

POSITIONS OF THE PLANETS 2016-2020

The Sun, Moon and planets are not shown on the *Star Disc*, as their positions change from day to day. The following tables give some idea of where the planets can be found at various times; look for them along the *ecliptic* (the **yellow line** on the Star Disc), which represents the plane of the Solar System; they are generally within a degree or so of this line.

Note: the planets generally move slowly **eastwards** from night to night (against the background stars), but occasionally a planet will move westwards or **retrograde**. This is due to the relative motions of the planet and the Earth. For the outer planets, retrograde motion occurs around the months of **opposition**, that is when they are 180° from the Sun and hence highest in the sky at midnight.

THE SUN also moves eastwards along the ecliptic, just like the planets do, but its movement against the background stars is not as easy to see because its brightness obscures the surrounding constellations. On March 21st, the Sun lies at the intersection of the *ecliptic* and *celestial equator* (the yellow and green lines) in *Pisces*; three months later on June 21st it is between *Taurus* and *Gemini*; on September 23rd it is at the intersection of the green and yellow lines in *Virgo*; and by December 21st, it is near the *Lagoon Nebula* in *Sagittarius*.

Note: Astrological dates for the *Star Signs* lag one month behind the Sun's actual position, because of the *precession of the equinoxes* - due to the gradual shift in the orientation of the Earth's axis of rotation over the last 2000 years.

The INNER PLANETS

MERCURY is the most difficult of the major planets to see, as its orbit never takes it more than 28° away from the Sun. Mercury varies greatly in brightness - sometimes it is barely visible, at other times brighter than *Sirius* (the brightest star in the sky). The following table lists the times of the year when Mercury is **brightest** and **easiest to see**. Look for it 10° to 20° above the eastern horizon about 40 minutes before sunrise, or the western horizon 40 minutes after sunset:

| Year | Morning Sky (East) | Evening Sky (West) |
|------|--------------------------|------------------------------|
| 2016 | Mid-February, mid-June | Early August, early December |
| 2017 | Early February, late May | Mid-July, mid-November |
| 2018 | Early January, mid-May | Late June, late October |
| 2019 | Late April, early May | Mid-June, early October |
| 2020 | Late March, early April | September |

VENUS is much easier to see than Mercury as it is constantly bright (over 15 times the brightness of *Sirius*) and gets further from the Sun, to a maximum angular separation of 46°. Look for it at the following times:

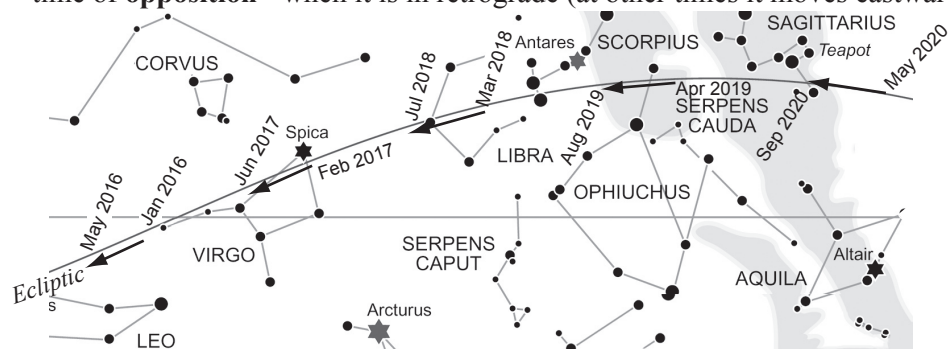
| Year | Morning Sky (East) | Evening Sky (West) |
|------|----------------------|---------------------|
| 2016 | January to April | August to December |
| 2017 | April to November | January to February |
| 2018 | November to December | March to October |
| 2019 | January to June | October to December |
| 2020 | June to December | January to May |

The OUTER PLANETS

MARS has a distinctive orange colour and varies greatly in brightness, being up to 100 times brighter at **opposition** (when it can be brighter than *Sirius*) than when it is in **conjunction** with the Sun. When not at opposition, it moves eastwards against the background stars, taking only about two months to cover one zodiac constellation. The following table shows in which constellation Mars can be found; **bold** months indicate when it is at its brightest, **no entry** indicates it is too close to the Sun to be seen. Mars is a morning object in the months before opposition (bold months) and an evening object after.

| Month | 2016 | 2017 | 2018 | 2019 | 2020 |
|-----------|-----------------|----------|---------------------|-------------|---------------|
| January | Virgo/Libra | Aquarius | Libra | Pisces | Scorpius |
| February | Libra | Pisces | Scorpius | Pisces | Sagittarius |
| March | Scorpius | Pisces | Ophiuchus | Aries | Sagit/Capric |
| April | Scorpius | Aries | Sagittarius | Taurus | Capricornus |
| May | Scorpius | Taurus | Sagit/Capric | Taurus/ Gem | Aquarius |
| June | Libra | - - | Capricornus | Gemini | Aquarius |
| July | Libra | - - | Capricornus | Cancer | Pisces |
| August | Scorpius | - - | Sagit/Capric | - - | Pisces |
| September | Ophiuchus | - - | Capricornus | - - | Pisces |
| October | Sagittarius | Virgo | Capricornus | - - | Pisces |
| November | Capricornus | Virgo | Aquarius | Virgo | Pisces |
| December | Aquarius | Virgo | Aquarius | Libra | Pisces |

JUPITER is bright (about four times brighter than *Sirius*) - and much slower moving than Mars, taking about a year to move through one zodiac constellation. The map below shows Jupiter's location when it is at its best - around the time of **opposition** - when it is in retrograde (at other times it moves eastwards).



SATURN - slightly yellowish in colour and brighter than *Alpha Centauri* when at its best - takes about two years to move through a zodiac constellation. Arrows below show the best times to view Saturn, around **opposition** each year.

