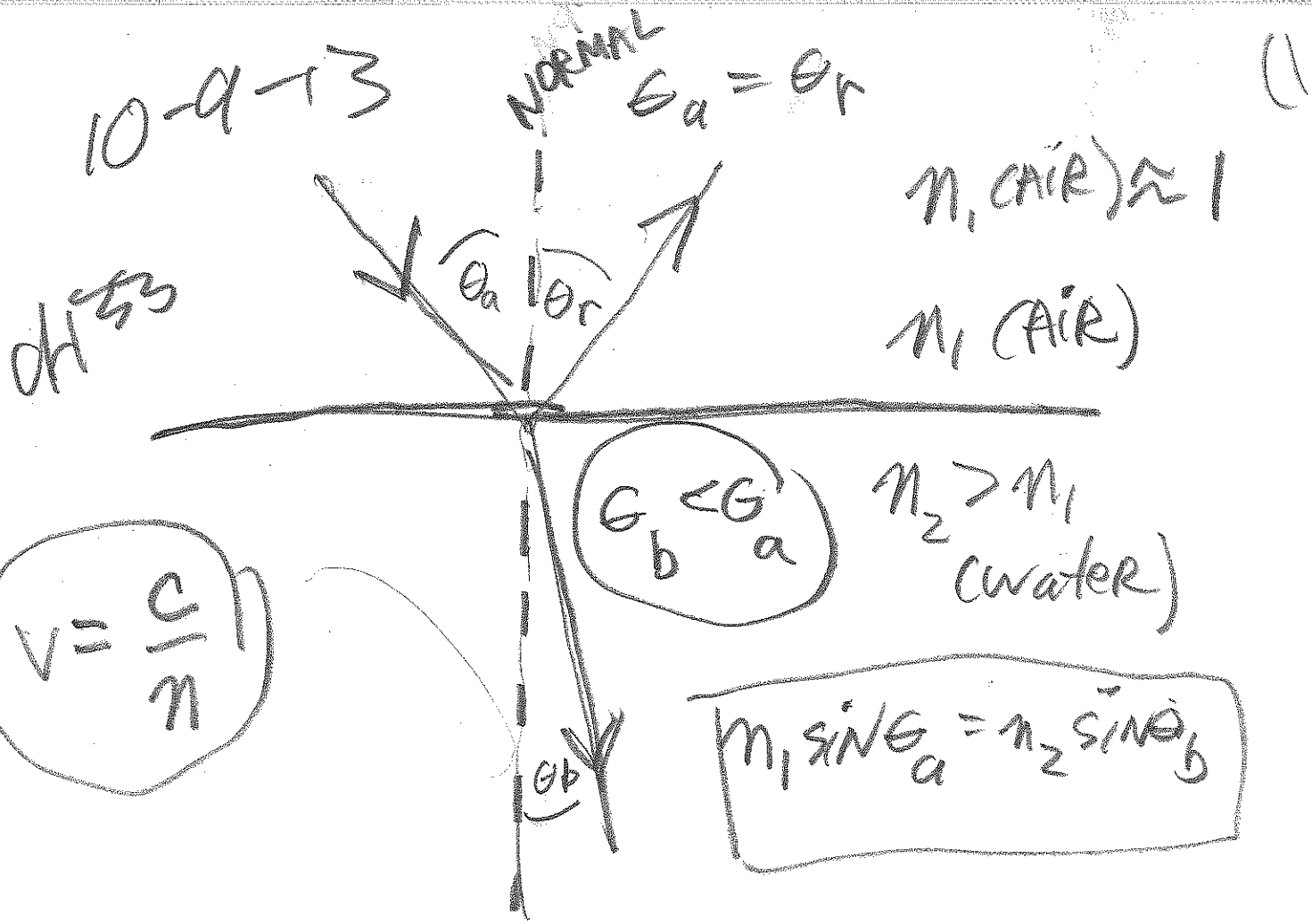
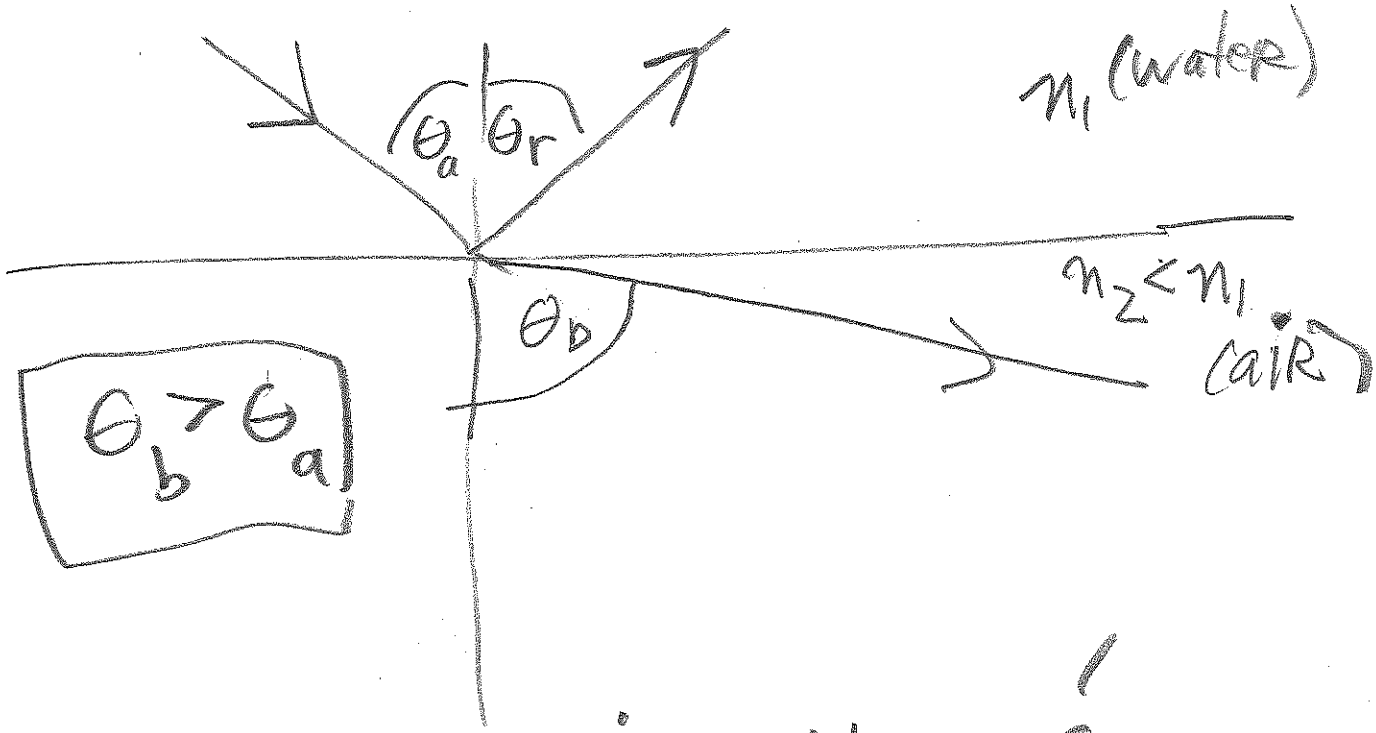
10-9-13

