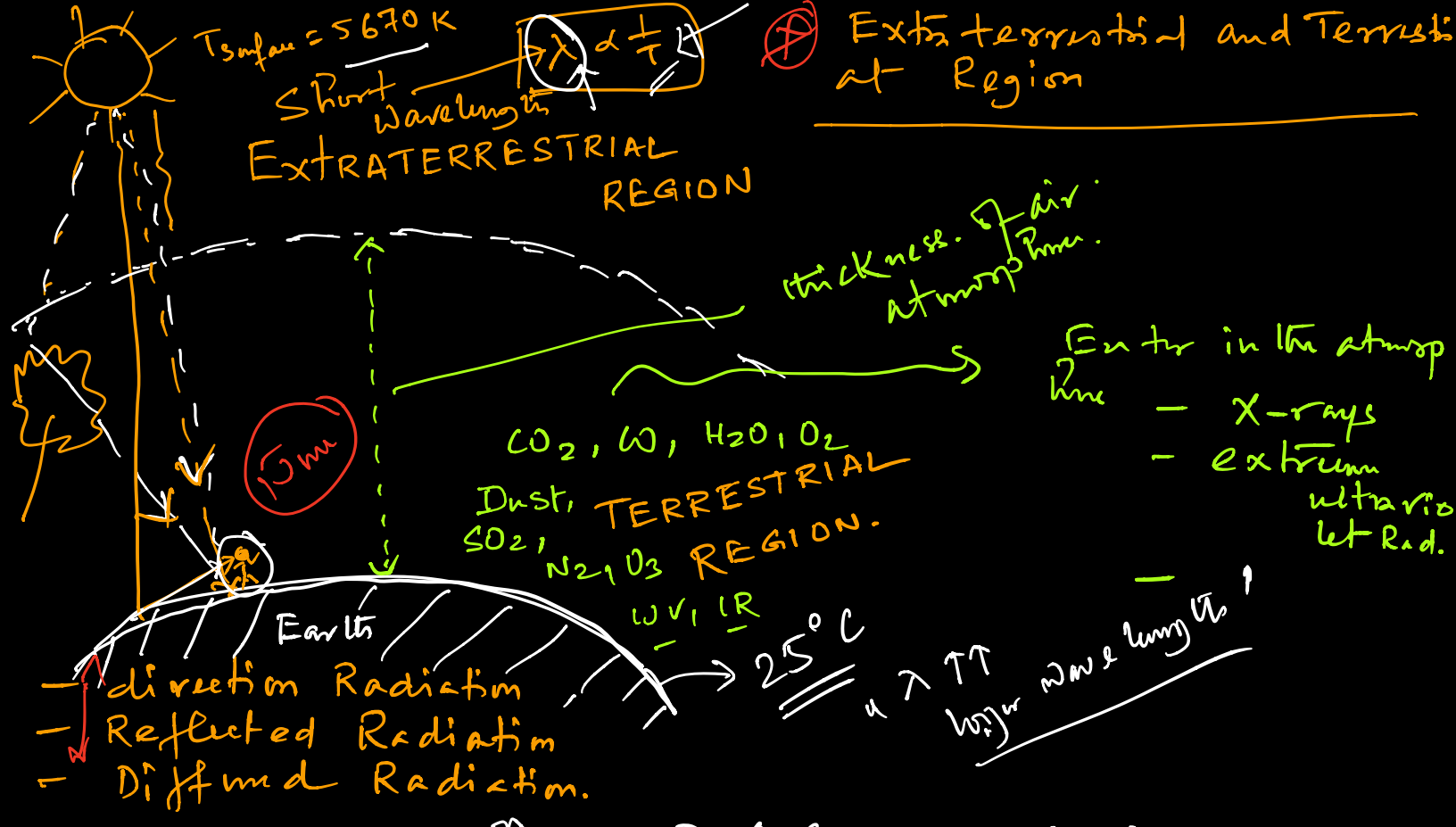
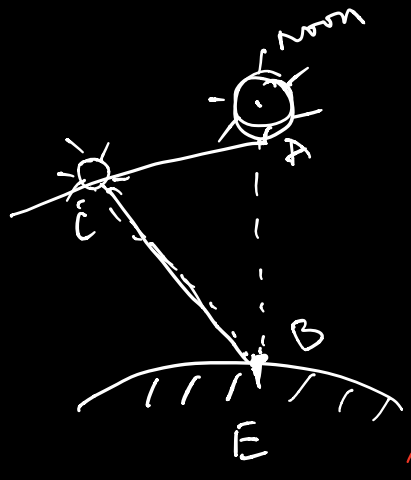
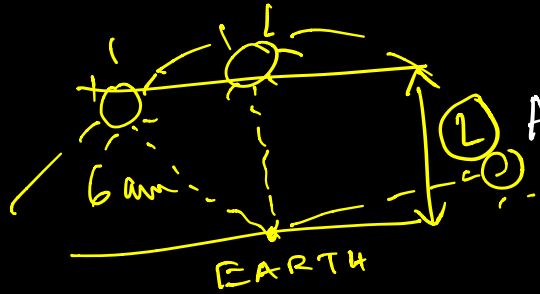


