Planisphere

Locating Objects

Classroom Activity

Overview

Age Range:

14-18

Prep. Time:

30 minutes

Lesson Time:

1 hour 15 minutes

Cost per activity:

Medium (€15 planispheres)

Includes the use of:

Planispheres (40, 50 or 60N)

Outline

Teaching students to locate constellations and stars on a planisphere, their visibility throughout the year and to assign celestial co-ordinates to stars.

You may wish to look at the 'Calibrating the Planisphere' activity first and also be aware of which latitude planisphere you are using.

40°N = Southern Europe

50°N = Central Europe

60°N = Northern Europe

Pupils will Learn:

- Reading scales (direction and precision)
- Measurement techniques
- Assigning co-ordinates to objects in the sky.

Lesson Plan:

Description	Time	Notes
Introduction to the subject	15 min	Teachers might like to ensure that students understand how the planisphere functions.
Activity 1	20 min	Examination of planisphere.
Assessment	15 min	Circumpolar and zodiacal constellations.

The online observatory collaboration consists of the following partners:
Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory

Introduction to activity 2	10 min	
Activity 2	15 min	Finding stars and assigning co-ordinates of right ascension and declination to them.

Introduction to the subject:

In this activity students will learn the parts of the planisphere and how to use them. The teacher should explain that all celestial objects have co-ordinates on an imaginary celestial sphere, i.e. a globe, viewed from the inside. The celestial sphere has longitude, called right ascension (RA) and latitude, called declination (Dec.). Students will be able to assign co-ordinates to a selection of objects and ones they choose themselves. Teachers should remind students that this is not an obsolescent exercise because modern telescopes steer to their targets when co-ordinates are entered into computers. This can be done on site or from a link thousands of miles away. Students will have already calibrated their planispheres so answers should be consistent.

Activity 1:

- Distribute planispheres to students

Students learn what the parts do and how moving the upper and lower parts changes what they see.

1. Students study their planispheres to understand what the features are for.
2. Show a labelled diagram so that all students understand what the planisphere does.

If groups have different latitude planispheres they should switch and experiment with them to see the difference it makes

Assessment:

Questions for students (Questions and answers will vary depending on latitude of planisphere used)

For all:

- Name four constellations that lie on the ecliptic.
- How many constellations, in total, does the ecliptic line cut through?
- Name four constellations that remain (mainly) above the horizon throughout the year? Rotate the mask to do this. These are known as circumpolar constellations.

For Latitude 40N:

- At midnight on the 1st July, which bright star is at the zenith? (Do this by placing

zero on the time scale next to 1st July on the date scale, then see which bright stars are close to the zenith position.)
- At midnight on the 11th December, which bright star is just a few degrees from the zenith?

For Latitude 50N:

- At midnight on the 1st July, which bright star is around 10 degrees south of the zenith? (Do this by placing zero on the time scale next to 1st July on the date scale, then see which bright star is close to the zenith position.)
- At midnight on the 11th December, which bright star is close to the zenith? (See Q4 for the procedure.)

For Latitude 60N:

- At midnight on the 7th March, which pair of bright stars are close to the zenith? (Do this by placing zero on the time scale next to 7th March on the date scale, then see which bright stars are close to the zenith position.)
- At midnight on the 7th October, which bright star is close to the zenith? Note that it has a Greek symbol on the planisphere. (See Q4 for the procedure.)

Introduction to Activity 2:

To read the declination of a star, place the red meridian lines across the star and read the scale on the meridian line. To read the RA of a star, place the red meridian line across the star then read the RA on the rim where the red line intersects it. The earlier mentioned divisions on the meridian will give the declination.