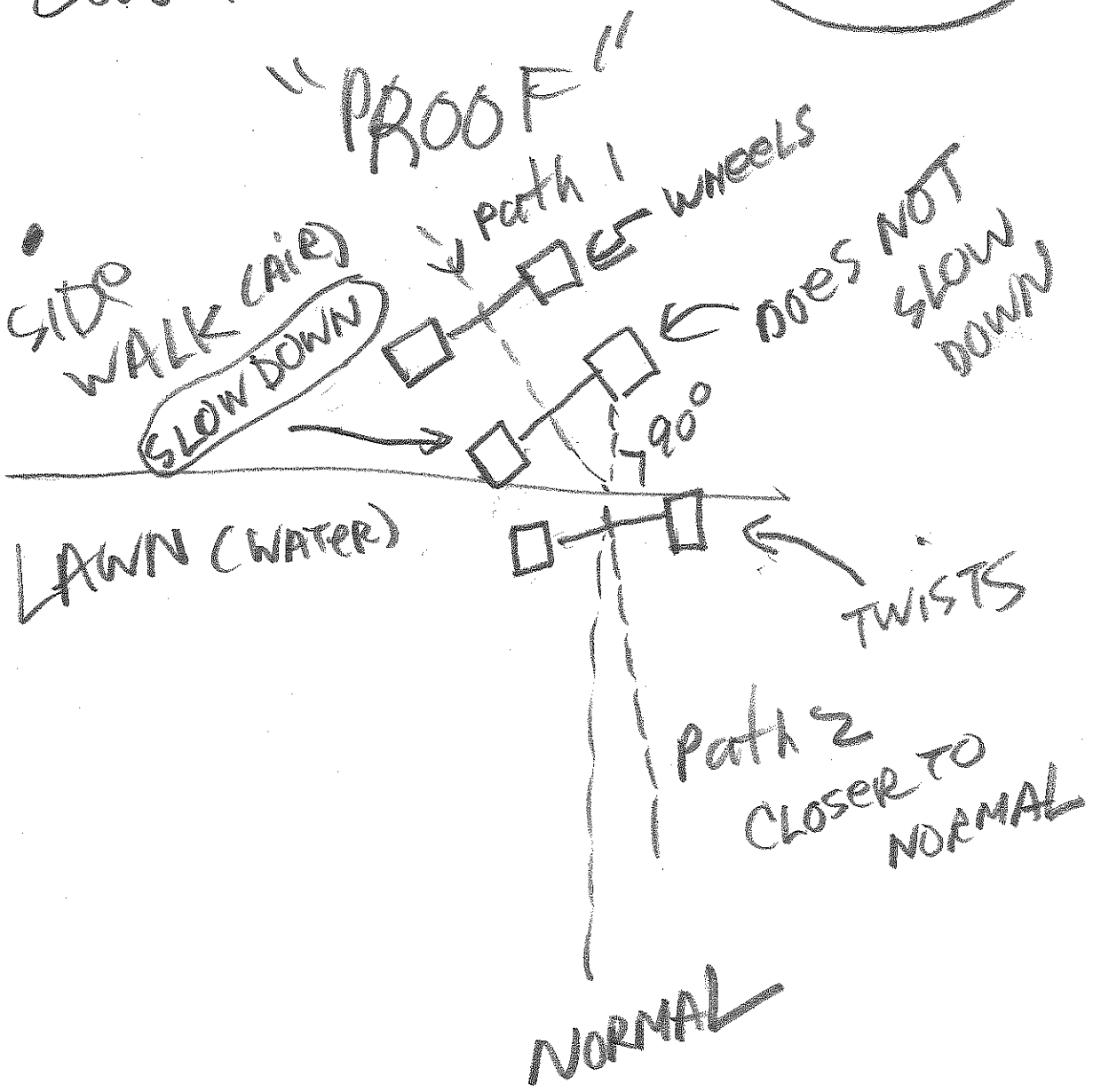




PROOF using Huygens principle LATER.

