-1.0.1 Exploring the ecliptic

1. Open Stellarium and set it to your home location. You can also stop time (the pause button in the bottom panel) and set the time to noon.
2. Make the constellations visible.
   (a) Turn off the Atmosphere visualisation.
   (b) Open the Sky and Viewing options window.
   (c) Go to the Starlore tab.
   (d) Under Options, check Show labels and Show boundaries.

1. Find out what constellation the
   (a) Sun
   (b) Moon

   are in today.
2. Click on the Sun and hit the spacebar. This will centre and lock on the Sun.
3. Move forward in time by jumping by day, by holding down the = key.
4. Find out the constellations that the Sun moves through over a year.

What constellations does the Sun move through? What is causing the Sun to move through the stars? What other things change position among the stars as time passes?

-1.0.2 What's your sign?

Table 1: Horoscope signs and dates

Sign	Aries	Taurus	Gemini	Cancer	Leo	Virgo	Libra	Scorpio	Sagittarius	Capricorn	Aquarius	Pisces
Start	21 Mar	20 Apr	21 May	21 Jun	23 Jul	23 Aug	23 Sep	23 Oct	22 Nov	22 Dec	20 Jan	19 Feb
End	19 Apr	20 May	20 Jun	22 Jul	22 Aug	22 Sep	22 Oct	21 Nov	21 Dec	19 Jan	18 Feb	20 Mar

1. Shift Stellarium to your birth date. What constellation was the Sun in? Save a screenshot of the Sun's location.

   According to the ancient idea of astrology, this is known as your sun sign or horoscope sign, which somehow determines your characteristics.

2. The dates for each horoscope sign according to modern astrologers is given in the table. What is your sign based on the table?

3. Based on Stellarium, over what range of dates is the Sun actually in the constellation corresponding to your horoscope sign?

4. Set Stellarium to a date in the middle of your horoscope sign. Jump back in time in 500-year blocks until the Sun is actually in the middle of your horoscope sign. How far did you have to go?

   N.B.: To enter a B.C. date, you may need to enter the number first, then put "-" in front.

-1.0.3 Precession of Earth's Axis

In fact, the position of the Sun on a particular date shifts steadily through the sky because of the precession of the Earth's axis. Let's visualise this in Stellarium.

1. Jump back to today and turn on the equatorial (NOT azimuthal!) grid.

2. Look at the North celestial pole. Which star is nearest to it? Which star was nearest to it when horoscopes were aligned with the zodiacal constellations?

3. Find the star Vega. Jump back in time in 1000-year blocks. When was Vega the North star?

4. Jump forward in time in 1000-year blocks. When will Vega be the North star again?

-1.0.4 Constellations in Other Cultures

Different cultures have come up with different groupings of stars and different stories associated with them. Let's explore them!

1. Go back to your birth date.

2. Pick constellations from another culture.

   (a) Go to Sky and viewing options and go to the Starlore tab.

   (b) Choose another cultural constellation system (other than Western). Which constellation is the Sun in?

If no labelled constellation is available, do some research online and tell us about what you find.

On Moodle, write about the culture you chose and what you've learnt about the constellation.

-1.0.5 The Motion of Mars

The planets move through the stars of the zodiac and show some surprising motions, like Mars.

1. Centre your view on Pisces.
   (a) Set Stellarium to 1 June 2020.
   (b) Turn off the atmosphere and ground visualisations.
   (c) Switch to the equatorial axis. (This is NOT the same as turning on the equatorial grid!)
   (d) In Sky and viewing options, turn on constellation lines and labels as before.
   (e) Centre and zoom in on Pisces.
2. Find Mars on the sky.
3. Plot the position of Mars every month for one year (i.e. once a month from June 2020 to June 2021).
4. Connect the points. How many days was it moving backwards (retrograde)?
5. Go back through the same period. This time, zoom in on Mars and take note of its magnitude, phase, and size.
6. Note the highest and lowest magnitudes and note them on the chart.

   Note that the lower or more negative the magnitude, the brighter an object is. The magnitude scale is logarithmic: 5 magnitudes lower is 100$\times$ brighter.
7. Repeat for all the planets. Do they all go retrograde (i.e. move backwards for some time)?

-1.0.6 Moodle Lab Quiz

Go to the section for this lab on the Moodle page and complete the End-of-Lab Quiz.