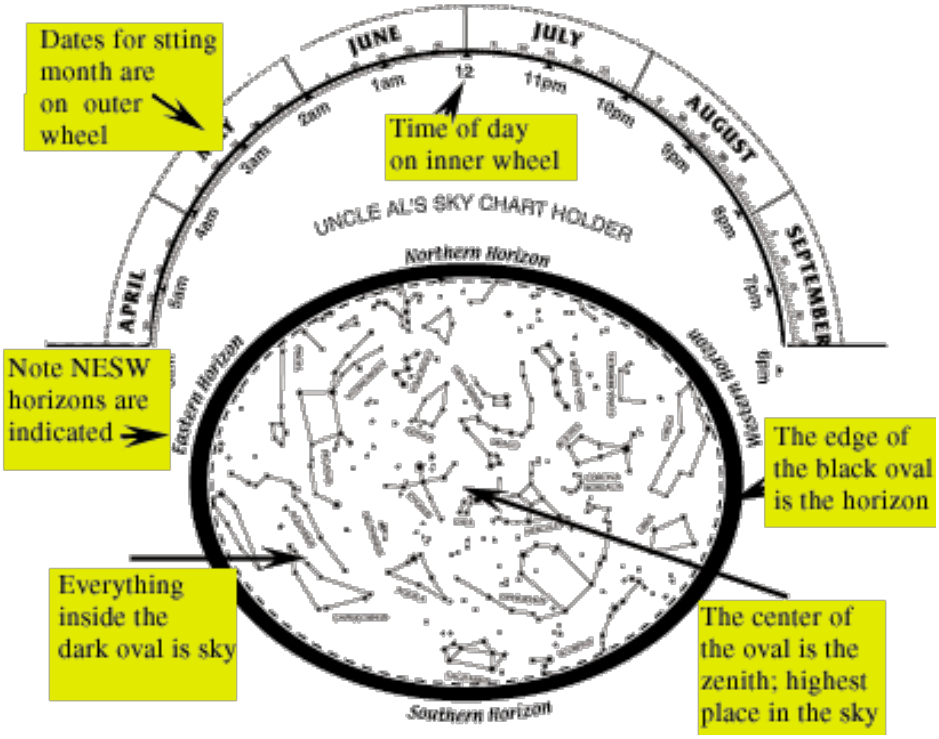
Activity 2:

- If students are not already working together pair them up or create small groups

Students will locate some stars or identify their co-ordinates, filling in the blanks of the table as they go.

1. Students should work together to fill in the table
2. Students should individually answer the question 'All the declination and right ascension values are approximate. If you had a very large planisphere would your values be more accurate? Explain your answer.'

Background Knowledge:



The Horizon is the point below which stars, planets and the Sun cannot be seen until they rise or after they have set. It is the red line bordering the window and has compass directions marked around it. The planisphere assumes the horizon is flat but your location may have mountains, buildings and trees that obscure stars when they are low in the sky.

The Meridian is the red line running north-south, through the north celestial pole and the south point in the visible sky, and which bisects the planisphere window.

The Zenith is the point directly overhead in the sky. This is where the red meridian line is intersected by the East-West (curved) red line. A small letter Z is printed here.

Declination (Dec) is the term for celestial latitude ('up-down') and Dec lines appear on the planisphere as dark circles at 30-degree intervals. The clear upper window also has declination marked in one-degree intervals down the red meridian line.
Declination runs from +90^o at the north celestial pole to –90^o at the south celestial pole. The north celestial pole is where the connecting rivet is on the planisphere and its centre of rotation. It inevitably hides the pole star (Polaris). The celestial equator has a declination of 0^o.

Right ascension (RA) is the term for celestial longitude and RA lines appear as radiating dark lines on the planisphere. There are 12 lines, at 2 hour intervals, marking out the 24 hours of RA. Each hour further subdivides into minutes and seconds. One hour corresponds to 15^o of longitude in the sky. The azimuth system is an alternative

longitudinal system with 0-360º, not used on the planisphere. Locate the 0/24 hour position on the planisphere.

The Ecliptic is the path followed by the Sun and planets across the sky. It appears as a dashed white line on the planisphere. The constellations that intersect the ecliptic line are those of the zodiac.