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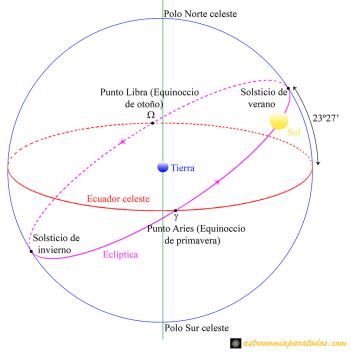
## Astronomy for everyone

A place for astronomy lovers

### The constellations of the ecliptic. The Zodiac

Published on November 20, 2024 by [José Luis Martínez Martínez](#)

The constellations of the ecliptic are those constellations through which the ecliptic passes. As discussed in the entry [The Celestial Sphere](#), the ecliptic is the apparent path of the Sun on the celestial sphere, or we can also say that it is the intersection of the [plane of the ecliptic](#) with that sphere (see also [The Apparent Motion of the Sun](#) and [The Apparent Motions of Celestial Objects](#)).



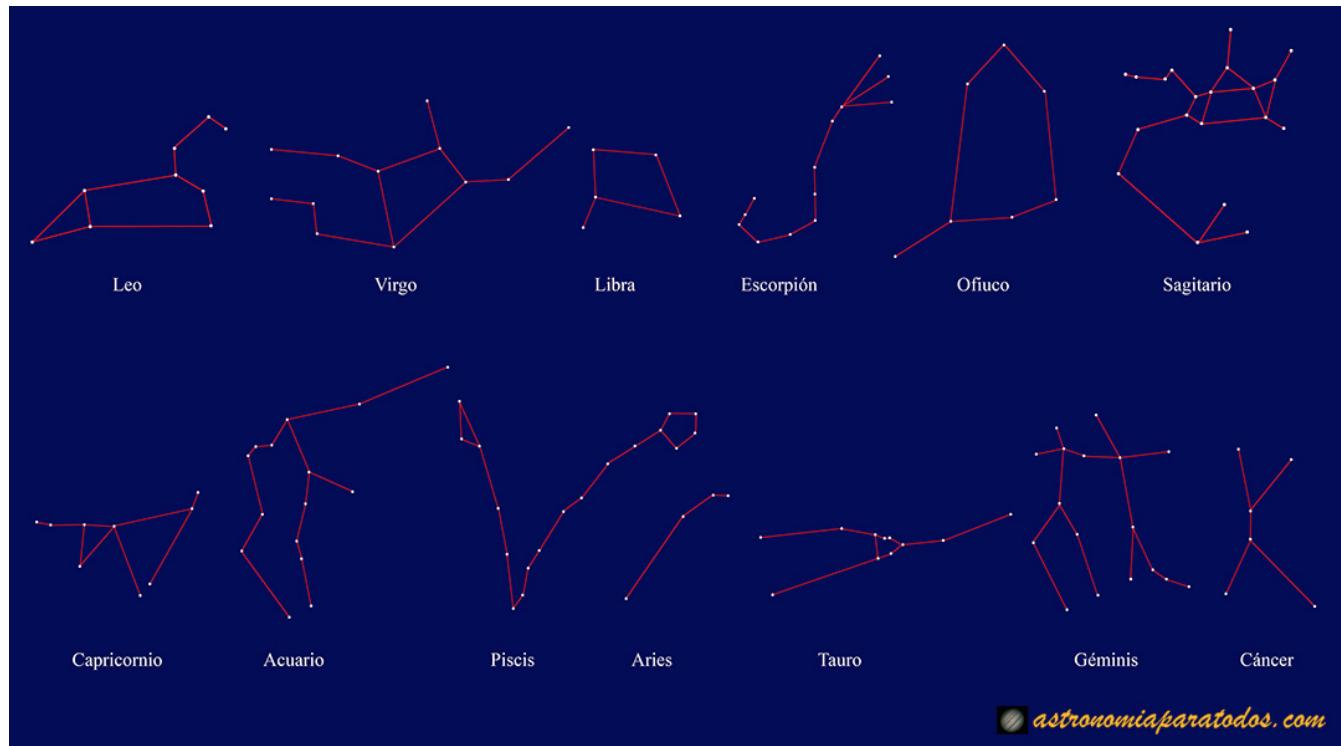
The celestial sphere and the ecliptic

Thus, we have that the ecliptic is a great circle on the celestial sphere that forms an angle of  $23.5^\circ$  with the celestial equator, that is, the inclination of the Earth's rotation axis.

