SCHEDULING RELATIVE TO MOON PHASES

Steve Maas
May 2019

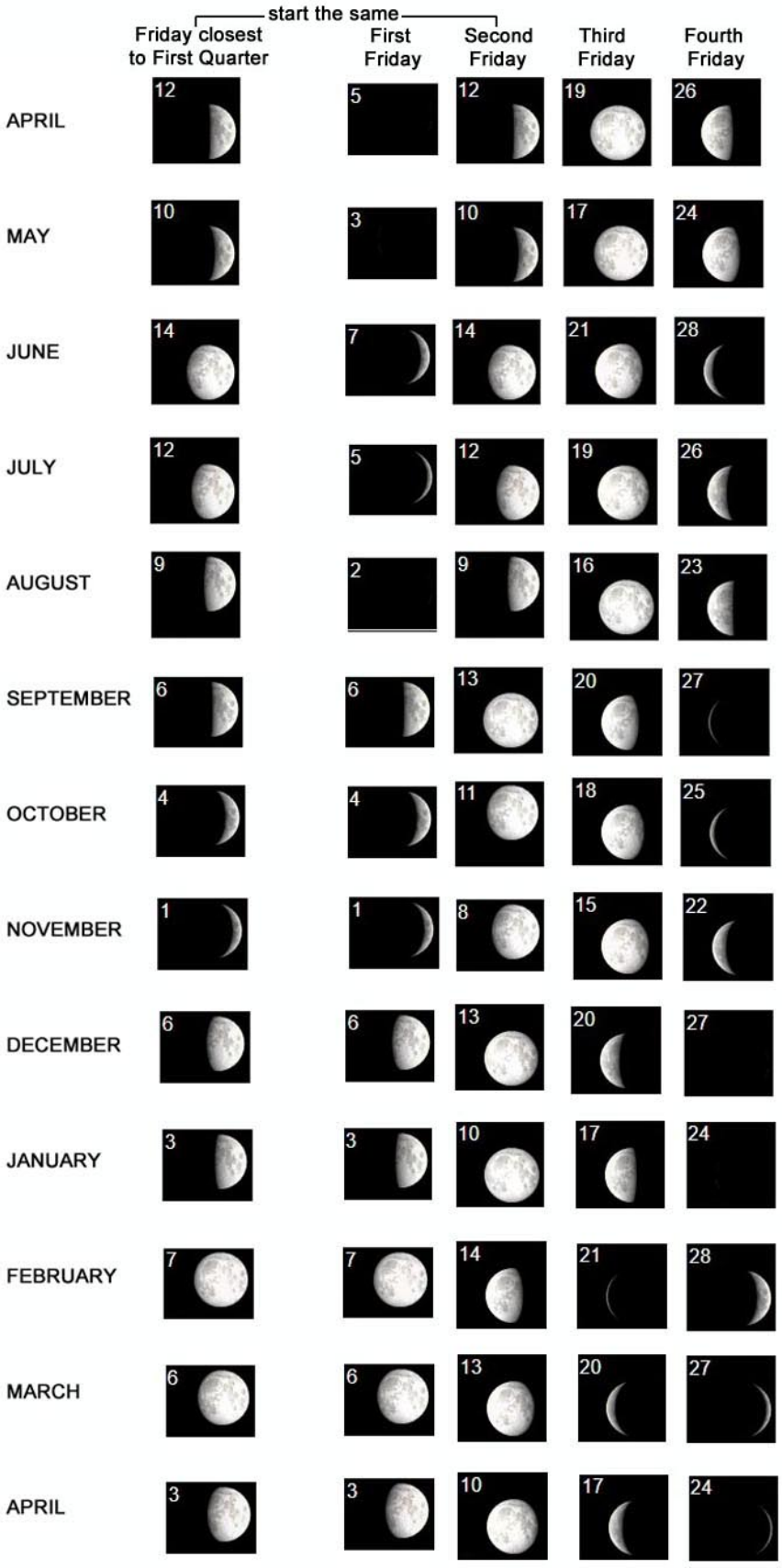
In scheduling monthly star parties, there are two basic strategies that can be employed to place the date of the event within the month. The first strategy is to use a *fixed date* for the event, like "the first Friday in the month". The other strategy is to use a *floating date* for the event, for example, one that is established relative to the phases of the moon. We currently use this second approach in SPAC, where we schedule the date of the Public Star Party as "the Friday closest to the date of the First Quarter Moon". There are advantages and disadvantages to both strategies. This document is intended to compare these two strategies with regard to what lunar conditions can be expected when certain dates in the month are chosen.

The basis for this comparison is the chart contained in the following page. It shows the phase of the moon on selected dates over the course of a year for the two approaches. Because the moon follows a 28-day cycle, and months are generally longer than 28 days, results like those shown in the chart will be different for different years, but these results will show what generally may be expected when comparing the two scheduling approaches over the same time period.

In the chart, the **first column** shows the names of the months progressing down the page. The **second column** shows results, in terms of moon phase, when a floating date is used to schedule the event. In this example, the date is the Friday in the month closest to the First Quarter Moon. The number in the upper left corner of each picture of the moon phase is the appropriate date during the month. We start in April on the date of the First Quarter Moon, which happens to be a Friday (the 12th), i.e., in this example the Friday closest to the First Quarter Moon is the second Friday in the month. This was selected specifically for this example—this date could be different for other years. The remaining pictures in this column show the dates for the Friday in each succeeding month closest to the First Quarter Moon and the corresponding moon phases on those dates.