Lawn Mower "Proof"

$v = \frac{c}{n}$



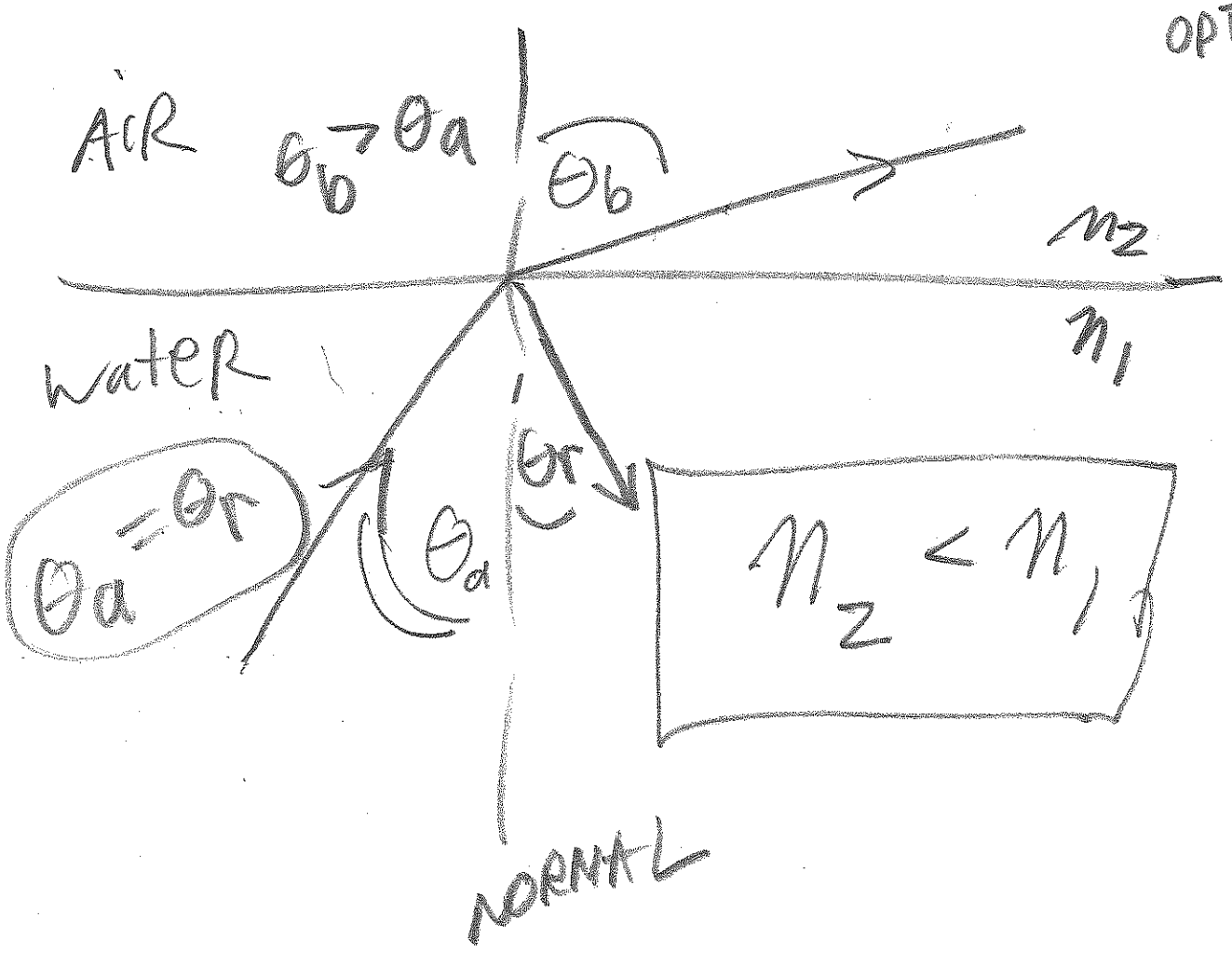
Note:

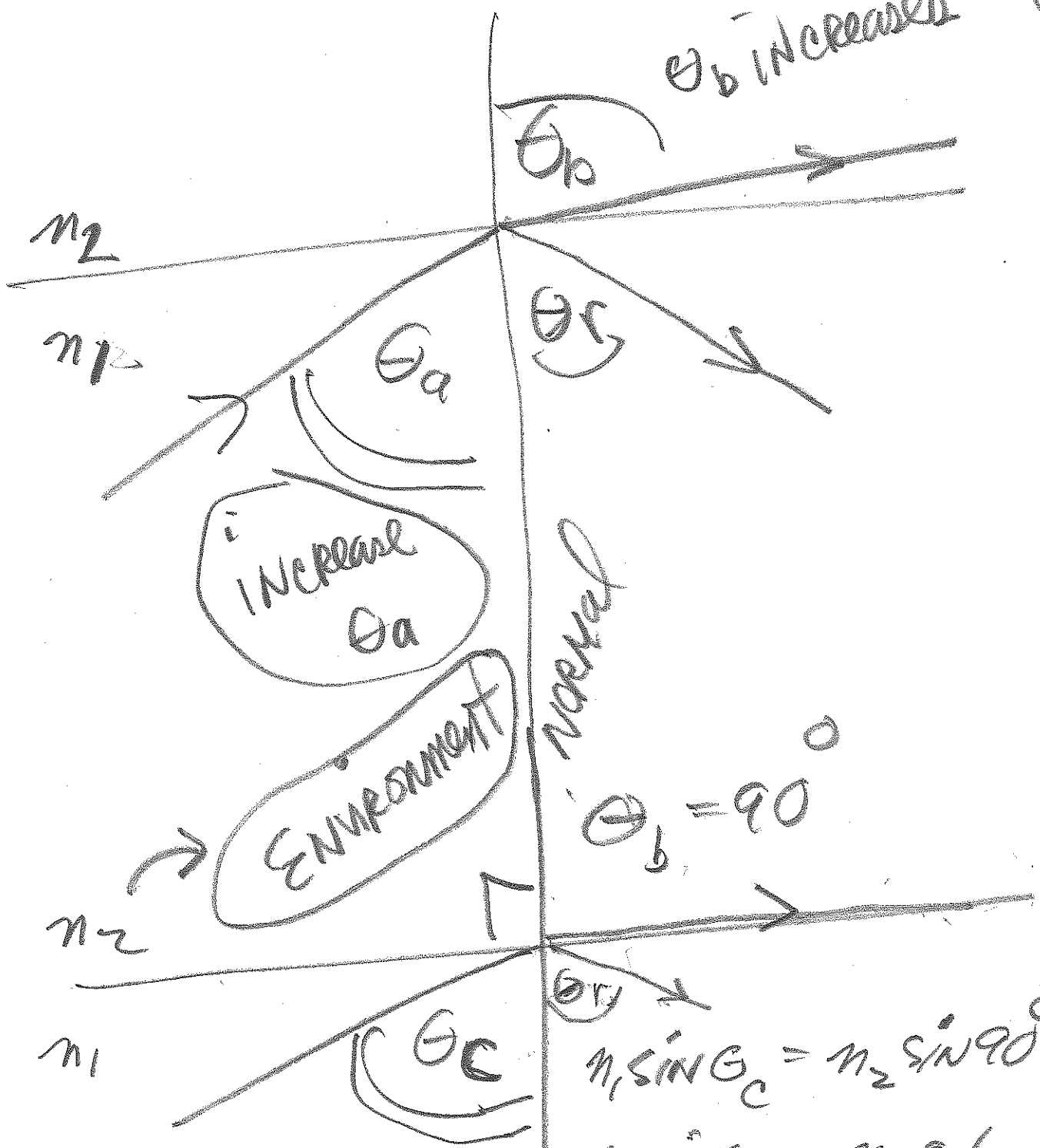
$$v = \frac{c}{n}$$ inside a medium

$v \leq c$ since $n \geq 1$

$n_{(AIR)} \approx 1$; $n_{silicon} \approx 12$; $n_{glass} \approx 1.53$

total internal reflection (fiber optics)