Since the 88 constellations are distributed across the entire surface of the celestial sphere, the ecliptic passes through 13 of them, which are called the **ecliptic constellations**.

And, since the ecliptic is the apparent path of the Sun in the celestial sphere, our star passes through each of these constellations throughout the year that the Earth's revolution period around the Sun lasts.

These 13 constellations of the ecliptic are: Leo, Virgo, Libra, Scorpio, Ophiuchus, Sagittarius, Capricorn, Aquarius, Pisces, Aries, Taurus, Gemini and Cancer, which are represented in the following figure.



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In the following figure, created from [Stellarium](#), you can see how the ecliptic passes through these thirteen constellations.



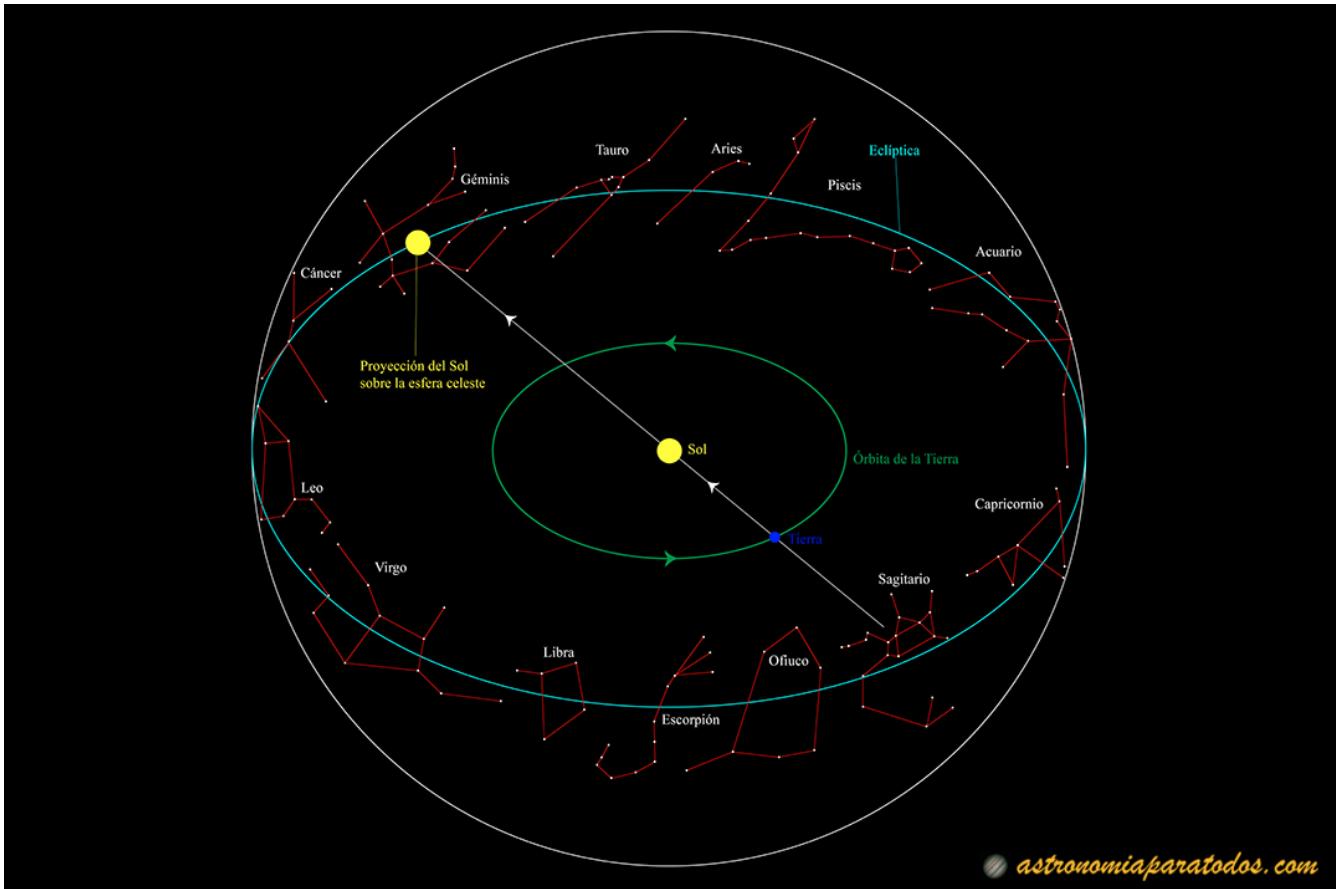
The constellations of the ecliptic

Although the ecliptic does not pass exactly through Aries (due to its asterism), this constellation occupies the precise position between Taurus and Pisces, and is also very close to the ecliptic. On the other hand, if we consider the [constellation boundaries](#) established in 1927 by the International Astronomical Union (IAU), then the ecliptic does indeed pass through Aries, as can be seen in the following figure, which is the same as the previous one, but with the constellation boundaries defined by the ecliptic.



