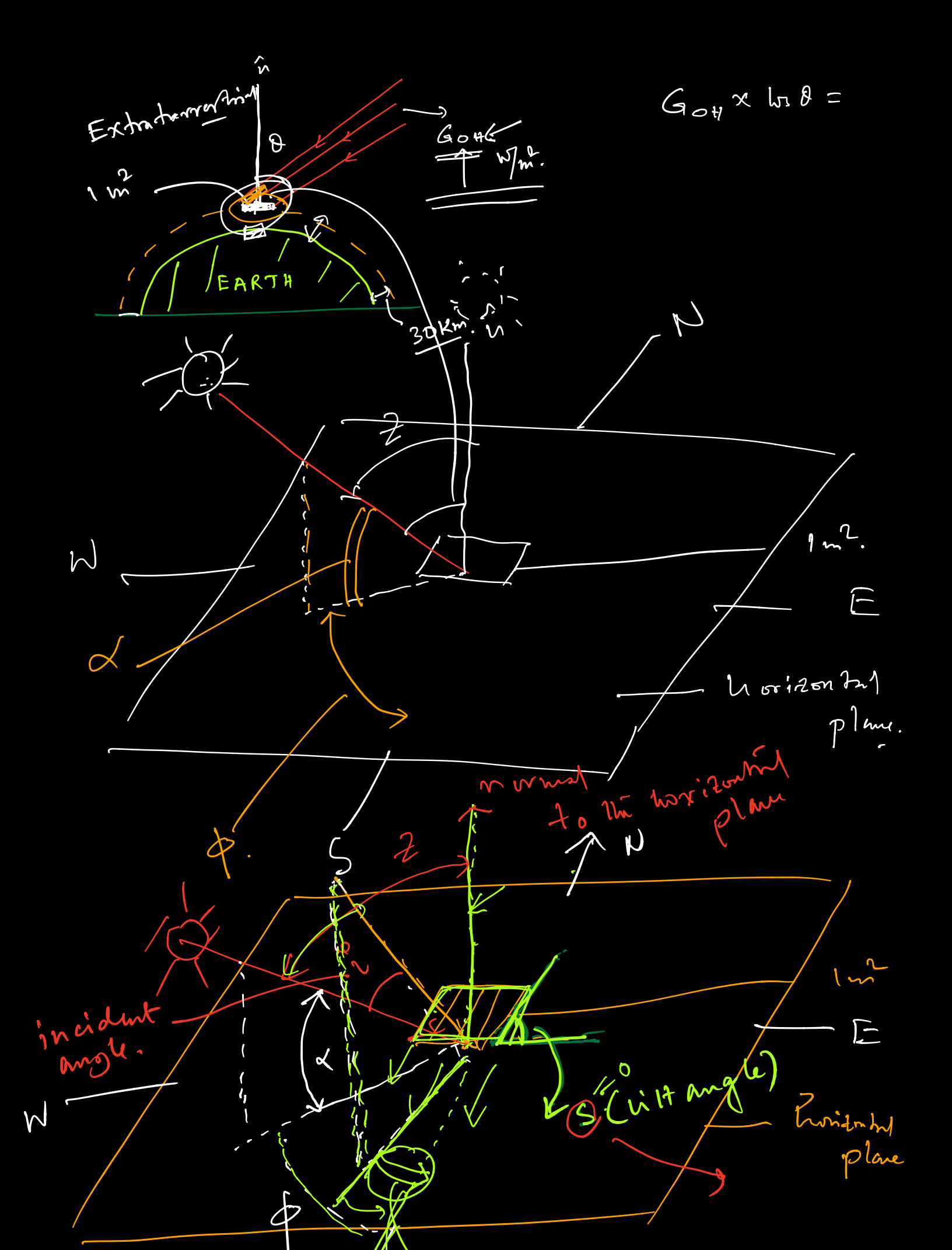
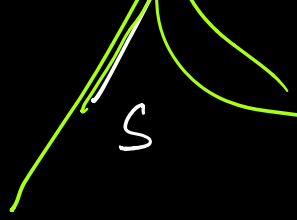

Extraterrestrial
$\hat{n}$
θ
$1\,m^2$
G_{0H}
W/m^2.
$G_{0H} \times \cos\theta =$
EARTH
30Km.
N
Z
W
$1\,m^2$.
E
α
Horizontal plane.
ϕ.
S
Z
normal to the horizontal plane
N
incident angle.
α
W
$1\,m^2$
E
θ (tilt angle)
Horizontal plane
ϕ



ψ – Surface azimuth angle.

$$\cos i = \sin L \sin\delta \cos s - \cos L \sin\delta \sin s \cos\psi + \cos L \cos\delta \cos h \cos s + \sin L \cos\delta \cos h \sin s \cos\psi + \cos\delta \sin h \sin s \sin\psi \quad \text{— (X)}$$

→ For horizontal surface.

