

Cellar and Terrestrial Co-ordinates

The polar axis of the Earth is tilted at an angle of 66.5° to the Ecliptic. It follows that the latitudes of the Tropic of Cancer and Capricorn are 23.5° N and 23.5° S, respectively.

Assume that Polaris lies at the North Celestial Pole, i.e., its declination is $+90^\circ$. We have shown that the angle of elevation of Polaris is equal to the observer's latitude.

For the questions concerning apparent differences in time due to differences in observers' longitude, remember that, in a time interval of four minutes, the Earth rotates one degree.

- ① From a latitude of 55° N, a star is observed directly over head. Determine the declination of the star.

Ans. Projection of latitude 55° N on the celestial sphere is a declination of $+55^\circ$ \therefore declination = $+55^\circ$

- ② At what angle above the horizon will the Sun be at local noon to an observer on the Tropic of Capricorn on the date of the summer Solstice?

Ans. At the summer Solstice, the declination of the Sun is $+23.5^\circ$. The latitude of the Tropic of Capricorn = $23\frac{1}{2}^\circ$ S \therefore the Sun is 47° from the zenith \therefore 43° above the horizon.

- ③ Two observers differ in their longitudes by 12° . One observer who is farther East sees a given star culminate at 21:30. At what time will the other student see the culmination of the same star?

Ans. 12° longitude \equiv 48 minutes.

\therefore "Western" observer sees the star culminate at 22:18