The constellations of the ecliptic and their limits

As I mentioned, since the ecliptic is the Sun's path across the celestial sphere, our star passes through each and every constellation along the ecliptic throughout the year. Obviously, if the Sun is above a constellation on the ecliptic, at night we will see the constellation directly opposite it. In the following figure, we can see how the Sun, following the ecliptic in its annual journey across the celestial sphere, passes over all 13 ecliptic constellations. Furthermore, when the Sun is above, for example, Gemini, the constellation directly opposite it is Sagittarius, which we can observe at night.



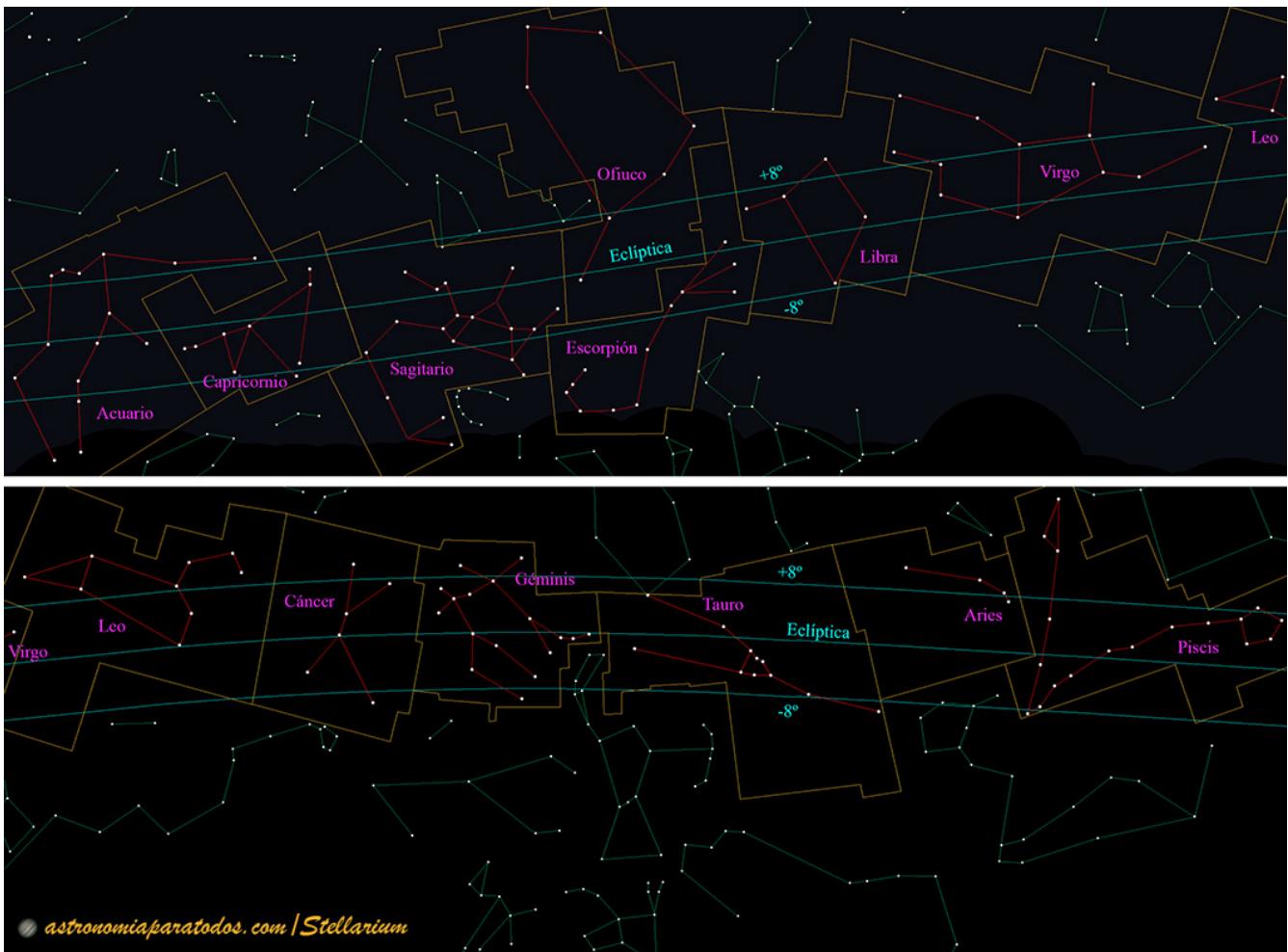
Thus, if at night we see a constellation of the summer ecliptic, the Sun will be above a winter constellation, and vice versa. And the same applies to spring and autumn.