The **remaining four columns** in the chart shows results, in terms of moon phase, when fixed dates are used to schedule the event. Specifically, the four dates are the first, second, third and fourth Fridays in the month. Since the First Quarter Moon initially occurs on the second Friday of the month (April 12th) in this example, the results start out the same for the columns corresponding to the floating "Friday closest to First Quarter" and the fixed "Second Friday". So, for this example, the four columns corresponding to fixed dates essentially start out at New Moon (First Friday), First Quarter (Second Friday), Full Moon (Third Friday), and Last Quarter (Fourth Friday).

The take-away from this chart is to see how the phase of the moon changes from month to month for each of the selection approaches as you progress through the year. Because the moon follows a 28-day cycle while the months generally have more than 28 days, the moon phase does not stay constant for a given date as you progress through the year.


start the same
Friday closest to First Quarter
First Friday
Second Friday
Third Friday
Fourth Friday
APRIL 12 5 12 19 26
MAY 10 3 10 17 24
JUNE 14 7 14 21 28
JULY 12 5 12 19 26
AUGUST 9 2 9 16 23
SEPTEMBER 6 6 13 20 27
OCTOBER 4 4 11 18 25
NOVEMBER 1 1 8 15 22
DECEMBER 6 6 13 20 27
JANUARY 3 3 10 17 24
FEBRUARY 7 7 14 21 28
MARCH 6 6 13 20 27
APRIL 3 3 10 17 24

Looking at the column corresponding to the floating "Friday closest to First Quarter", we can see that the selected date remains the second Friday in the month for the first 5 months in the sequence. But starting with the sixth month in the sequence, the date changes to the first Friday in the month. So, for this approach, the week within which the event is scheduled will have to change during the year to allow the date to remain close to the desired moon phase. Over the course of a year, the moon phase will vary between a thin crescent and almost full for this approach. The moon should be observable after sunset for every month using this approach.

Looking at the four columns corresponding to the fixed dates, we see a different situation. For the "Second Friday" column, the results stay the same as for the "Friday closest to First Quarter" for the first 5 months. But after that, the failure to switch weeks results in moon phases staying around Full Moon for the rest of the year. For the "First Friday" column, the moon phase stays around New Moon for the first 5 months and then switches to phases around First Quarter for the remainder of the year. For the "Third Friday" column, the moon phase stays around Full Moon for the first 5 months and then switches to phases around Last Quarter for the remainder of the year. Finally, for the "Fourth Friday" column, the moon phase stays around Last Quarter for the first 5 months and then switches to phases around New Moon for the remainder of the year.

So, in general--
Start the fixed date approach at New Moon—you'll end up at First Quarter after 6 months.
Start the fixed date approach at First Quarter—you'll end up at Full Moon after 6 months.
Start the fixed date approach at Full Moon—you'll end up at Last Quarter after 6 months.
Start the fixed date approach at Last Quarter—you'll end up at New Moon after 6 months.

Without the switch in weeks utilized by the floating date approach, the phase of the moon will continue though its full cycle for the fixed date approach as you progress through several years. Only *one switch per year* is needed to "reset" the cycle to keep it close to the desired lunar phase. This switch is achieved by moving the selected date one week earlier in the month.

Some advantages and disadvantages of the two approaches can be summarized:

Fixed Date Approach:
Advantage: Event occurs on the same day every month (easy to remember).
Disadvantage: If you want to observe the moon part of the night and also observe deep-sky objects (DSOs) when it's not up, you will either (a) get to the situation where the moon is up most of the night, so you won't observe DSOs, or (b) get to the situation where the moon doesn't come up until early in the morning, so you won't observe the moon.
Disadvantage: You can have strings of 5-6 consecutive months with the lunar phase near Full Moon, which could prevent observing DSOs over entire seasons.

Floating Date Approach:
Advantage: Suited to allow you to observe the moon part of the night and also observe deep-sky objects (DSOs) when it's not up for most months.
Advantage: Prevents long strings of consecutive months with near-Full Moon conditions.
Disadvantage: Requires a one-week shift in the day once a year to "reset" the date relative to the lunar cycle. The public will need to be made aware of this shift in date.

The results presented so far are relevant to only one night per month. This could be like if the star party is scheduled for only one night per month. However, this information could also apply to the primary and "back-up" days in a multi-date approach to scheduling star parties. In the latter case, if the primary date for the star party is around First Quarter, then scheduling a back-up date a week later would put it close to Full Moon, which you might want to avoid. In this case, it might be better to schedule back-up dates immediately after the primary date (like Friday-Saturday) or around 2 weeks or three weeks later to avoid the Full Moon. Unless, of course, you want to observe the Full Moon.

In the situation where you set up *two* star parties per month, you could use fixed dates and separate them by *two weeks*. In this case, one of the dates would end up a "lunar observing event" while the other would be a "DSO observing event" regardless of the specific dates you chose (as long as they are 2 weeks apart). Of course, based on cloud conditions, you wouldn't necessarily be able to hold both in any given month. So, in some months the public would get to observe the moon (plus double stars and planets) while in other months the public would get to observe nebulas and galaxies (plus double stars and planets)—and in a few months they might get to observe both. This could encourage people to regularly attend our star parties because they would get to see new stuff each month (the moon can get old after a while).

Again, the example presented in this document is for a given year. The dates on which specific lunar phases fall will change from year-to-year. However, the overall dynamic presented in this document should be relevant to most situations.