this is the only weakness that is a consequence of the proposed solution for the irreconcilable moon phases on two consecutive days.

## **7.6 Further references to celestial, seasonal or calendrical events**

Next, we will consider five other references to either phases of the moon, the seasons or specific dates. The first three references are to phases of the moon, including the evening the dwarves and Bilbo were captured by the trolls, the evening they arrived at Rivendell, and period extending from their escape from the goblins and wargs up to their arrival at the forest-gate. The next sequence of events can be placed by the apparent reference to the first day of autumn on the day the dwarves were captured and brought before the Elvenking. Finally, there is a reference to Bilbo's birthday on the day that Bilbo and the dwarves arrived in Lake-town. We will examine each of these.

### 7.6.1 Roast mutton

In the chapter *Roast Mutton*, the events occur during the end of May, for Bilbo grumbles “To think it will soon be June!” May 29 in the Shire Reckoning is May 19 in the Gregorian calendar. It was after sunset when they stumbled into a valley, for “it began to get dark as they went down into a deep valley with a river at the bottom.” Additionally, it was close to the end of the astronomical twilight, for “it was nearly night when they had crossed over” the Last Bridge. At this point, “the wind broke up the grey clouds, and a wandering moon appeared above the hills between the flying rags.” Civil twilight ends at around 8:39 PM on May 29, and while there would have been a new moon on May 26 (May 16 GC), on May 29 there is a waxing crescent moon that sets at 11:51 PM (the day of May 29 was chosen as Bilbo does not say “To think it will be June tomorrow!”) and that moon at 8:30 PM would have been  $25^\circ$  above the horizon in the direction of WNW. (Please recall that all times are given in standard and not daylight-savings time.) As the Mitheithel River flows south at this point, the “hills” would be on either side of the river and thus also behind the dwarves and Bilbo as they crossed over the bridge; that is, there were hills over which the moon could appear, and  $25^\circ$  would be sufficiently high in the sky to be “above the hills.” A waxing crescent moon that they would see three days after a new moon is shown in Figure 9.



Figure 9. A waxing crescent moon three days after a new moon.

That night, they run into William, Bert and Tom, and so Gandalf would have turned the trolls to stone at 6:37 AM the next morning on May 30.

### 7.6.2 Arrival at Rivendell

The next reference to a moon comes as they reach Rivendell, for on that night, “the light became very dim, for the moon had not risen.” It had taken them 31 days to reach the Last Bridge, and the distance from the Last Bridge to Rivendell is approximately 32% the distance from Hobbiton to the Last Bridge, so given that the roads grew steadily worse, it would have taken at least 10 further days to reach Rivendell. On June 12 (June 1 GC), civil twilight ends at 8:59 PM, so it would have had to be after 9:00 PM that “Bilbo’s pony began to stumble over roots and stones.” While a full moon rises at 9:34 PM on that day, given that they are so close to the Misty Mountains, it is likely that they would not have seen the moon until around 10:30 PM when the moon was  $5^\circ$  above the horizon.

### 7.6.3 From the goblin gate to the forest-gate

The next moon that is mentioned is when Gandalf, the dwarves and Bilbo do battle with the wargs and goblins (and are subsequently rescued by the eagles); however, there is a future event from which we must work back. The night before the day Gandalf, the dwarves and Bilbo reach the forest-gate, they are riding by the moon. The last reasonable day that this could have occurred is July 11, for it is on this day that a new full but waning gibbous moon rises at 10:05 PM: “that they rode still forward after dusk and into the night beneath the moon.” Now, on this day, civil twilight ends at 9:14 PM and nautical twilight ends at 10:28 PM. They could have proceeded more slowly during the time of nautical twilight and then continued when the moon arose. Additionally, the moon would have been in the sky at night, for “each night after dark a great bear going along with us or sitting far off in the moon watching our camps.” The next day they reached the entrance to the path, and they began their journey down the forest path on July 13.

Working backwards, they would have left the home of Beorn on July 9, in the evening of July 7, Bilbo would have woken up that first night at the home of Beorn seeing “a splash of white on the floor came from the high moon, which was peering down through the smoke-hole in the roof” as there is a waxing gibbous moon that reaches its zenith at 10:42 PM, which is after the end of nautical twilight at 10:30 PM. Consequently, the previous evening, July 6, when they were attacked by the goblins and wargs, there, too would have been a bright evening moon: a waxing gibbous moon rises at 6:13 PM. Fortunately, July 6, by the Stewards’ Reckoning, is also a Thursday, and thus they the

night they would have arrived in the cave would have been the evening of Monday, July 3. Recall that Bilbo may simply have been recording Gandalf's words, and Gandalf would have used the Stewards' Reckoning. This means that Gandalf, the dwarves and Bilbo would have been travelling for four full days before they found themselves in the goblin cave. While this may be a stretch for the text, the Fellowship of the Ring was travelling on foot and reached Moria in twenty days, and this was in the time of the shortest days of the year, while Gandalf, the dwarves and Bilbo were riding a horse and ponies with more than twice the hours of sunlight. The relevant texts include "long days after they had climbed out of the valley and left the Last Homely House miles behind, they were still going up and up and up," and "[a]ll was well, until one day they met a thunderstorm — more than a thunderstorm, a thunder-battle." This does not ideally suggest only four days, but the alternative that would place appropriate moons at the right time would stretch the imagination, as they would have travelled for a month before they reached they were captured by the goblins.

#### 7.6.4 The enchanted stream and the Wood-elven feast

The next reference to a season is the Elvenking, on whom there "was a crown of berries and red leaves, for the autumn was come again." The first day of autumn, for the elves, is approximately 126 days (*ethuil* is 54 days and *laer* is 72 days) after the actual Vernal Equinox (being March 29 in the Stewards' Reckoning), which would be on or around August 2 (2 + 1 + 30 + 30 + 30 + 1 + 30 + 2). It is therefore not unreasonable that the feast the dwarves and Bilbo stumbled upon was a celebration of the first day of autumn or perhaps the eve of summer on August 2. Working backward, the only information we have is following the time they crossed the Enchanted River: "[a]bout four days from the enchanted stream they came to a part where most of the trees were beeches" and "two days later they found their path going downwards." Then, "[t]hat night they ate their very last scraps and crumbs of food; and next morning when they woke the first thing they noticed was that they were still gnawingly hungry." This is the day Bombur wakes up and the day they walk into the elven feast. That the feast was a celebration of the eve of summer is suggested that when Thorin is dragged before the Elvenking, there is no mention of a crown; however, when the remaining dwarves are brought before the Elvenking the next day, there is the description that "[o]n his head was a crown of berries and red leaves, for the autumn was come again." On this assumption that they stumbled upon a celebration on the eve of summer on August 2, they thus would have crossed the Enchanted River on July 25. This means they had been travelling on the path up to the point of the Enchanted River since the morning of July 13, or for thirteen days (as there was sufficient light for both Bilbo and the deer). This is not unreasonable, as they were on foot and the distance is comparable to the distance from the Last Bridge to Rivendell; however, it's not necessarily ideal—one would think it would be more difficult to navigate a dark forest.