In the diagram, I've placed the constellations with their center on the ecliptic; although this isn't entirely accurate, it's more illustrative. Furthermore, the Sun, not the Earth, is at the center of the celestial sphere. However, since the celestial sphere is vastly larger than Earth's orbit, placing the center on the Earth or the Sun makes virtually no difference.

The **Zodiac** (Zodiac, both spellings are valid, with and without an accent), is a band or belt of the celestial sphere, centered on the ecliptic and  $16^\circ$  wide; that is, it is a band limited between the parallels of celestial latitude (the minor circles parallel to the ecliptic, see [ecliptic coordinates](#))  $+8^\circ$  and  $-8^\circ$ .

Obviously, the 13 constellations of the ecliptic are in this band, but we also find in it the orbits of the Moon, the planets and other bodies of the Solar System.

In the following figure, which is the same as the second and third, I have also indicated the celestial latitude parallels  $+8^\circ$  and  $-8^\circ$ , that is, the Zodiac band.



The zodiac band and the constellations of the ecliptic

I've highlighted the constellations in the area; if you look closely, there are more constellations whose boundaries fall within the zodiac band (Scutum, Serpens, specifically Serpens Taila, Corvus, Crater, Hydra, Pegasus, Sextans, Canis Minor, Orion, Auriga, and Cetus). This leads some to consider the ecliptic to have 24 constellations. However, besides the fact that they barely fall within this band, the Sun only passes through the 13 mentioned; only the planets and the Moon also pass through the others. Therefore, we can consider the ecliptic to have 13 constellations.

For a few days, the Sun appears to pass through one of the 13 constellations along the ecliptic. As the days go by, the Sun will move along the ecliptic in the opposite direction to Earth's revolution around the Sun. This is similar to what happens when we are in a car; we see objects in the landscape moving in the opposite direction to our movement. It gives us the sensation that we are stationary and the landscape is moving backward; this is an apparent motion, just like the Sun's movement in the celestial sphere, since it is the Earth that revolves around the Sun.

Continuing with the previous comparison, distant objects appear to move more slowly than nearby objects. The same occurs in the celestial sphere. The stars are so incredibly far away that they appear motionless, but we can observe the movement of the Sun in the celestial sphere, since it is much closer.