$\theta_a > \theta_c$

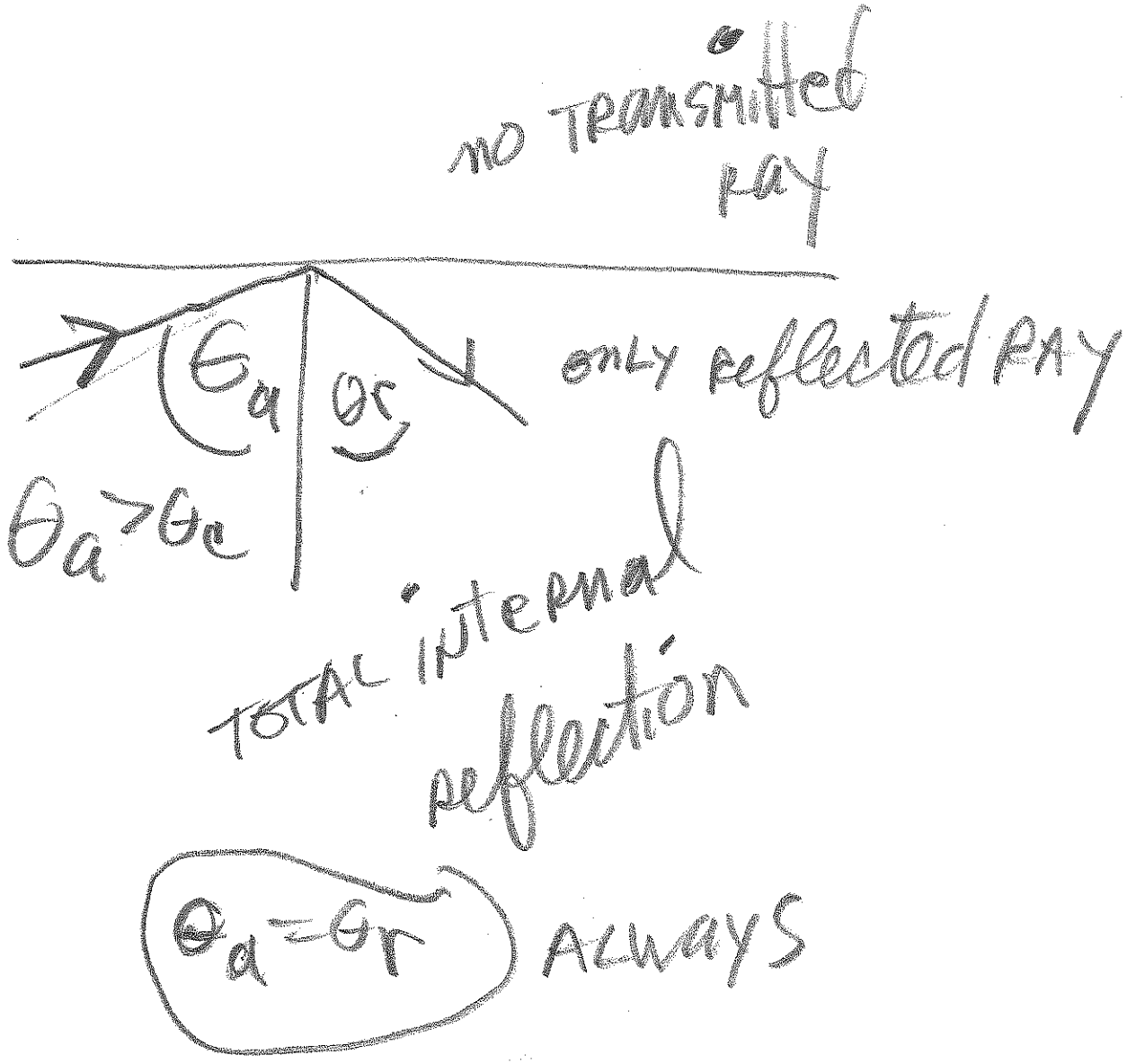
TOTAL INTERNAL REFLECTION

$n_1 \sin\theta_c = n_2 \sin 90^\circ$

$n_1 \sin\theta_c = n_2 \cdot 1$

$\sin\theta_c = \frac{n_1}{n_2} < 1$

θ_c depends n_1 (MAIN MATERIAL) and n_2 (ENVIRONMENT)