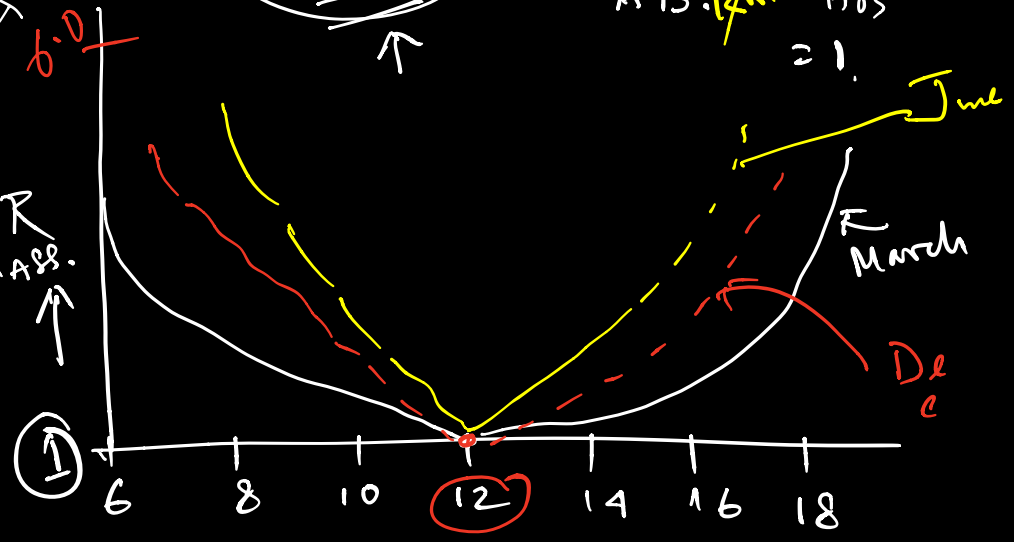


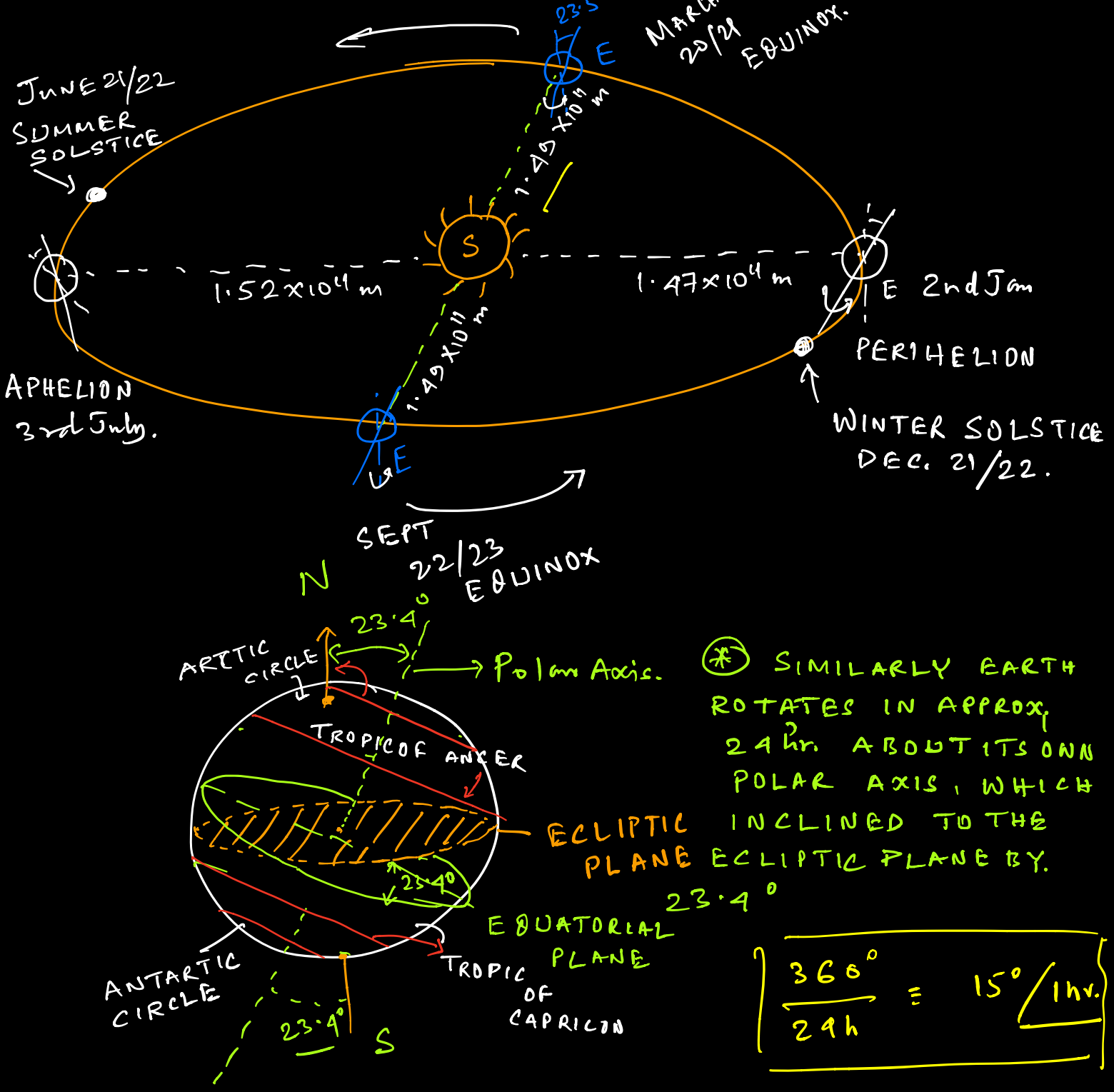
AIR MASS. : (25).

- Variation of Sun - Earth angle; the distance travel by the Sun variation varies. wrt. fixed location.

$$\sec 25 = \frac{BC}{AB.1km} = \frac{AB}{AB} = 1.$$