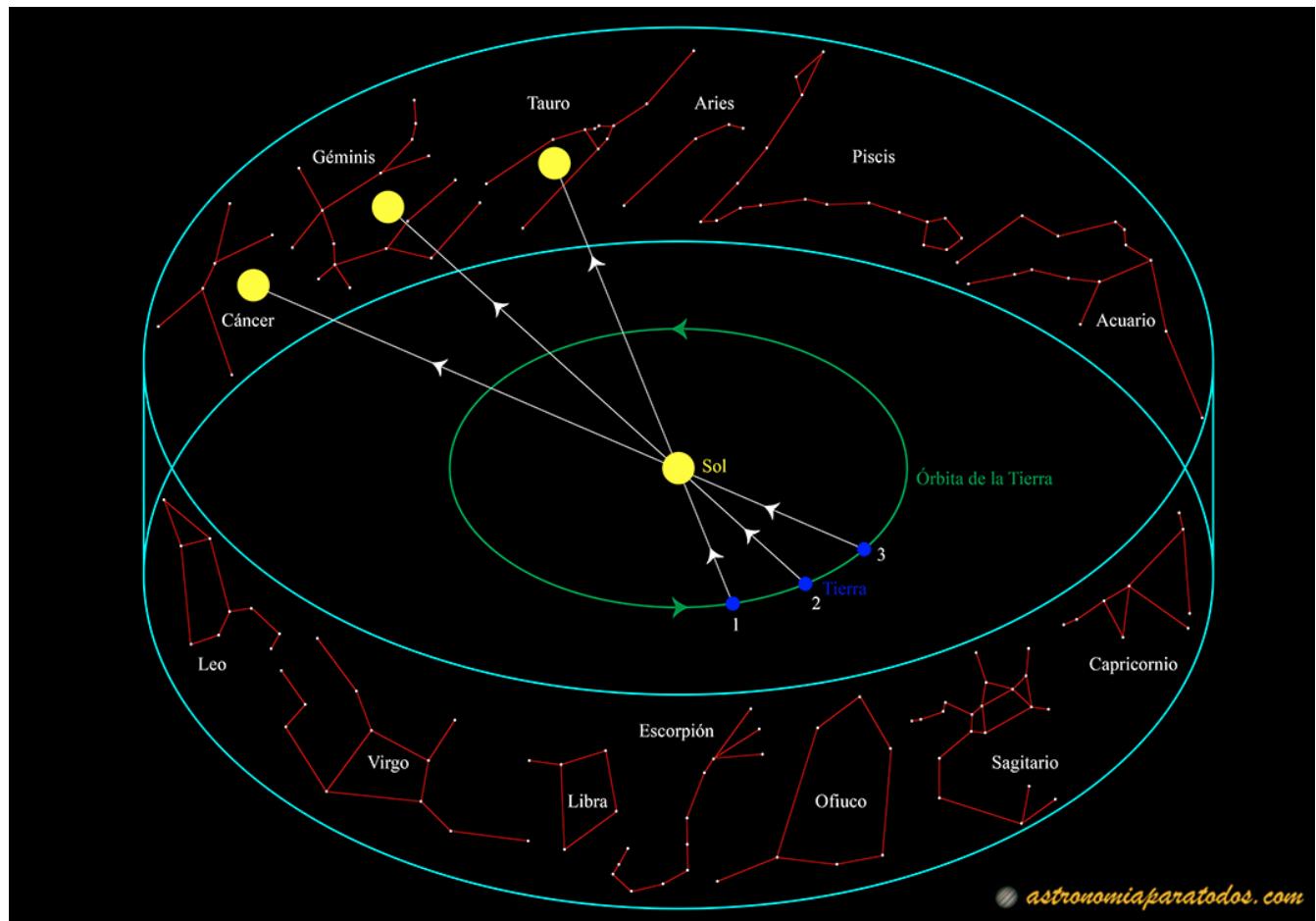
The Sun, in its apparent movement along the ecliptic on the celestial sphere, will move in the opposite direction to and Cookies: This site uses cookies. By continuing to use this website, you agree to their use.

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to over Gemini, after a few days it will pass over Cancer, then over Leo, Virgo, Libra, Scorpio, and so on, until it

returns to Gemini after a year. The following figure illustrates this movement.



The Sun's movement in the celestial sphere and its projection onto the constellations of the ecliptic

When the Earth is in position 1 of its orbit, the Sun is over Taurus; after a few days the Earth reaches position 2 and the Sun will be over Gemini; days later, when the Earth is in position 3, the Sun will be over Cancer and so on until it travels through the 13 constellations in a year.

If we disregard Ophiuchus, the other twelve constellations are familiar to everyone, as they are the **zodiac constellations**, which correspond to the signs of the zodiac. But since we're on the topic of zodiac signs and horoscopes, let's clarify a few things so no one gets their minds off the cuff.

The word zodiac comes from Greek, and from there from Latin, meaning "circle or wheel of animals," since most zodiacal constellations represent animals. And although it was the Greeks who established the foundations of Western astrology, it began earlier, in ancient Babylon.

The ancient Babylonians had already realized that the Sun traced a circle in the sky and that, for approximately one month, the Sun passed through 13 constellations that repeated themselves every so often (a year). If they divided this circle (the ecliptic) into 12 equal segments of  $30^\circ$  ( $30^\circ \cdot 12 = 360^\circ$ ) and aligned them with the beginning and end of the Sun's passage through each of these constellations, they obtained a year of twelve months (like the lunar year) of 30 days.