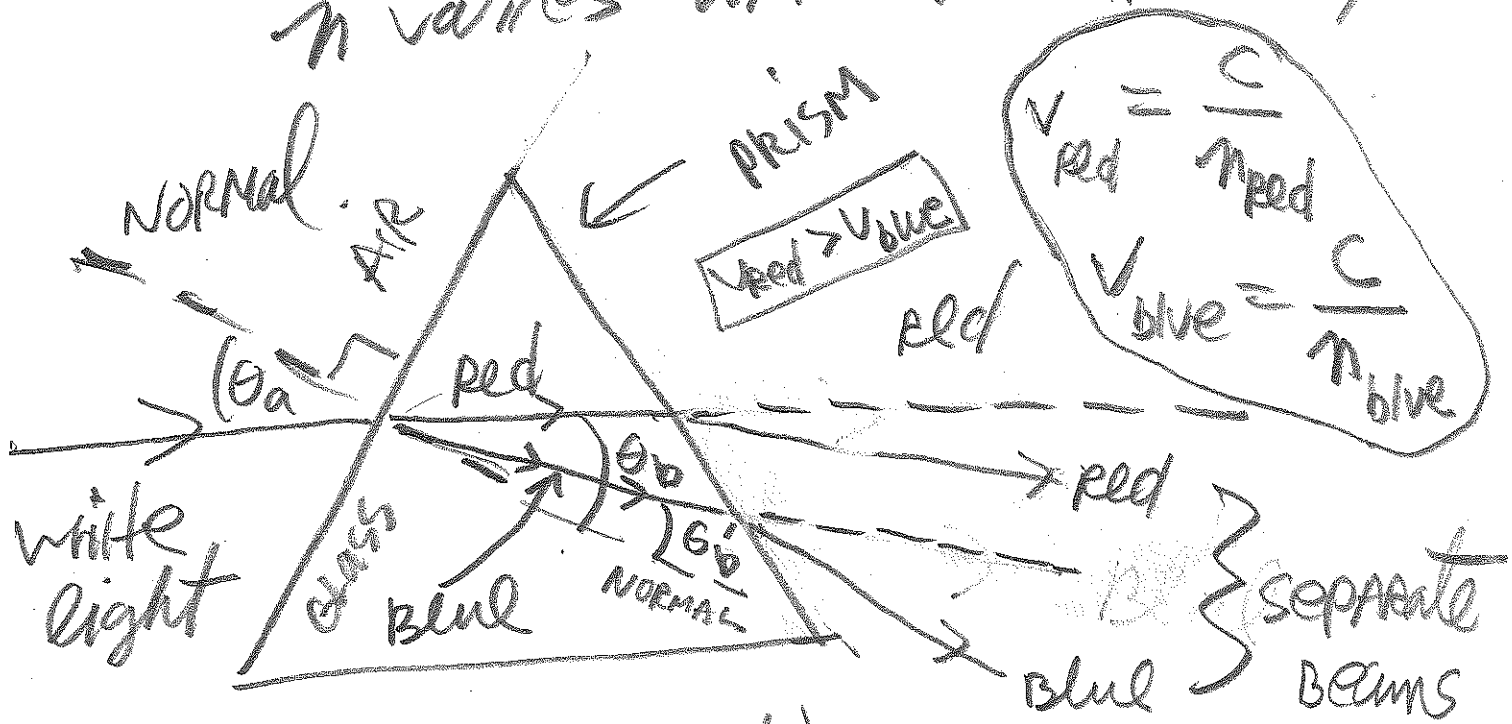

no transmitted ray
θ_a θ_c
only reflected ray
$\theta_a > \theta_c$
TOTAL internal reflection
$\theta_a = \theta_r$ always

Applications of TOTAL INTERNAL REFLECTION

fiber optics fig 33.5

Dispersion:

n varies with f = frequency.