One feature of the text that does not really support approximately two weeks is that "[t]hey were thirsty too, for they had none too much water, and in all the time they had seen neither spring nor stream. This was their state when one day they found their path blocked by a running water." Now dwarves can carry a significant load, for it is later described that "[e]ach one of [Dain's] folk was clad in a hauberk of steel mail that hung to his knees, and his legs were covered with hose of a fine and flexible metal mesh... The dwarves are exceedingly strong for their height, but most of these were strong even for dwarves. In battle they wielded heavy two-handed mattocks; but each of them had also a short broad sword at his side and a roundshield slung at his back... Their caps were of iron and they were shod with iron." In addition to their armor, "[t]hey had brought with them a great store of supplies; for the dwarves can carry very heavy burdens, and nearly all of Dain's folk, in spite of their rapid march, bore huge packs on their backs in addition to their weapons. They would stand a siege for weeks." Thorin and company were not wearing armor, so it is likely they could have carried a lot of water in addition to their supplies, more than two weeks' worth. The alternative date for the celebration of the last day of summer would be the last day of summer in the Stewards' Reckoning, which would be August 15. This would give the dwarves and Bilbo twenty-six days on the forest path (and would consequently also reduce the time spent in the prisons of the Elvenking); however, there is no reason that the Wood-elves would celebrate the end of summer by the Stewards' Reckoning: their calendar was significantly different. At the time of writing *The Hobbit*, this author suspects Tolkien likely had a time closer to August 15 in mind, and likely never considered this when he described in detail the the elven calendar in

Appendix D of *The Lord of the Rings*. While this author would like to ignore the elven calendar presented in that appendix, if one is to remain faithful to the entire mythology, it seems two weeks will have to do.

### 7.6.5 Barrels out of bonds to thoughts of departure and beyond

Now, Bilbo reached Lake-town on the evening of September 23 by the Stewards' Reckoning (Bilbo's birthday was September 22 by the Shire Reckoning), so their escape was on September 22 StR. Thus, the dwarves had been prisoners of the elves for fifty days (fifty-one for Thorin). A fortnight later, on October 5, "Thorin began to think of departure." It still would have taken a few days, for first "[h]orses and ponies had been sent round by circuitous paths to meet them at their appointed landing-place" and preparation for this would, too, have taken a few days. Thus, we may suppose that on or around October 10, "three large boats left Lake-town." Thus, "[a]t the end of the third day, some miles up the river, they drew in to the left or western bank and disembarked." As mentioned above, it took them one day to get to the foot of Ravenhill, so on or around October 14. This would give them approximately twenty-two days to find the door and to then sit upon the doorstep before the coming of Durin's Day.

### Summary of further references

While the interpretation of the Wood-elven feast as being on the last day of the elven summer leaves the dwarves less than three full weeks on the forest path, this is a necessary consequence of using Tolkien's calendars as described in *The Lord of the Rings*. The other references to the phases of the moon and the calendar, however, do nicely tie into the proposed solution: there is a moon out on the night they reach the Last Bridge, there is a moon by which Gandalf, the dwarves and Bilbo can escape from the goblins and wargs, and that same moon lights the night sky while they are watched by Beorn as they travel from Beorn's house up to the forest-gate. Finally, reaching Lake-town on September 22 of the Shire Reckoning gives sufficient time for the balance of the story to play out before Gandalf and Bilbo celebrate the Yule with Beorn at his house.

### Summary of a proposed solution

The proposed solution of having Durin's Day be the day of the last full moon of Autumn, and having the first day of winter appearing on November 16 (under both the Stewards' and Shire Reckonings) provides the beautiful coincidence that a broad silver crescent appears on midsummer's eve and also reasonably matches subsequent descriptions of phases of the moon. It provides for a nearly full moon to guide Bard's eye to the weakness in Smaug's armour, it results in a new moon on the day the host of elves and men enter Dale, it gives a reasonably dark evening on which Bilbo can leave under the cover of darkness to give the Arkenstone to Bard and the Elvenking, and it provides a half moon on the evening of the Battle of Five Armies, allowing the forces of good to vanquish the goblins and wargs after the eagles appear at sunset and Beorn appearing in the twilight hours. It also gives an almost full moon to shine through Bilbo's window on May 2 of the next year, but also does allow appropriate tie-ins to other events described in the books between Elrond reading the moon-letters on midsummer's eve to the dwarves and Bilbo entering the secret door. These events are summarized in a tabular format in the attached Appendix.

### Overall summary

The irreconcilable difference between there being a new moon on the day that the secret door is opened and a waning gibbous moon the next suggest that Tolkien may have either been indifferent to the phases of the moon, or changed the text so as to create a new moon without addressing the effect of this on the next chapter. It is unlikely that the first is the case, but then again, this was a children's story and not the monumental work that was to follow in *The Lord of the Rings*. His purpose was entertainment and not precision. He likely worked in a bright moon in order to allow Bard to see the weakness in Smaug's armour, but also required some interpretation of Durin's Day, and for a lunisolar calendar, it is natural that a day of significance such as the start of a year would begin with a new moon. As these two are irreconcilable, the proposed solution is to make the dwarves' New Year begin on the last full moon of autumn. This results in phases of the moon that very close match almost all other events in the story, and while requiring subtle changes to the text, do not lead to any significant changes in the story line. Consequently,

the proposed solution satisfies the constraints that were given in Section 4, and reasonably well satisfies the criteria given in Section 3. While this author does not suggest in any way that these amendments should be included in the original text—for that was Tolkien’s masterpiece—this at least gives a plausible tweak that allows the balance of the story to follow the same rigor that appears in *The Lord of the Rings*.

## References

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Time and Date AS, <http://timeanddate.com>, retrieved July 2018.

Various Wikipedia articles related to the Lunar cycles, the Solstices, the Equinoxes, etc., retrieved July 2018.

## Appendix

The following is a proposed calendar of events based on the assumption presented in the corresponding article.

1. The days are according to the Stewards' Reckoning.
2. The second column contains the days of the week according to the Stewards' Reckoning. The weekdays are based on Gandalf stating in *The Quest for Erebor* that the unexpected party was on Wednesday, May 26. The week starts with Saturday and ends with Friday. Saturday, Sunday, Monday, Tuesday, Wednesday, Thursday and Friday are denoted S, N, M, T, W, R and F, respectively. Every second week is highlighted in maroon.
3. The third column includes this author's description and commentary.
4. The fourth column indicates the corresponding day in the Gregorian calendar for 2007.
5. The fifth column gives the percent of the moon that is lit as it passes its zenith. On certain days, the moon does not reach the zenith, so no percentage is given that day.
6. The sixth column occasionally contains an image of the phase of the moon.
7. The seventh column includes the moonrises and moonsets. Any time following an arrow indicates a moonset: the moon was up until this time; for example, →5:14 am. Any time before an arrow indicates a moonrise: the moon began to appear at this time; for example, 5:36 pm→. Thus, 2:34 am→9:20 am indicates the moon was visible throughout the day, and →5:32 am / 7:57 pm→ indicates that the moon set in the morning and did not rise again until the evening.
8. The eighth column contains the time of sunset, the end of civil twilight, the end of nautical twilight and the end of the astronomical twilight and the beginning of night. In June and July when the sun never sinks below the horizon sufficiently to merit astronomical twilight, the fourth entry is marked with an *em-dash*: —.

All of the times for sunset, the ends of the various twilights, the phase of the moon, moonrise and moonset are all provided by [www.timeanddate.com](http://www.timeanddate.com) and come from the year 2007 in Oxford, England where Tolkien wrote *The Hobbit*. Adjustments for daylight savings time have been removed.

