Changing Times 50N

Planisphere Activity

Classroom Activity

Material List:

- Rob Walrecht 50N Latitude Planisphere

Outline

Discover how stars move east to west across the sky because the ground is moving west to east as the Earth rotates.

The Earth also orbits around the Sun in an anticlockwise direction as viewed from above the north pole. As a result the stars appear approximately 1 degree further west each day and rise above the eastern horizon 4 minutes earlier.

Universal Time (UT) used throughout.

Procedure:

1. Set your planisphere to midnight (00:00 UT), 2nd January by moving the red time scale against the blue and white date scale. Which bright star (with a six letter name) is on (or very near) the meridian line and with a declination of -16 degrees at this date and time?

2. Keep watching the bright star and now set the planisphere to midnight (00:00 UT), 1st March. Compare what you see with the first question a). What has happened to the position of the bright star? Has it moved east/west and lower/higher in the sky?

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

3 Now set the planisphere to 20:00 on the 2nd March. Has the position of the bright star significantly changed? Consider where it is in the sky and at what time compared to question 1.

4 By now you will have realised that stars appear to move westwards across the sky each night. What aspect of the Earth's motion causes this?

5 You will also have realised that any star appears to move westwards, day by day, when viewed at the same time each night. What aspect of the Earth's motion causes this?

6 Locate Aldebaran in the constellation of Taurus and move it to the eastern horizon so that it is half concealed (as you did for Regulus in the calibration exercise. Note the time that it rises on the 13th August. Now rotate the time mark you selected on the red scale to the 13th September on the date scale and look for the bottom right hand star in Gemini, called Alhena. It should be on the eastern horizon and its name may be partly concealed, so move the horizon back and forth a bit to check.

How many days are there between 13th August and 13th September?

7 Approximately, what is the difference in right ascension (RA) between Aldebaran and Alhena (they have broadly the same declination.)? You can find this using the outermost RA scale. To align the star with the RA value, use the red meridian line as a connecting line.

8 How many degrees (of azimuth) is this difference in right ascension (RA) equivalent to? Remember that 24 hours of RA = 360 degrees.

9 Thus, calculate how many degrees (to the nearest whole degree) the sky moves westward between identical clock times which are 24 hours apart

10 Therefore, how much earlier will a star rise from one 24 hour period to the next? (Hint 1/360th of 24 hours.)

11 Could you have worked out the number of degrees difference in a 24 hour period in a more direct way? Consider the number of days in a year and the number of degrees in a circle (i.e. the Earth's orbit is approximately circular). Comment/calculate….

Assessment:

- Compare answers with the model answer sheet.

Total = /13