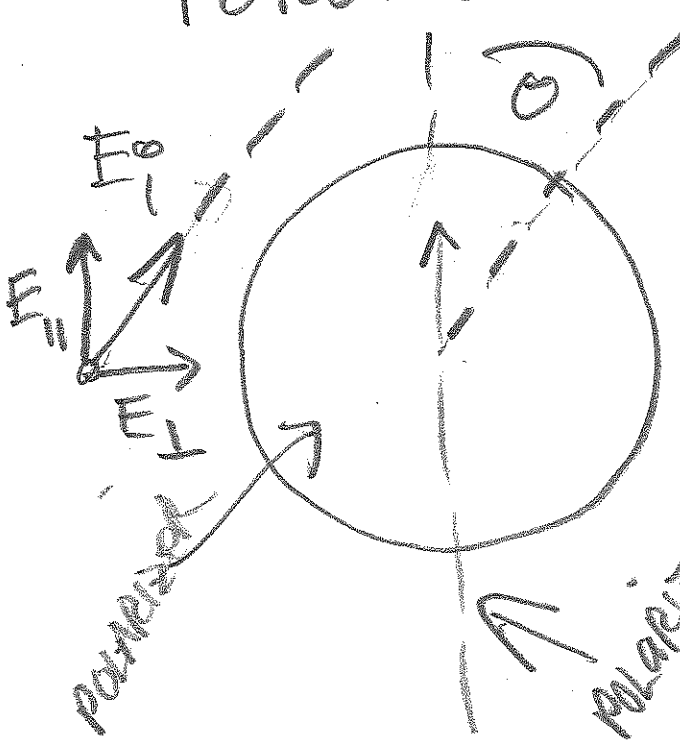


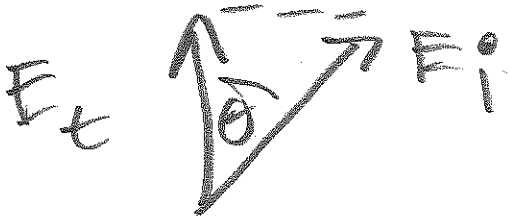
see fig 33.19 θ_b (red)

θ_b' (blue) $\theta_b > \theta_b'$

$$n_{red} > n_{blue}$$

Polarization: sec 33-5





Power and Intensity I_0

since $I \propto E^2 \leftrightarrow I_i \propto E_i^2$, $I_t \propto E_t^2$

THUS $I_t = I_i \cos^2\theta$ $\left(\frac{J}{m^2 \cdot s}\right)$

Proof:

$$I_i \propto E_i^2$$

$$I_t \propto E_t^2 = E_i^2 \cdot \cos^2\theta$$

$$\frac{I_i}{I_t} = \frac{E_i^2}{E_i^2 \cdot \cos^2\theta}$$

$$\rightarrow I_t = I_i \cdot \cos^2\theta$$

test 2 = Oct 30 (WED) (9

CH 16, 17, 32, 33 (E.C.)

2 sheets
(a side!)
of notes.

0.25 degree = 0.25 $\left(\frac{\pi}{180}\right)$ RAD

L.C. = 0.25 degree = CONVERT TO RADIANS

(10)

DATA SHEET

	$\Delta\theta_{inst}$ = LC/2 [redacted] LC/2	
θ_i	✓	
	✓	
	✓	
	✓	
	Average θ_i = ✓	
	$\Delta\theta_{inst}$ = [illegible]	
	$(\theta_{max} - \theta_{min})/4$ = ✓	
	$\Delta\theta$ = (the larger of the previous two.) ✓	
θ_f	✓	
	✓	
	✓	
	✓	
	Average θ_f = ✓	
	$\Delta\theta_{inst}$ = [illegible]	
	$(\theta_{max} - \theta_{min})/4$ =	
	$\Delta\theta$ = (the larger of the previous two.)	
n_w	$n_{best} = n_{AV}$ = AVERAGE OF 4	
	Overall error in n_{best} = [illegible]	
	Compare $\lvert n_{best} - n_w \rvert$ with the overall error, which gives the range, as discussed in class. Does the accepted value fall within the range centered at the average value?	