There are sequences of dates that are fixed relative to each other by descriptions in the text; for example, "Event A occurs, on the next day Event B occurs, and then three days later Event C occurs." If any one day within such a sequence of dates is fixed to a calendar day, we will describe it as an *anchored chronology*, while if such a sequence is not anchored, it is said to be a *floating chronology*. There are three anchored chronologies: those around the unexpected party, midsummer's eve and Bilbo's birthday. These contiguous days of these three anchored chronologies are highlighted with a light-green background. The remaining floating chronologies are highlighted with a light-red background, for we are not really sure:

1. which last day of May they crossed the bridge,
2. how long they journeyed before being captured by goblins,
3. how long they walked on the forest path (or the exact date of the start of the elven autumn,
4. what day they departed from Lake-town,
5. when they found the secret door or moved their camp the next day,
6. when the door was opened,
7. how long it took the host of elves and men to march from the mouth of the River Running to Dale, or
8. which night Bilbo chose to deliver the Arkenstone to Bard and the Elvenking.

Arguments for the placement of any floating chronologies are provided in the comments and description. In addition, events recorded on individual days are also not certain, especially in December. There are two further anchored dates in the following year: arriving in Rivendell on May 1 and arriving at Bag-End on June 22; however, these are not significant to the timeline.

The Vernal Equinox is on March 20 of the Gregorian calendar, so March 29 in the Stewards' Reckoning.

## April

Day	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1	S	23/3			
2	N	24/3			
3	M	25/3			
4	T	26/3			
5	W	27/3			
6	R	28/3			
7	F	29/3			
8	S	30/3			
9	N	31/3			
10	M	1/4	—	☉ →5:14 am / 5:36 pm→	6:37 pm 7:12 pm 7:53 pm 8:37 pm
11	T	2/4	99.5	☉ →5:23 am / 6:46 pm→	6:39 pm 7:13 pm 7:55 pm 8:39 pm
12	W	3/4	99.9	☉ →5:32 am / 7:57 pm→	6:41 pm 7:15 pm 7:57 pm 8:42 pm
13	R	4/4	98.4	☉ →5:44 am / 9:10 pm→	6:42 pm 7:17 pm 7:59 pm 8:44 pm
14	F	5/4	95.0	☉ →5:58 am / 10:24 pm→	6:44 pm 7:19 pm 8:01 pm 8:46 pm
15	S	6/4	89.9	☾ →6:16 am / 11:38 pm→	6:46 pm 7:20 pm 8:03 pm 8:49 pm
16	N	7/4	83.2	☾ →6:42 am	6:47 pm 7:22 pm 8:05 pm 8:51 pm
17	M	8/4	75.1	☾ 12:48 am→7:20 am	6:49 pm 7:24 pm 8:07 pm 8:53 pm
18	T	9/4	65.7	☾ 1:48 am→8:12 am	6:51 pm 7:26 pm 8:09 pm 8:56 pm
19	W	10/4	55.4	☾ 2:34 am→9:20 am	6:53 pm 7:28 pm 8:11 pm 8:58 pm
20	R	11/4	44.5	☾ 3:08 am→10:40 am	6:54 pm 7:29 pm 8:13 pm 9:01 pm
21	F	12/4	33.5	☾ 3:32 am→12:06 pm	6:56 pm 7:31 pm 8:15 pm 9:03 pm
22	S	13/4	23.0	☾ 3:50 am→1:34 pm	6:58 pm 7:33 pm 8:17 pm 9:06 pm
23	N	14/4	13.7	☾ 4:04 am→3:03 pm	6:59 pm 7:35 pm 8:19 pm 9:09 pm
24	M	15/4	6.4	☾ 4:17 am→4:33 pm	7:01 pm 7:37 pm 8:21 pm 9:11 pm
25	T	16/4	1.6	☾ 4:30 am→6:05 pm	7:03 pm 7:39 pm 8:23 pm 9:14 pm
26	W	17/4	0.1	☾ 4:44 am→7:40 pm	7:04 pm 7:40 pm 8:25 pm 9:17 pm
27	R	18/4	1.9	☾ 5:02 am→9:17 pm	7:06 pm 7:42 pm 8:28 pm 9:19 pm
28	F	19/4	6.8	☾ 5:25 am→10:50 pm	7:08 pm 7:44 pm 8:30 pm 9:22 pm
29	S	20/4	14.2	☾ 5:59 am→	7:09 pm 7:46 pm 8:32 pm 9:25 pm
30	N	21/4	23.5	☾ →12:12 am / 6:48 am→	7:11 pm 7:48 pm 8:34 pm 9:28 pm

## May

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1	M	22/4	33.9		→1:15 am / 7:53 am→ 7:13 pm 7:50 pm 8:36 pm 9:31 pm
2	T	23/4	44.7		→1:59 am / 9:10 am→ 7:15 pm 7:52 pm 8:39 pm 9:34 pm
3	W	24/4	55.3		→2:27 am / 10:30 am→ 7:16 pm 7:53 pm 8:41 pm 9:37 pm
4	R	25/4	65.4		→2:47 am / 11:49 am→ 7:18 pm 7:55 pm 8:43 pm 9:40 pm
5	F	26/4	74.5		→3:01 am / 1:04 pm→ 7:20 pm 7:57 pm 8:45 pm 9:43 pm
6	S	27/4	82.6		→3:13 am / 2:16 pm→ 7:21 pm 7:59 pm 8:47 pm 9:46 pm
7	N	28/4	89.3		→3:23 am / 3:26 pm→ 7:23 pm 8:01 pm 8:50 pm 9:49 pm
8	M	29/4	94.5		→3:32 am / 4:35 pm→ 7:25 pm 8:03 pm 8:52 pm 9:53 pm
9	T	30/4	98.0		→3:42 am / 5:46 pm→ 7:26 pm 8:05 pm 8:54 pm 9:56 pm
10	W	1/5	—		→3:52 am / 6:58 pm→ 7:28 pm 8:07 pm 8:57 pm 9:59 pm
11	R	2/5	99.7		→4:05 am / 8:12 pm→ 7:30 pm 8:08 pm 8:59 pm 10:03 pm
12	F	3/5	99.5		→4:23 am / 9:27 pm→ 7:31 pm 8:10 pm 9:01 pm 10:06 pm
13	S	4/5	97.4		→4:47 am / 10:38 pm→ 7:33 pm 8:12 pm 9:04 pm 10:10 pm
14	N	5/5	93.3		→5:21 am / 11:41 pm→ 7:34 pm 8:14 pm 9:06 pm 10:14 pm
15	M	6/5	87.4		→6:08 am 7:36 pm 8:16 pm 9:08 pm 10:18 pm
16	T	7/5	79.8		12:32 am→7:11 am 7:38 pm 8:18 pm 9:11 pm 10:22 pm
17	W	8/5	70.6		1:08 am→8:27 am 7:39 pm 8:20 pm 9:13 pm 10:26 pm
18	R	9/5	60.3		1:35 am→9:49 am 7:41 pm 8:21 pm 9:15 pm 10:30 pm
19	F	10/5	49.2		1:54 am→11:13 pm 7:43 pm 8:23 pm 9:18 pm 10:34 pm
20	S	11/5	37.8		2:10 am→12:38 pm 7:44 pm 8:25 pm 9:20 pm 10:39 pm
21	N	12/5	26.8		2:23 am→2:04 pm 7:46 pm 8:27 pm 9:23 pm 10:43 pm
22	M	13/5	16.8		2:35 am→3:32 pm 7:47 pm 8:29 pm 9:25 pm 10:48 pm
23	T	14/5	8.6		2:48 am→5:03 pm 7:49 pm 8:30 pm 9:27 pm 10:53 pm
24	W	15/5	2.9		3:04 am→6:38 pm 7:50 pm 8:32 pm 9:30 pm 10:59 pm
25	R	16/5	0.3		3:24 am→8:13 pm 7:52 pm 8:34 pm 9:32 pm 11:02 pm
26	F	17/5	1.0		3:52 am→9:43 pm 7:53 pm 8:36 pm 9:34 pm 11:04 pm
27	S	18/5	4.7		4:34 am→10:58 pm 7:55 pm 8:37 pm 9:37 pm 11:11 pm
28	N	19/5	11.0		5:34 am→11:51 pm 7:56 pm 8:39 pm 9:39 pm 11:18 pm
29	M	20/5	19.2		6:48 am→ 7:58 pm 8:41 pm 9:42 pm 11:26 pm
30	T	21/5	28.6		→12:27 am / 8:10 am→ 7:59 pm 8:43 pm 9:44 pm 11:37 pm

