Q4. **Hour angle:** It is the angle through which the earth must be rotated to during to meridan of a point directly in line with sun's ray

mathematically Hour angle can be expressed

$$\omega = 15(LST - 12)$$

LST = Local solar time

Day Taken - The Hour angle and the given below

$\theta_z = 0$ and $\omega = \omega_s$

$$\cos\omega_s = -\tan\phi \tan\delta$$

Tidal surface $\omega_s = \cos^{-1}[-\tan(\phi - \beta)\tan\delta]$

The corresponding day length.

$$N = \frac{2}{15}\cos^{-1}[-\tan(\phi - \beta)\tan\delta]$$