$s = 0$, $i = z$.

$$\cos z = \sin L \sin\delta + \cos L \cos\delta \cos h$$

→ When the plate is at vertical position, $s = 90°$,

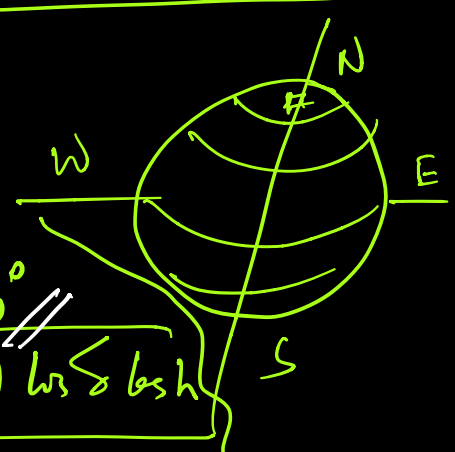
$$\cos i = -\cos L \sin\delta \cos\psi + \sin L \cos\delta \cos h \cos\psi + \cos\delta \sin h \sin\psi$$

→ South Facing at Northern Hemisphere.

$\psi = 0$

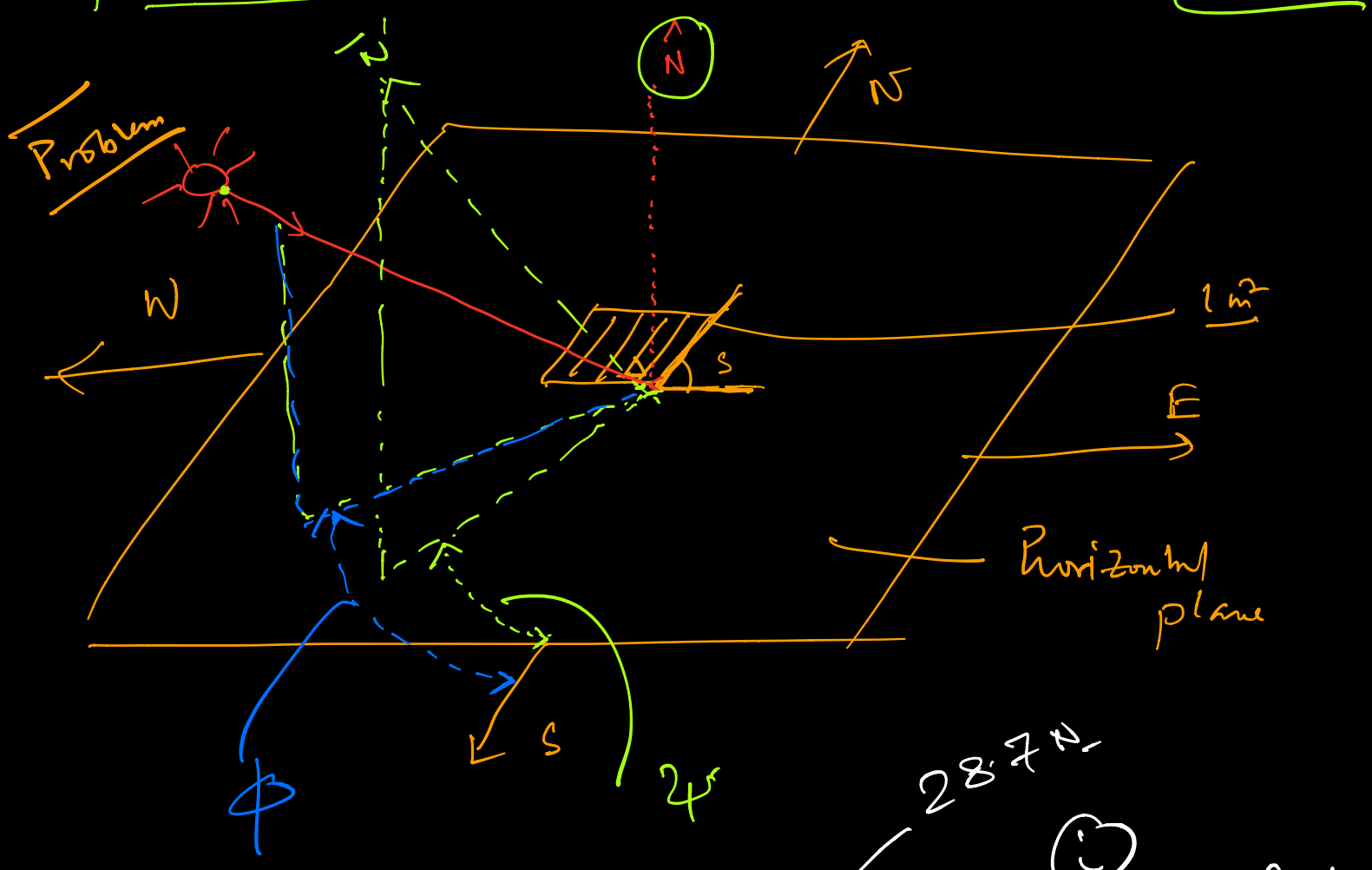
$$\cos i = \sin(L-s)\sin\delta + \cos(L-s)\cos\delta \cos h$$