↑  
They continue journeying east along the Great East Road.  
↓

They cross the Last Bridge and are captured by the trolls. This cannot happen much later, for Bilbo grumbles that “it will soon be June!” although he may have used the Shire Reckoning, and May 29 in the Stewards’ Reckoning is May 28 in the Shire Reckoning; nor can it be much earlier for it was “nearly night”, they were in a “deep valley”, and they could still see the moon.

Gandalf rescues the dwarves and Bilbo when the sun rises at 4:04 AM.

## June

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 W		22/5	38.7	→12:50 am / 9:32 am→	8:01 pm 8:44 pm 9:46 pm —
2 R		23/5	49.0	→1:07 am / 10:49 am→	8:02 pm 8:46 pm 9:48 pm —
3 F		24/5	59.0	→1:20 am / 12:03 pm→	8:03 pm 8:47 pm 9:51 pm —
4 S		25/5	68.4	→1:30 am / 1:15 pm→	8:05 pm 8:49 pm 9:53 pm —
5 N		26/5	77.1	→1:40 am / 2:24 pm→	8:06 pm 8:51 pm 9:55 pm —
6 M		27/5	84.6	→1:50 am / 3:34 pm→	8:07 pm 8:52 pm 9:57 pm —
7 T		28/5	90.9	→2:00 am / 4:46 pm→	8:08 pm 8:54 pm 10:00 pm —
8 W		29/5	95.7	→2:12 am / 5:59 pm→	8:10 pm 8:55 pm 10:02 pm —
9 R		30/5	—	→2:28 am / 7:14 pm→	8:11 pm 8:56 pm 10:04 pm —
10 F		31/5	98.7	→2:50 am / 8:27 pm→	8:12 pm 8:58 pm 10:06 pm —
11 S		1/6	99.8	→3:21 am / 9:34 pm→	8:13 pm 8:59 pm 10:08 pm —
12 N	They reach Rivendell in the evening after sunset. Initially Bilbo's pony begins "to stumble over roots and stones" (suggesting that civil twilight has ended) yet at this point "the moon had not risen." A rising waning gibbous moon at 10:29 PM may help guide the way down to Rivendell after nautical twilight ends.	2/6	98.8	→4:05 am / 10:29 pm→	8:14 pm 9:00 pm 10:10 pm —
13 M		3/6	95.7	→5:04 am / 11:10 pm→	8:15 pm 9:02 pm 10:12 pm —
14 T		4/6	90.5	→6:17 am / 11:39 pm→	8:16 pm 9:03 pm 10:13 pm —
15 W		5/6	83.3	→7:37 am	8:17 pm 9:04 pm 10:15 pm —
16 R		6/6	74.4	12:00 am→9:01 am	8:18 pm 9:05 pm 10:17 pm —
17 F		7/6	64.1	12:16 am→10:24 am	8:19 pm 9:06 pm 10:19 pm —
18 S		8/6	52.8	12:29 am→11:48 am	8:20 pm 9:07 pm 10:20 pm —
19 N		9/6	41.1	12:41 am→1:12 pm	8:21 pm 9:08 pm 10:22 pm —
20 M		10/6	29.7	12:54 am→2:38 pm	8:21 pm 9:09 pm 10:23 pm —
21 T	↑ They rest at Rivendell.	11/6	19.3	1:08 am→4:08 pm	8:22 pm 9:10 pm 10:24 pm —
22 W	↓	12/6	10.6	1:25 am→5:41 pm	8:23 pm 9:11 pm 10:25 pm —
23 R		13/6	4.3	1:49 am→7:13 pm	8:24 pm 9:12 pm 10:27 pm —
24 F		14/6	0.8	2:23 am→8:35 pm	8:24 pm 9:12 pm 10:28 pm —
25 S		15/6	0.4	3:14 am→9:38 pm	8:25 pm 9:13 pm 10:29 pm —
26 N		16/6	2.9	4:23 am→10:22 pm	8:25 pm 9:13 pm 10:29 pm —
27 M		17/6	7.8	5:44 am→10:51 pm	8:26 pm 9:14 pm 10:30 pm —
28 T		18/6	14.8	7:08 am→11:11 pm	8:26 pm 9:14 pm 10:31 pm —
29 W		19/6	23.2	8:29 am→11:25 pm	8:26 pm 9:15 pm 10:31 pm —
30 R	Midsummer's eve: Elrond reads the moon-letters on the map. The moon is 32.5% full, which is reasonably well described as "broad" and it is visible for over an hour almost due west after nautical twilight ends.	20/6	32.5	9:46 am→11:37 pm	8:27 pm 9:15 pm 10:31 pm —
F	Midsummer's day (the summer solstice): they leave Rivendell in the morning. Sunrise is at 3:46 AM.	21/6	42.2	21 11:00 am→11:47 pm	8:27 pm 9:15 pm 10:32 pm —