(*) SIMILARLY EARTH ROTATES IN APPROX. 24 hr. ABOUT ITS OWN POLAR AXIS, WHICH INCLINED TO THE ECLIPTIC PLANE BY 23·4°

$$\frac{360^\circ}{24\,h} = 15^\circ / 1\,hr.$$

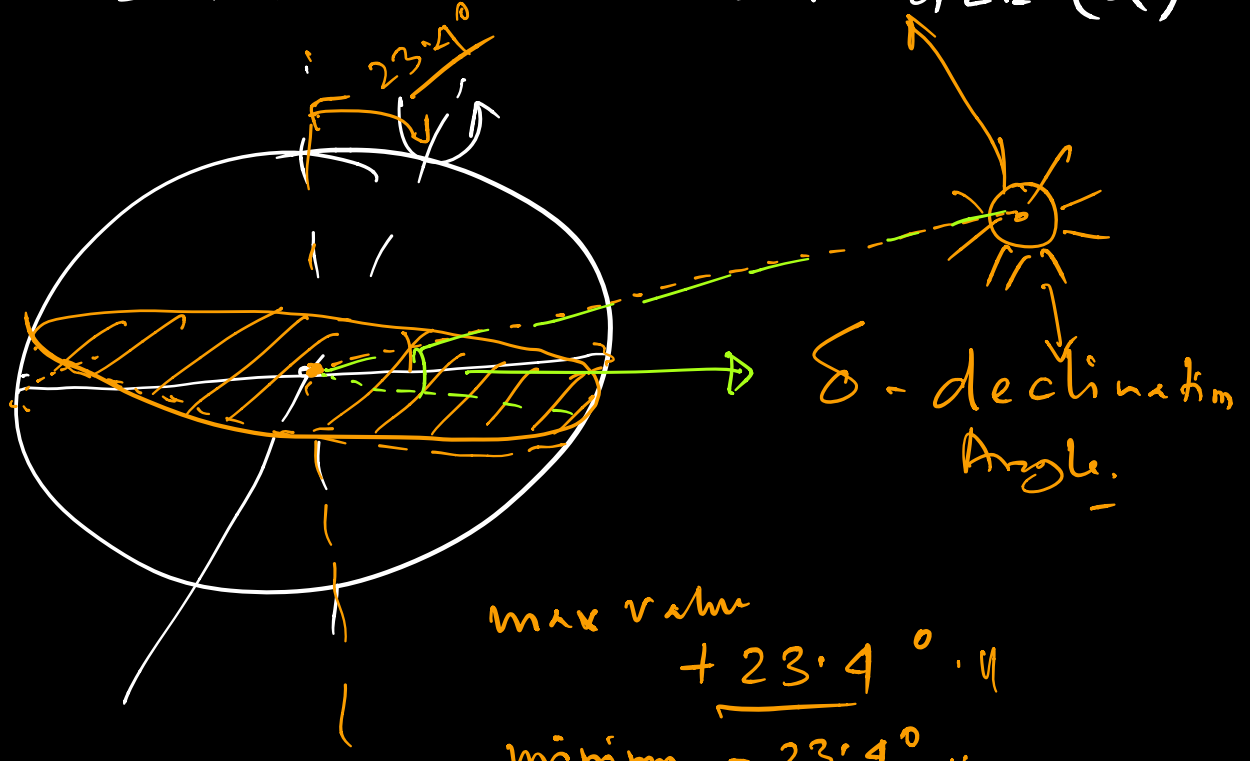
Two Types of Angles:

Earth - Sun Angle:

- DECLINATION Angle (δ) -
- Hour Angle (h) -

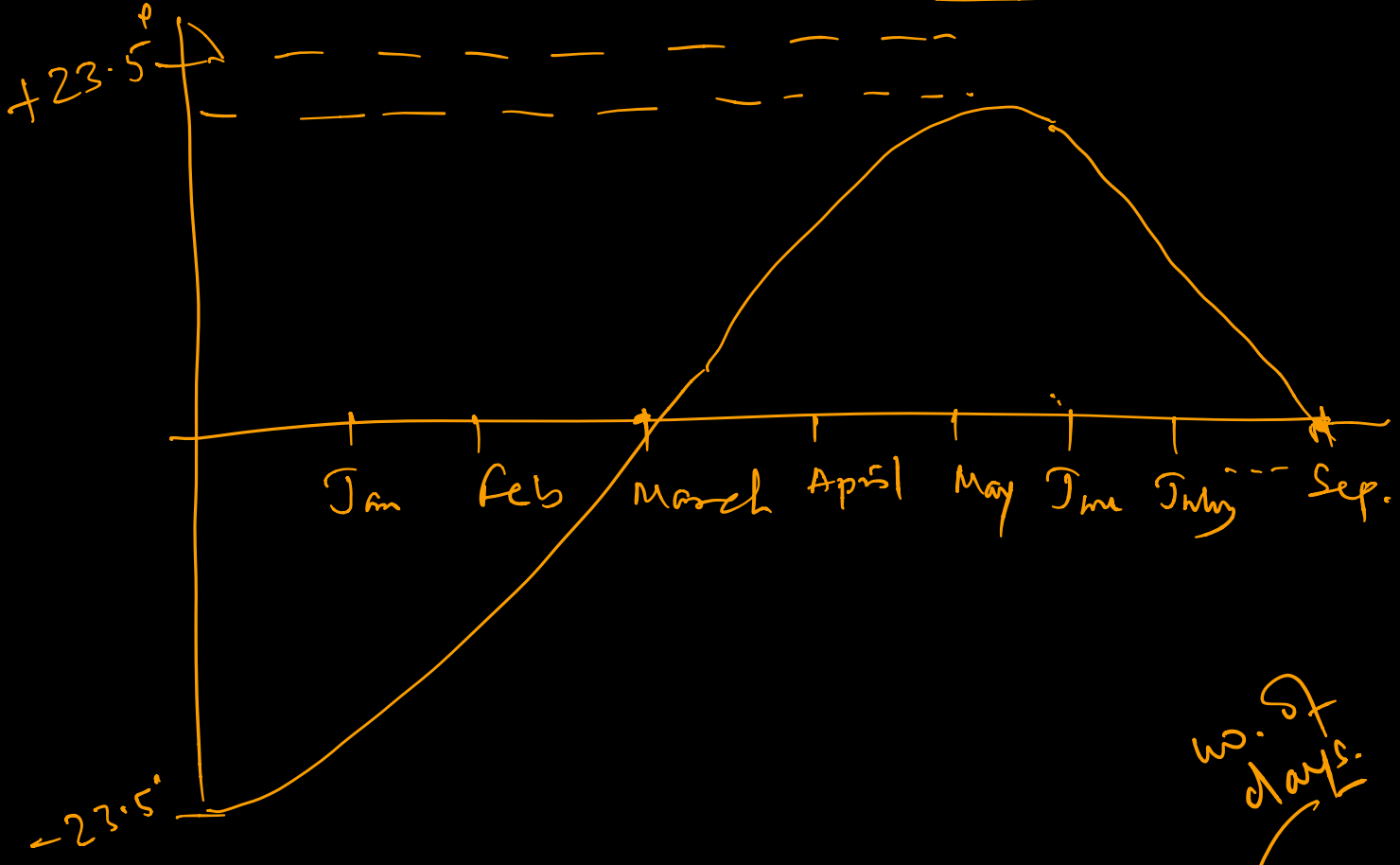
Observer - Sun Angles:

- Zenith Angle (z)
- Solar Azimuth Angle (ϕ)
- Solar ALTITUDE ANGLE (α)



max value $+23.4^\circ$

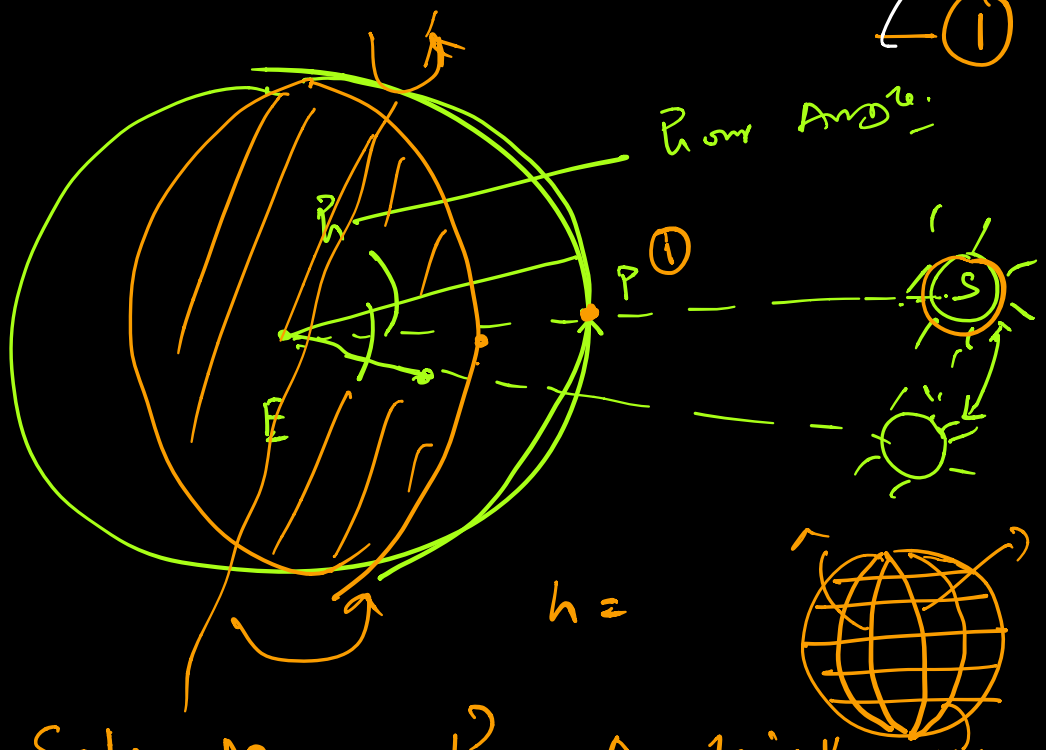
minimum -23.4°



w.r.t days:

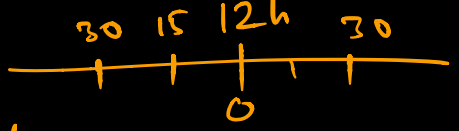
$$\delta = 23.45 \sin\left[\frac{360}{365}(284 + n)\right]$$

(1)



