How to Determine the Conjunction of the New Moon Without a Computer or Time Tables

Many think that it is very complicated to determine the conjunction of the New Moon without some sophisticated computer program or time tables which have predetermined conjunction times already calculated for them. This is not the case at all. It is quite simple to accurately calculate the conjunction of the New Moon by using simple math. Once you know these simple calculations, it's very easy to accurately determine the conjunction in your head without doing any calculating on paper at all.

To make it easy, in the beginning you should have a protractor, or a compass with degree markings on it, a pencil or pen, and some paper. That's all! In time you won't even need these.

WHERE TO BEGIN?

1. *Locate the moon a week or so before the conjunction, shortly before sunrise. It will look like a crescent above your head or over toward the eastern sky.*

2. *Write down the date.*

3. *Take the protractor or compass and measure the angle between the waning crescent and the horizon, just as the sun rises.*

4. *Write down the degree of the angle and the time.*

Let's say, for example, that it's June 30th, 1997, and the angle is 52° between the moon and the horizon where the sun is just appearing; and this is about 4 days before the conjunction (or what you believe will be the day of the conjunction). In our example it's 5:50 a.m. when the sun appears.

Given the above example, we can do some essential preliminary calculations. The moon travels around the earth once a month. This takes about 29.5 days; actually 29.53 days, on average. We also know that this revolution is 360°. With that information we do this calculation: 29.53 days X 24 hours a day = 708.72 hours (on the average) in one 360° revolution of the moon in one month. Then we can take 360° divided by that 708.72 hours to determine that the moon moves precisely .508° (or to make it easier we round this number to .51°) in one hour. The moon moves relative to the sun by an amount almost equal to the moon's diameter every hour, which equals the .51°; so if we multiply by 24 hours, this makes the movement of the moon about 12.2° every day. This is a little more than half a degree every hour, on the average.

Remember, these are just rough figures, though using them will give you accurate results. As more time is spent in observing the moon's movement in the sky, as the ancients did, we would discover the different cycles of the moon's movement. We would then be able to more accurately know at which points in its cycles the moon moves faster or slower than the average of 29.53 days a month. We would use these modified figures to come up with a very accurate conjunction time, as the ancients were able to achieve.

THE FORMULA

Very simply put, the formula is the angle of the sun to the moon at sunrise divided by the rate of change per hour, which equals the time of conjunction, in hours, from the time you took your measurements. That's all you need to know.

PUTTING IT ALL TOGETHER

Now that we have all these figures and a formula, what do we do with them? The moon will travel 360° from new moon to new moon in 29.53 days, on average. So remembering our example, all we need to do is to take the 52° measurement for the angle between the sun and the moon at sunrise and divide it by the .51° rate of change per hour. This figure will give us the amount of time it will take for the sun and moon to reach the point of alignment or conjunction. That's all the information we need to do the calculations.

Now, let's do the math. 52° divided by .51 degrees per hour gives us 101.96 hours. That is, it will take 101.96 hours from 5:50 a.m. on June 30, 1997, when we determined our angle between the sun and the moon, for the moon to travel the 52° still needed to reach conjunction. So, how many days away is 101.96 hours from the time we determined our angle between the sun and the moon? How many days away is the conjunction? Divide 101.96 hours by 24 hours (don't use fractions of a day for the remainder; we want whole days with the remainder in hours) and we come up with 4 days, or 96 hours with 5.96 hours remaining. Add this 4 days to June 30th, 1997, and we arrive at 5:50 a.m. July 4th, 1997. Now we add the remaining 5 hours to 5:50 a.m. July 4th, 1997, and that brings us to 10:50 a.m. with the .96 of an hour left to be added to that time. Multiply .96 by 60 minutes, which gives us 57.6 minutes. Add 57.6 minutes (or 57 minutes; we can round off the number to make it easier) to 10:50 a.m. which brings us to 11:47 a.m. July 4, 1997 as our "rough" calculation for the time of the conjunction.

Did you think it was going to be that easy? Now you can go out tomorrow morning with this formula and figure out the time of the next conjunction. Just give it a try, and with a little practice you can amaze about 99.9% of the people on the planet with your ability to determine the exact time of the conjunction without a computer program or a calculator.

RULE OF THUMB

Don't like all that math? If you want to quickly determine the conjunction, all you really have to do is ascertain the angle of the sun to the moon at sunrise and multiply by 2. You then know the number of hours until the occurrence of the conjunction (that is, which day the conjunction will occur). Don't forget to convert your total number of hours into days. If this puts the conjunction close to sunset, then do the calculations above to get a more precise result. This will let you know on which of the two days the conjunction will most likely be (the one before sunset or the one after sunset).

HOW DID WE DO?

The real test to our example is to see when the conjunction really took place. We can do this by checking a computer program or by getting some astronomical tables. Remember, these are just to verify our figures and give us confidence that we are accurate in our calculations. You can refer to The Astronomical Tables of the Sun, Moon and Planets, by Jean Meeus. There is also a very good shareware program that is available on the Internet, called "Moonrise," by Dr. Bruce P. Sidell in Grand Rapids, Michigan.

The actual time of conjunction on July 4th, 1997 was at 11:40 a.m. PDT. Our calculations were off by only 7 minutes.

CONCLUSION

From the time man has been on the planet it has been possible to accurately determine the conjunction of the moon using simple arithmetic. According to Joesphus, Seth's sons were the first astronomers and had developed a knowledge of the precise cycles of the sun, moon and stars (what we today call astronomy). We can likewise determine the various cycles of the moon with precision.

"And God saith, 'Let luminaries [those which produce or reflect the light] be in the expanse of the heavens, to make a separation between the day and the night, then they have been for signs, and for seasons [Hebrew Moedim, or appointments], and for days and years, and they have been for luminaries in the expanse of the heavens to give light upon the earth:' and it is so. And God maketh the two great luminaries, the great luminary for the rule [domination] of the day, and the small luminary—and the stars—for the rule [domination] of the night; and God giveth them in the expanse of the heavens to give light upon the earth, and to rule [dominate] over day and over night, and to make a separation between the light and the darkness; and God seeth that it is good; and there is an evening, and there is a morning—day fourth" (Genesis 1:14-17, Young's Literal Translation).

The sun is to give us light during the day and the moon and stars are also to give us light, though less, in the night. Their purpose is also for the precise measurement of time, using astronomy. This is the divine time clock for the appointed times of

the Creator, given for man to calculate their movement in order to have knowledge of the exact times of the Father's appointments with His people.

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Shalom, and may Yahweh bless you in walking in the whole Word of God.

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