## July

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 S		22/6	52.1 	12:11 pm→11:57 pm	8:27 pm 9:15 pm 10:32 pm —
2 N		23/6	61.8 	1:21 pm→	8:27 pm 9:16 pm 10:32 pm —
3 M	They have been travelling by pony and horse for four full days at a time of year when the days have 16 hours and 40 minutes of sunlight. On the last day on the high pass, they encounter a “thunder-battle” described as being “at night,” so they take refuge inside a cave. At this point, they are captured by goblins. The Fellowship got to Moria in only 20 days, travelling with stealth in the dead of winter when the days are less than eight hours long.	24/6	70.9 	→12:07 am / 2:32 pm→	8:27 pm 9:16 pm 10:32 pm —
4 T		25/6	79.3 	→12:18 am / 3:45 pm→	8:27 pm 9:16 pm 10:32 pm —
5 W		26/6	86.7 	→12:33 am / 4:59 pm→	8:27 pm 9:15 pm 10:31 pm —
6 R	They escape, do battle with the wargs and goblins and are rescued by the eagles. A waxing gibbous moon rises prior to sunset, so the evening is well lit by a moon that does not sink below the Misty Mountains until around midnight (accounting for the height of the mountains).	27/6	92.7 	→12:52 am / 6:13 pm→	8:27 pm 9:15 pm 10:31 pm —
7 F	They are dropped off at the Carrock and arrive at Beorn's house that evening. Bilbo wakes up to moonlight coming in from the smoke-hole, likely at some time after 10:30 pm.	28/6	97.1 	→1:20 am / 7:23 pm→	8:27 pm 9:15 pm 10:30 pm —
8 S	They spend the day at Beorn's house; Beorn returns in the evening.	29/6	— 	→1:59 am / 8:23 pm→	8:27 pm 9:15 pm 10:30 pm —
9 N	They set out in the morning. Beorn watches them that night under the light of an almost full moon.	30/6	99.5 	→2:54 am / 9:09 pm→	8:27 pm 9:14 pm 10:29 pm —
10 M	They continue north. Beorn continues to watch them under the light of a full moon.	1/7	99.7 	→4:03 am / 9:42 pm→	8:26 pm 9:14 pm 10:28 pm —
11 T	They press forward after sunset, first by the light of nautical twilight and then the rising of a waning gibbous moon at 10:05 pm. It cannot be much later than this, for the days are already getting short, and the moon is rising much later after today. On July 12, the moon only begins to rise at the very end of the astronomical twilight.	2/7	97.5 	→5:24 am / 10:05 pm→	8:26 pm 9:14 pm 10:27 pm —
12 W	They start before dawn, when the sun rises at 3:51 AM. They reach the forest-gate in the afternoon.	3/7	92.9 	→6:48 am / 10:23 pm→	8:26 pm 9:13 pm 10:26 pm —
13 R	They enter the forest path in the morning.	4/7	86.1 	→8:12 am / 10:37 pm→	8:25 pm 9:12 pm 10:25 pm —
14 F		5/7	77.3 	→9:36 am / 10:49 pm→	8:25 pm 9:12 pm 10:24 pm —
15 S		6/7	67.0 	→11:00 pm / 11:01 pm→	8:24 pm 9:11 pm 10:22 pm —
16 N		7/7	55.5 	→12:24 pm / 11:14 pm→	8:24 pm 9:10 pm 10:21 pm —
17 M		8/7	43.7 	→1:51 pm / 11:29 pm→	8:23 pm 9:09 pm 10:20 pm —
18 T		9/7	32.1 	→3:20 pm / 11:50 pm→	8:22 pm 9:09 pm 10:18 pm —
19 W	They journey along the forest path.	10/7	21.4 	→4:51 pm	8:21 pm 9:08 pm 10:17 pm —
20 R		11/7	12.4 	12:19 am→6:15 pm	8:21 pm 9:07 pm 10:15 pm —
21 F		12/7	5.7 	1:02 am→7:25 pm	8:20 pm 9:06 pm 10:13 pm —
22 S		13/7	1.5 	2:02 am→8:16 pm	8:19 pm 9:04 pm 10:11 pm —
23 N		14/7	0.1 	3:18 am→8:50 pm	8:18 pm 9:03 pm 10:10 pm —
24 M		15/7	1.4 	4:42 am→9:14 pm	8:17 pm 9:02 pm 10:08 pm —
25 T	They cross the Enchanted River. • The evidence for this date is that the feast of the Wood-elves held one week from this date is likely a celebration of the last day of summer. See below.	16/7	5.0 	6:05 am→9:30 pm	8:16 pm 9:01 pm 10:06 pm —
26 W		17/7	10.7 	7:25 am→9:43 pm	8:15 pm 9:00 pm 10:04 pm —
27 R		18/7	17.9 	8:41 am→9:54 pm	8:14 pm 8:58 pm 10:02 pm —
28 F		19/7	26.2 	9:54 am→10:04 pm	8:13 pm 8:57 pm 10:00 pm —
29 S	After “[a]bout four days from the enchanted stream”, they reach a part of Mirkwood that is mostly beech trees.	20/7	35.4 	11:05 am→10:13 pm	8:11 pm 8:55 pm 9:58 pm —
30 N		21/7	45.0 	12:16 pm→10:24 pm	8:10 pm 8:54 pm 9:55 pm —

# August

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 M	"Two days later" they enter a valley of oak trees and Bilbo climbs a tree.	22/7	54.7	1:28 pm→10:38 pm	8:09 pm 8:52 pm 9:53 pm 11:58 pm
2 T	Bombur wakes up and that evening they stumble upon an Elven feast. Thorin is captured by the Wood-elves and the others by spiders. This evening feast may have been in celebration of the last evening of summer, for the Elvenking is described as having a "crown of leaves."	23/7	64.3	2:42 pm→10:55 pm	8:08 pm 8:51 pm 9:51 pm 11:43 pm
3 W	Bilbo rescues the dwarves and the dwarves are captured by the elves. On or around this day is the first day of the elven autumn. The calendar of Rivendell could be off by up to three days; however, if the Wood-elves started their calendar always on the Vernal Equinox, then this day would be exactly the first day of autumn for spring starts on the Vernal Equinox and lasts 54 days, after which is 72 days of summer. On this day, the Elvenking is described as having "a crown of berries and red leaves, for the autumn was come again."  Note that elves are not mortal, so many of the Wood-elves may be thousands of years old; hence, one year is a very short period of time, so they do not use the solar calendar used by the Stewards' or Shire Reckonings. Even the seasons differ (there are six of various lengths), so such a celebration is unlikely to held on August 16, the first day of Autumn in the reckonings of humans and hobbits. However, if you did want to add thirteen more days onto the forest path (and thirteen fewer days in prison), you may believe this alternative.	24/7	73.5	3:56 pm→11:18 pm	8:06 pm 8:49 pm 9:49 pm 11:34 pm
4 R		25/7	81.9	5:08 pm→11:52 pm	8:05 pm 8:47 pm 9:47 pm 11:26 pm
5 F		26/7	89.2	6:12 pm→	8:03 pm 8:46 pm 9:44 pm 11:19 pm
6 S		27/7	94.9	→12:40 am / 7:04 pm→	8:02 pm 8:44 pm 9:42 pm 11:13 pm
7 N		28/7	—	→1:45 am / 7:42 pm→	8:00 pm 8:42 pm 9:40 pm 11:07 pm
8 M		29/7	98.6	→3:02 am / 8:09 pm→	7:59 pm 8:41 pm 9:37 pm 11:02 pm
9 T		30/7	99.9	→4:27 am / 8:28 pm→	7:57 pm 8:39 pm 9:35 pm 11:57 pm
10 W		31/7	98.7	→5:54 am / 8:44 pm→	7:56 pm 8:37 pm 9:32 pm 10:52 pm
11 R		1/8	94.8	→7:20 am / 8:57 pm→	7:54 pm 8:35 pm 9:30 pm 10:48 m
12 F		2/8	88.4	→8:45 am / 9:09 pm→	7:53 pm 8:33 pm 9:28 pm 10:43 pm
13 S		3/8	79.7	→10:11 am / 9:21 pm→	7:51 pm 8:31 pm 9:25 pm 10:39 pm
14 N		4/8	69.4	→11:38 am / 9:36 pm→	7:49 pm 8:29 pm 9:23 pm 10:35 pm
15 M		5/8	57.9	→1:07 pm / 9:54 pm→	7:47 pm 8:27 pm 9:20 pm 10:31 pm
16 T		6/8	45.9	→2:36 pm / 10:20 pm→	7:46 pm 8:25 pm 9:18 pm 10:27 pm
17 W	↑ The dwarves are prisoners in the Wood-elves' palace.	7/8	34.3	→4:02 pm / 10:57 pm→	7:44 pm 8:23 pm 9:15 pm 10:23 pm
18 R	↓	8/8	23.6	→5:16 pm / 11:50 pm→	7:42 pm 8:21 pm 9:13 pm 10:19 pm
19 F		9/8	14.5	→6:12 pm	7:40 pm 8:19 pm 9:10 pm 10:15 pm
20 S		10/8	7.4	12:59 am→6:51 pm	7:38 pm 8:17 pm 9:08 pm 10:11 pm
21 N		11/8	2.6	2:20 am→7:17 pm	7:36 pm 8:15 pm 9:05 pm 10:07 pm
22 M		12/8	0.3	3:43 am→7:36 pm	7:34 pm 8:13 pm 9:02 pm 10:04 pm
23 T		13/8	0.4	5:04 am→7:50 pm	7:32 pm 8:11 pm 9:00 pm 10:00 pm
24 W		14/8	2.7	6:22 am→8:01 pm	7:30 pm 8:08 pm 8:57 pm 9:57 pm
25 R		15/8	7.0	7:36 am→8:11 pm	7:29 pm 8:06 pm 8:55 pm 9:53 pm
26 F		16/8	12.9	8:48 am→8:21 pm	7:27 pm 8:04 pm 8:52 pm 9:50 pm
27 S		17/8	20.3	10:00 am→8:31 pm	7:24 pm 8:02 pm 8:49 pm 9:46 pm
28 N		18/8	28.7	11:12 am→8:43 pm	7:22 pm 8:00 pm 8:47 pm 9:43 pm
29 M		19/8	37.9	12:25 pm→8:58 pm	7:20 pm 7:57 pm 8:44 pm 9:39 pm
30 T		20/8	47.6	1:38 pm→9:19 pm	7:18 pm 7:55 pm 8:42 pm 9:36 pm