→ Similarly for a North facing in the Southern hemisphere,



$\psi = 180°$

$$\cos i = \sin(L+s)\sin\delta + \cos(L+s)\cos\delta \cos h$$



→ Calculate the angle of incidence on a surface located at New Delhi (L) at 1:30 pm solar time on 16 Feb 1995. if the surface is tilted 45° from the horizontal and pointed 30° West of South.

$n = 47.$

$\delta = ? \; -13^\circ$

$h = 22.5^\circ$

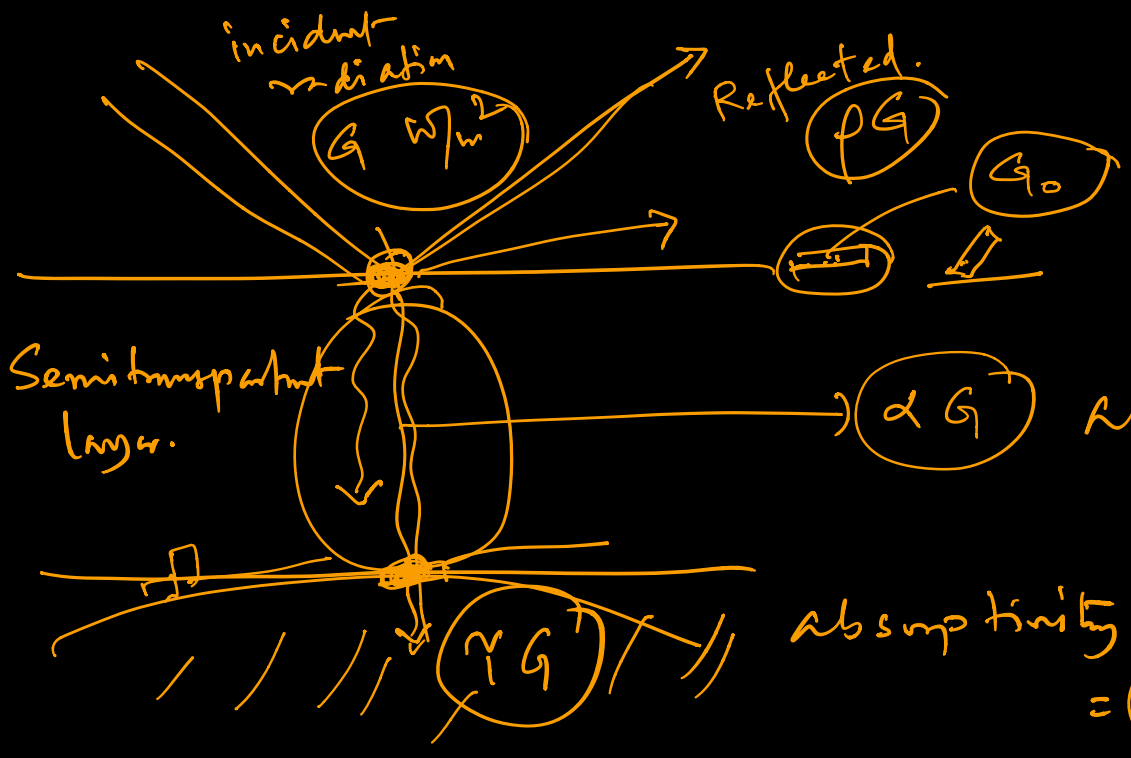
$z_s = +30^\circ$

$L = 28.7\,N^\circ$

$$\cos i = \sin^{-1}(0.999) = 2.56^\circ$$

$$i = 2.03^\circ$$

Alternative



Absorptivity $\alpha = \frac{G_{abs}}{G}$

Reflectivity $\rho = \frac{G_{ref.}}{G}$

Transmissivity $\tau = \frac{G_{trans}}{G}$

$G_{abs} + G_{ref} + G_{trans} = G$

dividing by G.

$$\alpha + \rho + \tau = 1 \quad \text{—(1)}$$

→ Extra terrestrial Solar Radiation

- Horizontal Surface
- tilted Surface

→ Terrestrial Solar Radiation.

- H
- T.