$\frac{LC}{2} = 0.125 = 0.1$

$36.0 = 36.0 \pm 0.1$

$36.25 = 36.3 \pm 0.1$

36 — 36.25 = 36.3

(B.) FIND ERROR

$= \frac{n_{WMAX} - n_{WMIN}}{2}$

(C.) CHECK

n_w calculated from AVERAGE

$n_{MIN} < n_{acc} < n_{MAX}$

$n_{MAX} = n_{AV} + ERROR$

$n_{MIN} = n_{AV} - ERROR$

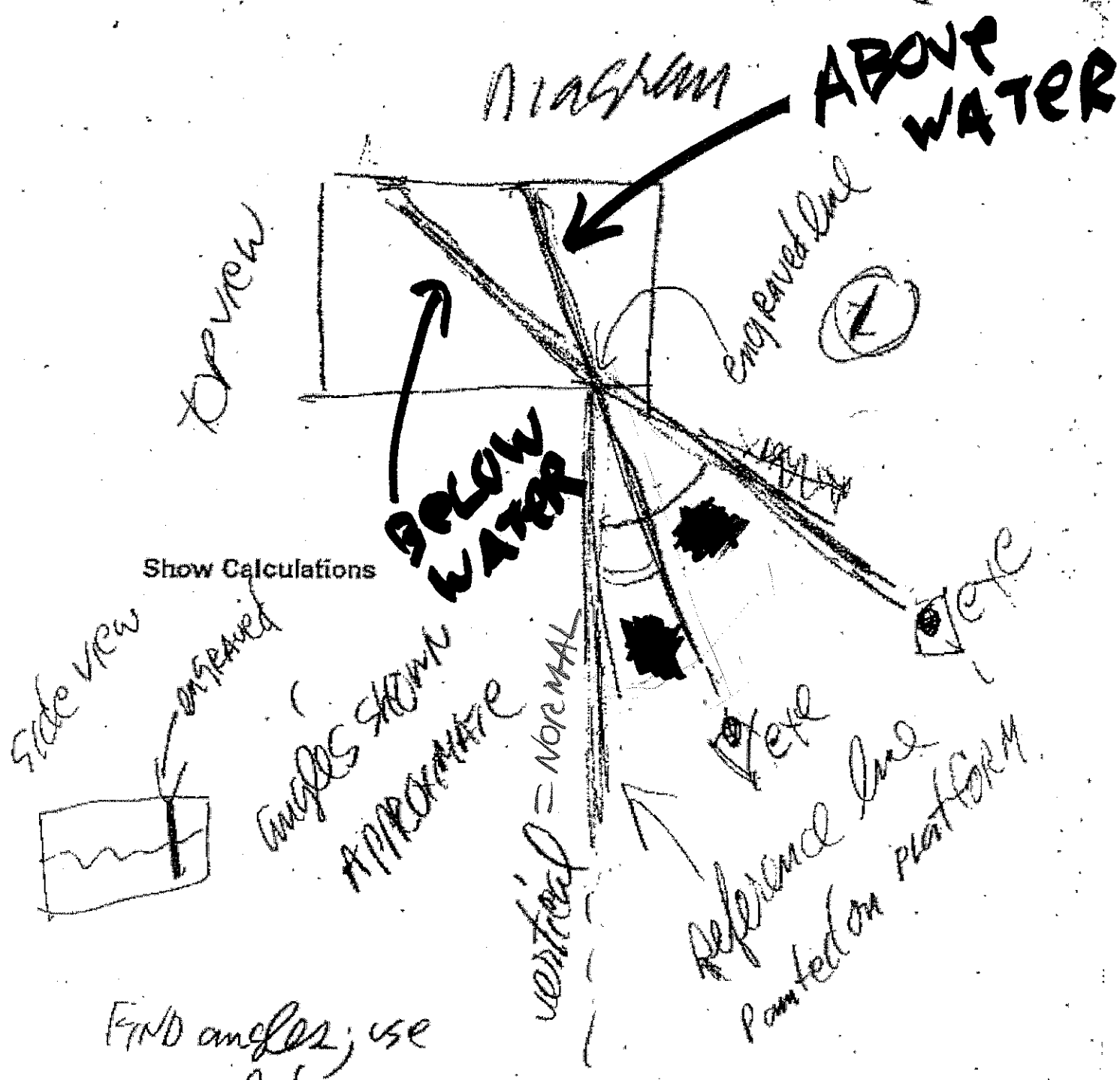
(A) FIND

$P.E. = \left|\frac{n_w - n_{acc}}{n_{acc}}\right| \times 100\%$

[redacted]

Physics 4C Data Sheet

Draw diagram



Show Calculations

FIND angles; use smaller CAN TO