## September

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 W		21/8	57.5	2:51 pm→9:47 pm	7:16 pm 7:53 pm 8:39 pm 9:33 pm
2 R		22/8	67.3	3:58 pm→10:28 pm	7:14 pm 7:51 pm 8:36 pm 9:30 pm
3 F		23/8	76.7	4:55 pm→11:25pm	7:12 pm 7:48 pm 8:34 pm 9:26 pm
4 S		24/8	85.1	5:38 pm→	7:10 pm 7:46 pm 8:31 pm 9:23 pm
5 N		25/8	92.1	→12:37 am / 6:10 pm→	7:08 pm 7:44 pm 8:29 pm 9:20 pm
6 M		26/8	97.1	→1:59 am / 6:32 pm→	7:06 pm 7:41 pm 8:26 pm 9:17 pm
7 T		27/8	—	→3:26 am / 6:49 pm→	7:03 pm 7:39 pm 8:23 pm 9:13 pm
8 W		28/8	99.7	→4:54 am / 7:03 pm→	7:01 pm 7:37 pm 8:21 pm 9:10 pm
9 R		29/8	99.5	→6:22 am / 7:16 pm→	6:59 pm 7:34 pm 8:18 pm 9:07 pm
10 F		30/8	96.4	→7:50 am / 7:29 pm→	6:57 pm 7:32 pm 8:16 pm 9:04 pm
11 S	↑ The dwarves are prisoners in the Wood-elves' palace. ↓	31/8	90.4	→9:19 am / 7:43 pm→	6:54 pm 7:30 pm 8:13 pm 9:01 pm
12 N		1/9	82.0	→10:50 am / 8:00 pm→	6:52 pm 7:27 pm 8:10 pm 8:58 pm
13 M		2/9	71.8	→12:21 pm / 8:23 pm→	6:50 pm 7:25 pm 8:08 pm 8:55 pm
14 T		3/9	60.3	→1:50 pm / 8:57 pm→	6:48 pm 7:23 pm 8:05 pm 8:52 pm
15 W		4/9	48.5	→3:08 pm / 9:44 pm→	6:45 pm 7:20 pm 8:03 pm 8:49 pm
16 R		5/9	37.0	→4:10 pm / 10:49 pm→	6:43 pm 7:18 pm 8:00 pm 8:46 pm
17 F		6/9	26.4	→4:53 pm	6:41 pm 7:15 pm 7:57 pm 8:43 pm
18 S		7/9	17.2	12:05 am→5:22 pm	6:39 pm 7:13 pm 7:55 pm 8:40 pm
19 N		8/9	9.8	1:27 am→5:43 pm	6:36 pm 7:11 pm 7:52 pm 8:37 pm
20 M		9/9	4.4	2:48 am→5:58 pm	6:34 pm 7:08 pm 7:50 pm 8:34 pm
21 T		10/9	1.1	4:06 am→6:09 pm	6:32 pm 7:06 pm 7:47 pm 8:31 pm
22 W	They escape from the Wood-elves' palace in barrels. While Bilbo is under the stars for much of the night, no mention of any moon is made.	11/9	0.0	5:20 am→6:20 pm	6:29 pm 7:04 pm 7:45 pm 8:29 pm
23 R	Bilbo's birthday and they arrive at Lake-town in the evening. September 22 of the Shire Reckoning is September 23 in the Stewards' Reckoning.	12/9	1.0	6:33 am→6:29 pm	6:27 pm 7:01 pm 7:42 pm 8:26 pm
24 F		13/9	3.9	7:44 am→6:40 pm	6:25 pm 6:59 pm 7:39 pm 8:23 pm
25 S		14/9	8.6	8:56 am→6:51 pm	6:23 pm 6:56 pm 7:37 pm 8:20 pm
26 N		15/9	14.9	10:09 am→7:05 pm	6:20 pm 6:54 pm 7:34 pm 8:17 pm
27 M	↑ They rest at Lake-town. ↓	16/9	22.4	11:22 am→7:23 pm	6:18 pm 6:52 pm 7:32 pm 8:15 pm
28 T		17/9	31.1	12:35 pm→7:47 pm	6:16 pm 6:49 pm 7:29 pm 8:12 pm
29 W		18/9	40.6	1:44 pm→8:22 pm	6:13 pm 6:47 pm 7:27 pm 8:09 pm
30 R		19/9	50.6	2:45 pm→9:11 pm	6:11 pm 6:45 pm 7:24 pm 8:06 pm
F	Autumnal equinox.	20/9	60.9	3:33 pm→10:15 pm	6:09 pm 6:42 pm 7:22 pm 8:04 pm