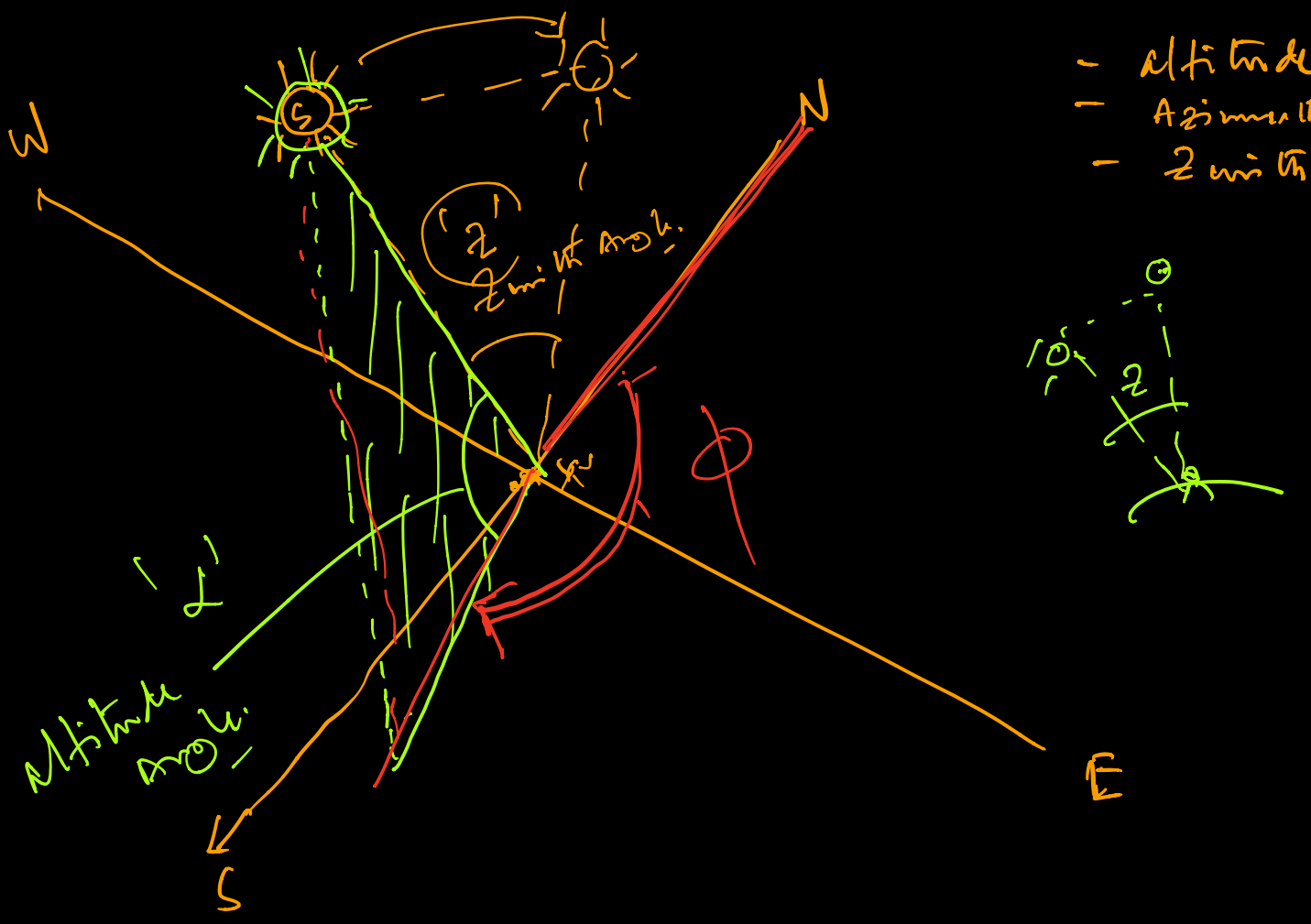
At Solar Noon - Hour Angle is "Zero"

- 15° Change in every 1 hr.
- '+'ve hour angle is counted from noon to evening.
- -ve Before noon.



10 Am. $\rightarrow -30^\circ$

2 Pm $\rightarrow +30^\circ$



SOLAR AZIMUTH ANGLE IS DEFINED AS THE ANGLE MEASURED ON THE HORIZONTAL PLANE, CLOCKWISE FROM - NORTH-POINTING CO-ORDINATE AXIS to THE PROJECTION OF THE CENTRAL SUN-RAY ON THE HORIZONTAL PLANE

$$\cos z = \sin\alpha = \sin L \sin\delta + \cos L \cos\delta \cos h \quad (2)$$

$$\sin\phi = \cos\delta \frac{\sin h}{\cos\alpha} \quad (3)$$

* L - Latitude Angle.
* δ - declination Angle.

$z \rightarrow$ Zenith Angle

α - Altitude Angle

ϕ = Azimuth Angle.

h = Hour Angle.