But it turns out that the Sun passed through thirteen, not twelve, constellations along the ecliptic. In this way, they eliminated, or rather, didn't include, Ophiuchus, and the problem was solved. These twelve segments of the ecliptic were then assigned signs that corresponded to the names of the twelve constellations along the ecliptic through which the Sun passed. These constellations, which are the constellations of the zodiac, are the ones we all know.

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All of this reached the ancient Greeks, who translated the names of the signs and constellations and laid the

foundations for Western astrology. This was largely due to the erroneous belief in the geocentric model, which persisted for centuries and gave us a centralized view of the Universe.

But astrology, and horoscopes in particular, makes no sense. According to horoscopes, those born on a certain date are influenced by the stars of the zodiac constellation over which the Sun is located on those days. Well, let's look at a few aspects that make this untenable.

Influence? The stars of the zodiac constellations are tens and hundreds of light-years away from us. What influence can they possibly have on us—gravitational? As Carl Sagan said, when we are born, the doctor who assists us in childbirth exerts far more gravitational influence than any star, including the Sun, which is 150 million kilometers away.

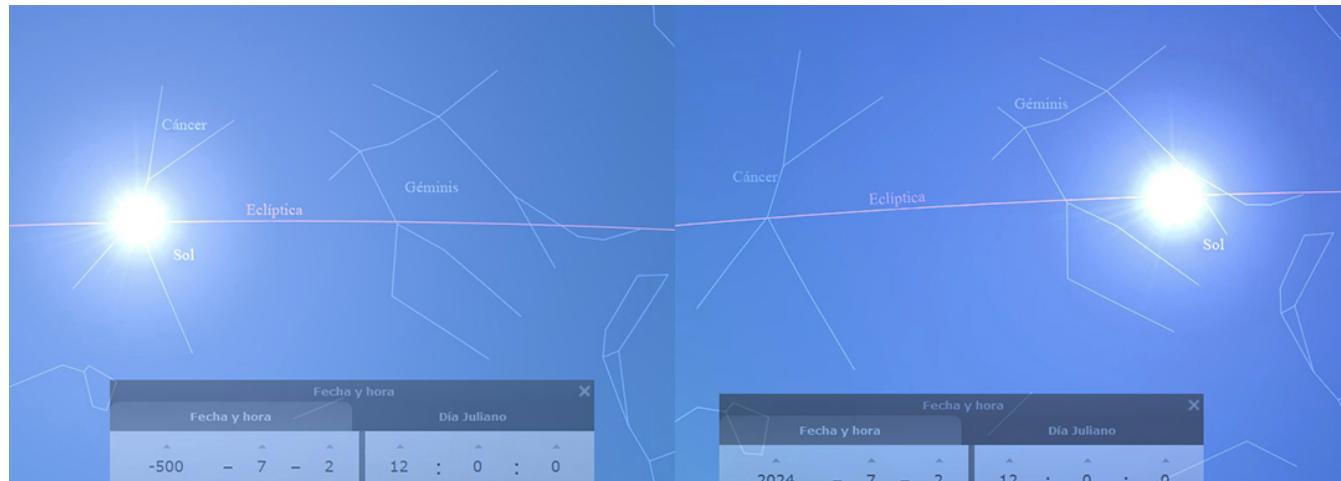
Furthermore, the stars in the same constellation are not only very far from us, but they are also unrelated to each other; they do not form a group of stars close to each other; we see them in the same field due to our terrestrial perspective (see [The constellations are not what they seem](#) ).

On the other hand, they do not occupy exactly  $30^\circ$  of the ecliptic nor does the Sun take 30 days to cross them; there are zodiac constellations with longer segments and, therefore, the Sun takes more days to cross them (the one that takes the longest is Virgo, 45 days) and others with shorter segments and, therefore, the Sun takes fewer days to cross them (the one that takes the shortest is Scorpio, 7 days).

There's also the issue of Ophiuchus; the Sun passes through this constellation on the ecliptic between November 30th and December 17th. According to astrology, those born on those dates, specifically between November 21st and December 21st, are Sagittarians, but the Sun isn't actually in that constellation.

And finally, what I think most undermines the whole horoscope and astrology thing. Over 2,000 years ago, in the time of the ancient Babylonians and Greeks, the Sun passed through the zodiac constellations more or less on the dates they predicted. But due to the [precession of the equinoxes](#), the sky has changed over all this time; the stars as a whole have moved, so that today the Sun passes through a zodiac constellation approximately earlier on the same dates.