## October

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 S		21/9	71.0	4:08 pm→11:31 pm	6:06 pm 6:40 pm 7:19 pm 8:01 pm
2 N		22/9	80.4	4:34 pm→	6:04 pm 6:37 pm 7:17 pm 7:58 pm
3 M	They rest at Lake-town.	23/9	88.6	→12:55 am / 4:53 pm→	6:02 pm 6:35 pm 7:15 pm 7:56 pm
4 T		24/9	95.0	→2:22 am / 5:08 pm→	5:59 pm 6:33 pm 7:12 pm 7:53 pm
5 W		25/9	—	→3:49 am / 5:22 pm→	5:57 pm 6:30 pm 7:10 pm 7:51 pm
6 R	“At the end of a fortnight Thorin begins to think of departure.”	26/9	98.9	→5:18 am / 5:34 pm→	5:55 pm 6:28 pm 7:07 pm 7:48 pm
7 F		27/9	99.9	→6:48 am / 5:48 pm→	5:52 pm 6:26 pm 7:05 pm 7:45 pm
8 S		28/9	97.7	→8:21 am / 6:05 pm→	5:50 pm 6:23 pm 7:03 pm 7:43 pm
9 N		29/9	92.5	→9:56 am / 6:26 pm→	5:48 pm 6:21 pm 7:00 pm 7:40 pm
10 M	They depart by boat for the Lonely Mountain. • There is no evidence for this date, but it must have taken a few days to gather provisions and to send the group travelling on land ahead of our company.	30/9	84.5	→11:29 am / 6:56 pm→	5:45 pm 6:19 pm 6:58 pm 7:38 pm
11 T		1/10	74.7	→12:55 pm / 7:40 pm→	5:43 pm 6:16 pm 6:55 pm 7:35 pm
12 W	They disembark this evening.	2/10	63.6	→2:04 pm / 8:40 pm→	5:41 pm 6:14 pm 6:53 pm 7:33 pm
13 R	They head towards Ravenhill and reach there by evening.	3/10	52.1	→2:53 pm / 9:54 pm→	5:39 pm 6:12 pm 6:51 pm 7:31 pm
14 F		4/10	40.8	→3:27 pm / 11:15 pm→	5:36 pm 6:10 pm 6:49 pm 7:28 pm
15 S		5/10	30.3	→3:49 pm	5:34 pm 6:07 pm 6:46 pm 7:26 pm
16 N	They move their camp to the long western valley. • There is no evidence for this date, although it may have taken Bilbo a few days to get the dwarves to move the camp and start searching for the hidden door.	6/10	21.0	12:36 am→4:06 pm	5:32 pm 6:05 pm 6:44 pm 7:23 pm
17 M		7/10	13.2	1:54 am→4:18 pm	5:29 pm 6:03 pm 6:42 pm 7:21 pm
18 T		8/10	7.1	3:09 am→4:29 pm	5:27 pm 6:01 pm 6:40 pm 7:19 pm
19 W		9/10	2.9	4:21 am→4:39 pm	5:25 pm 5:59 pm 6:37 pm 7:17 pm
20 R		10/10	0.6	5:32 am→4:49 pm	5:23 pm 5:56 pm 6:35 pm 7:14 pm
21 F	They search for the secret door.	11/10	0.2	6:43 am→5:00 pm	5:21 pm 5:54 pm 6:33 pm 7:12 pm
22 S		12/10	1.7	7:55 am→5:12 pm	5:18 pm 5:52 pm 6:31 pm 7:10 pm
23 N		13/10	5.1	9:08 am→5:29 pm	5:16 pm 5:50 pm 6:29 pm 7:08 pm
24 M		14/10	10.2	10:22 am→5:51 pm	5:14 pm 5:48 pm 6:27 pm 7:05 pm
25 T		15/10	16.8	11:32 am→6:22 pm	5:12 pm 5:46 pm 6:24 pm 7:03 pm
26 W	Bilbo, Fili and Kili find the secret door. • There is no evidence for this date, although had they sat on the doorstep too much longer, they may have been more pressure on Bilbo to enter the main gate.	16/10	24.8	12:35 pm→7:05 pm	5:10 pm 5:44 pm 6:22 pm 7:01 pm
27 R	They move their camp to the doorstep of the secret door.	17/10	33.9	1:27 pm→8:03 pm	5:08 pm 5:41 pm 6:20 pm 6:59 pm
28 F		18/10	43.9	2:06 pm→9:13 pm	5:05 pm 5:39 pm 6:18 pm 6:57 pm
29 S	They sit on the doorstep.	19/10	54.4	2:35 pm→10:31 pm	5:03 pm 5:37 pm 6:16 pm 6:55 pm
30 N		20/10	65.0	2:56 pm→11:53 pm	5:01 pm 5:35 pm 6:14 pm 6:53 pm

## November

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 M		21/10	75.3 	3:12 pm→	4:59 pm 5:33 pm 6:12 pm 6:51 pm
2 T	They sit on the doorstep. ↑	22/10	84.6 	→1:18 am / 3:26 pm→	4:57 pm 5:31 pm 6:10 pm 6:49 pm
3 W		23/10	92.3 	→2:44 am / 3:39 pm→	4:55 pm 5:29 pm 6:09 pm 6:47 pm
4 R	↓	24/10	97.5 	→4:11 am / 3:52 pm→	4:53 pm 5:28 pm 6:07 pm 6:45 pm
5 F	Thorin says that "tomorrow begins the last week of autumn."	25/10	— 	→5:42 am / 4:07 pm→	4:51 pm 5:26 pm 6:05 pm 6:44 pm
6 S	It is a full moon, the door is opened, Bilbo steals a cup and Smaug discovers the theft.	26/10	99.8 	→7:17 am / 4:26 pm→	4:49 pm 5:24 pm 6:03 pm 6:42 pm
7 N	Bilbo talks to Smaug, Smaug smashes the side of the mountain and attacks Lake-town, and Smaug is killed by Bard. A waning gibbous moon was already in the sky when Smaug attacked, having risen at 4:53 pm.	27/10	98.8 	→8:55 am / 4:53 pm→	4:47 pm 5:22 pm 6:01 pm 6:40 pm
8 M	Trapped, they cower in the tunnel.	28/10	94.6 	→10:28 am / 5:32 pm→	4:45 pm 5:20 pm 5:59 pm 6:38 pm
9 T	They explore the lair of Smaug and reach the front door, making their way to Ravenhill by the evening.	29/10	87.5 	→11:48 am / 6:27 pm→	4:43 pm 5:18 pm 5:58 pm 6:36 pm
10 W	They learn that Smaug is dead and Thorin sends for Dain. They begin work.	30/10	78.4 	→12:47 pm / 7:39 pm→	4:41 pm 5:16 pm 5:56 pm 6:35 pm
11 R		31/10	68.0 	→1:27 pm / 9:01 pm→	4:39 pm 5:15 pm 5:54 pm 6:33 pm
12 F	The Elven host reaches Lake-town.	1/11	57.0 	→1:53 pm / 10:24 pm→	4:38 pm 5:13 pm 5:53 pm 6:31 pm
13 S		2/11	46.1 	→2:12 pm / 11:43 pm→	4:36 pm 5:11 pm 5:51 pm 6:30 pm
14 N		3/11	35.8 	→2:26 pm	4:34 pm 5:10 pm 5:49 pm 6:28 pm
15 M		4/11	26.3 	12:59 am→2:37 pm	4:32 pm 5:08 pm 5:48 pm 6:27 pm
16 T	First day of winter	5/11	18.0 	2:12 am→2:47 pm	4:30 pm 5:06 pm 5:46 pm 6:25 pm
17 W		6/11	11.1 	3:23 am→2:57 pm	4:29 pm 5:05 pm 5:45 pm 6:24 pm
18 R	The host of elves and men reach the mouth of the River Running.	7/11	5.8 	4:33 am→3:08 pm	4:27 pm 5:03 pm 5:43 pm 6:22 pm
19 F		8/11	2.2 	5:44 am→3:20 pm	4:25 pm 5:02 pm 5:42 pm 6:21 pm
20 S	The host of elves and men reach Dale by evening. They are not detected until their torches are seen, for it is an evening of a new moon.	9/11	0.4 	6:57 am→3:36 pm	4:24 pm 5:00 pm 5:40 pm 6:20 pm
21 N	The Lonely Mountain is reconnoitred by a small party of elves and men.	10/11	0.5 	8:10 am→3:57 pm	4:22 pm 4:59 pm 5:39 pm 6:18 pm
22 M	Bard and the Elvenking parley with Thorin. The mountain is declared to be besieged.	11/11	2.4 	9:21 am→4:25 pm	4:21 pm 4:57 pm 5:38 pm 6:17 pm
23 T		12/11	6.3 	10:27 am→5:04 pm	4:19 pm 4:56 pm 5:37 pm 6:16 pm
24 W		13/11	11.9 	11:22 am→5:57 pm	4:18 pm 4:55 pm 5:35 pm 6:15 pm
25 R		14/11	19.1 	12:05 pm→7:03 pm	4:16 pm 4:53 pm 5:34 pm 6:13 pm
26 F	Bilbo steals away into the night to give the Arkenstone to Bard. There is a quarter moon, but it is already sinking in the west and the arms of the southern spurs would have hidden the moon much earlier than when it sets at 8:17 pm.	15/11	27.7 	12:36 pm→8:17 pm	4:15 pm 4:52 pm 5:33 pm 6:12 pm
27 S	Bard, the Elvenking and Gandalf parley again with Thorin around noon. Bilbo leaves the dwarves.	16/11	37.5 	12:59 pm→9:36 pm	4:13 pm 4:51 pm 5:32 pm 6:11 pm
28 N	Early in the morning, Dain arrives; soon thereafter, the Battle of Five Armies begins; the eagles arrive at sunset at 4:12 pm, and Beorn arrives thereafter. Victory was assured before the fall of night, or 6:10 pm. A half-moon would have continued to light the battlefield after sunset.	17/11	48.1 	1:17 pm→10:57 pm	4:12 pm 4:50 pm 5:31 pm 6:10 pm
29 M	Thorin dies.	18/11	59.2 	1:31 pm→	4:11 pm 4:48 pm 5:30 pm 6:09 m
30 T		19/11	70.1 	→12:19 am / 1:44 pm→	4:10 pm 4:47 pm 5:29 pm 6:08 pm

## December

Stewards' Reckoning	Description and comments	GC	Phase of the moon	Moonrise and moonset	Sunset and the ends of civil, nautical and astronomical twilight
1 W		20/11	80.3	→1:42 am / 1:56 pm→	4:08 pm 4:46 pm 5:28 pm 6:07 pm
2 R		21/11	89.0	→3:08 am / 2:10 pm→	4:07 pm 4:45 pm 5:27 pm 6:07 pm
3 F		22/11	95.6	→4:38 am / 2:27 pm→	4:06 pm 4:44 pm 5:26 pm 6:06 pm
4 S		23/11	99.2	→6:13 am / 2:49 pm→	4:05 pm 4:43 pm 5:25 pm 6:05 pm
5 N		24/11	—	→7:49 am / 3:21 pm→	4:04 pm 4:42 pm 5:24 pm 6:04 pm
6 M	Gandalf, Bilbo, Beorn and the elven host depart. <ul style="list-style-type: none"> <li>There is no evidence for this date, but a week after the battle seems reasonable and this gives Gandalf, Bilbo and Beorn twenty-four days to return to Beorn's house.</li> </ul>	25/11	99.6	→9:18 am / 4:09 pm→	4:03 pm 4:42 pm 5:23 pm 6:04 pm
7 T		26/11	96.7	→10:30 am / 5:16 pm→	4:02 pm 4:41 pm 5:23 pm 6:03 pm
8 W		27/11	90.9	→11:20 am / 6:37 pm→	4:01 pm 4:40 pm 5:22 pm 6:02 pm
9 R	Gandalf, Bilbo and Beorn turn north.	28/11	83.0	→11:53 am / 8:03 pm→	4:00 pm 4:39 pm 5:21 pm 6:02 pm
10 F		29/11	73.6	→12:16 pm / 9:26 pm→	4:00 pm 4:39 pm 5:21 pm 6:01 pm
11 S		30/11	63.4	→12:32 pm / 10:45 pm→	3:59 pm 4:38 pm 5:20 pm 6:01 pm
12 N		1/12	53.0	→12:44 pm	3:58 pm 4:37 pm 5:20 pm 6:00 pm
13 M		2/12	42.8	12:00 am→12:55 pm	3:57 pm 4:37 pm 5:19 pm 6:00 pm
14 T		3/12	33.1	1:12 am→1:05 pm	3:57 pm 4:36 pm 5:19 pm 6:00 pm
15 W		4/12	24.3	2:23 am→1:16 pm	3:56 pm 4:36 pm 5:19 pm 5:59 pm
16 R		5/12	16.5	3:34 am→1:28 pm	3:56 pm 4:36 pm 5:18 pm 5:59 pm
17 F		6/12	10.0	4:45 am→1:42 pm	3:55 pm 4:35 pm 5:18 pm 5:59 pm
18 S	Gandalf, Bilbo and Beorn journey towards Beorn's house	7/12	5.0	5:58 am→2:01 pm	3:55 pm 4:35 pm 5:18 pm 5:59 pm
19 N	along the north edge of Mirkwood.	8/12	1.7	7:11 am→2:27 pm	3:55 pm 4:35 pm 5:18 pm 5:59 pm
20 M		9/12	0.2	8:19 am→3:03 pm	3:55 pm 4:35 pm 5:18 pm 5:59 pm
21 T		10/12	0.7	9:18 am→3:52 pm	3:54 pm 4:35 pm 5:18 pm 5:59 pm
22 W		11/12	3.3	10:04 am→4:55 pm	3:54 pm 4:34 pm 5:18 pm 5:59 pm
23 R		12/12	7.8	10:39 am→6:08 pm	3:54 pm 4:34 pm 5:18 pm 5:59 pm
24 F		13/12	14.2	11:04 am→7:26 pm	3:54 pm 4:35 pm 5:18 pm 5:59 pm
25 S		14/12	22.3	11:22 am→8:45 pm	3:54 pm 4:35 pm 5:18 pm 5:59 pm
26 N		15/12	31.9	11:37 am→10:05 pm	3:54 pm 4:35 pm 5:18 pm 5:59 pm
27 M		16/12	42.5	11:50 am→11:25 pm	3:54 pm 4:35 pm 5:18 pm 5:59 pm
28 T	Gandalf, Bilbo and Beorn arrive at Beorn's house.	17/12	53.8	12:02 pm→	3:55 pm 4:35 pm 5:19 pm 6:00 pm
29 W		18/12	65.2	→12:47 am / 12:15 pm→	3:55 pm 4:35 pm 5:19 pm 6:00 pm
30 R		19/12	76.1	→2:11 am / 12:29 pm→	3:55 pm 4:36 pm 5:19 pm 6:00 pm
F	Yule: Gandalf and Bilbo celebrate the Yule at Beorn's house	20/12	85.7	→3:41 am / 12:48 pm→	3:56 pm 4:36 pm 5:20 pm 6:01 pm
S		21/12	93.2	→5:13 am / 1:14 pm→	3:56 pm 4:37 pm 5:20 pm 6:01 pm