In the following figure, also created from Stellarium, I have shown the position of the Sun for the same day (July 2, my birthday) in the year -500 and in 2024.



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The Sun is not in the same constellation today as it was on the same day 2500 years ago.

As we can see, if I had been born 2,500 years ago, I would have been a Cancer, since that's where the Sun was on that day. But due to the precession of the equinoxes, the sky has shifted, and it turns out that on July 2nd, the Sun is no longer in Cancer, but in the previous constellation, Gemini. However, according to the horoscope, those of us born between June 20th and July 22nd are Cancers. So, what am I, a Cancer or a Gemini? How can Cancer influence me if the constellation the Sun was in when I was born was Gemini?

In any case, the zodiac constellations were of great importance in antiquity for marking the seasons and other annual periods, and today they are still valid astronomically; they serve, among other things, to orient ourselves and to know where the planets and other bodies of the Solar System might be. Furthermore, they form part of the 88 zones into which the celestial sphere is divided.

And finally, a series of images, all taken with a Canon EOS 70D camera and a Canon 15-85mm lens, of the 13 constellations of the ecliptic. Except for Libra, which I took from Sant Llorenç de la Muga, the rest were taken from Querol.



The constellations of the ecliptic



**About José Luis Martínez Martínez**  
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alvaro6j says:

November 20, 2024 at 10:03 pm

Thank you so much for the article and your effort. I believe the phrases Tropic of Cancer and Tropic of Capricorn are named as such because they fall within those constellations, but this would only have been the case 2,500 years ago. Now it would be Tropic of Taurus and Tropic of Aquarius.

Thank you

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[José Luis Martínez Martínez](#) says:

November 21, 2024 at 11:00 am

You're welcome, Álvaro, and thank you very much for your comments. Yes, the same applies to the names of the Tropics of Cancer and Capricorn. These are the two parallels located  $23.5^{\circ}$  from the equator, one in the Northern Hemisphere (Cancer) and the other in the Southern Hemisphere (Capricorn). They are unique in that, during the summer solstice in each hemisphere, the sun's rays fall perpendicularly (completely vertically) upon them. At the summer solstice, which occurs between June 20th and 21st, summer begins in the Northern Hemisphere and winter in the Southern Hemisphere, and the sun's rays fall completely vertically on the Tropic of Cancer. At the winter solstice, which occurs between December 21st and 22nd, winter begins in the Northern Hemisphere and summer in the Southern Hemisphere, and the sun's rays fall completely vertically on the Tropic of Capricorn. Well, in ancient times, at the summer solstice the Sun was in Cancer and at the winter solstice in Capricorn. But nowadays, due to the precession of the equinoxes, at the summer solstice the Sun is in Taurus, bordering Gemini, and at the winter solstice the Sun is in Sagittarius. However, the ancient names have been preserved. The same is true for the equinoxes and the Aries and Libra points. Best regards.

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[Josep Mª](#) says:

February 5, 2025 at 11:28 am

Your article on the zodiac constellations is very interesting. How do we experience the sun passing through one of them in practice? How did the ancients observe it? During the day, the stars aren't visible in sunlight, so how did they know the sun was in a particular zodiac constellation?

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[José Luis Martínez Martínez](#) says:

February 5, 2025 at 6:43 pm

Hello Josep Maria, I'm glad you found it interesting.

Well, the ancients had a perfect understanding of the sky through long-term observations, and they knew the position of the constellations on the celestial sphere perfectly throughout the year. They had observed that if a zodiacal constellation began to appear on the eastern horizon of the ecliptic, for example, in January, night after night it would rise higher in the sky until, after three months (April), it reached the zenith in the southern sky. Then, during the following three months, it would descend in the sky until it disappeared three months later (July) below the western horizon. For six months, this constellation was not in the night sky; of course, they reasoned, it was precisely on the other side of the celestial sphere, on the daytime side (of the Sun). And then, again in January, it began to rise on the eastern horizon to repeat the cycle. Since they knew the sequence of the zodiacal constellations along the ecliptic, if a constellation was at the zenith on the nights of, for example, March, Leo

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home this clears things up.

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**Samai** says:  
November 18, 2025 at 10:18 pm

Thank you very much, José Luis. You've clarified some things and reinforced several others. No questions, just thanks.

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**José Luis Martínez Martínez** says:  
November 18, 2025 at 10:46 pm

You're welcome, thank you for commenting. I'm very glad it clarified and reinforced several points for you. Best regards

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