

1.15

$$d = 90 \text{ km} = 9 \cdot 10^4 \text{ m}, \quad v = 3 \cdot 10^8$$

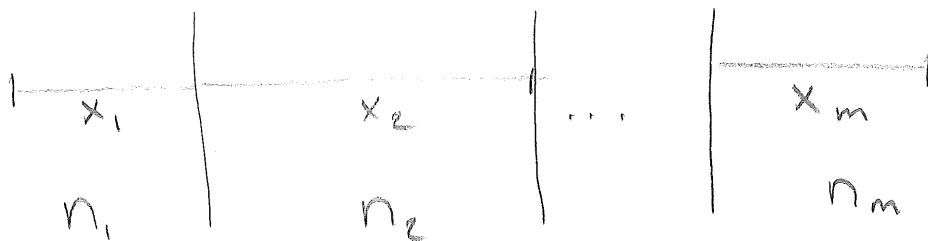
$$a) \quad t = \frac{d}{v} = \frac{9 \cdot 10^4}{3 \cdot 10^8} = \boxed{3 \cdot 10^{-4} \text{ s}}$$

$$b) \quad v = 340 \text{ m/s}$$

$$s = 340 \cdot 3 \cdot 10^{-4} = 3 \cdot 10^2 \cdot 3 \cdot 10^{-4} \approx \boxed{0,1 \text{ m}}$$

## CHAPTER 2

2.1



$$i \ n_i: \quad x_i = v_i \cdot t_i, \quad n_i = \frac{c}{v_i} \Leftrightarrow v_i = \frac{c}{n_i}$$

$$t_m = \frac{x_m n_m}{c}$$

$$T = \sum_{i=1}^m \frac{x_i n_i}{c}$$

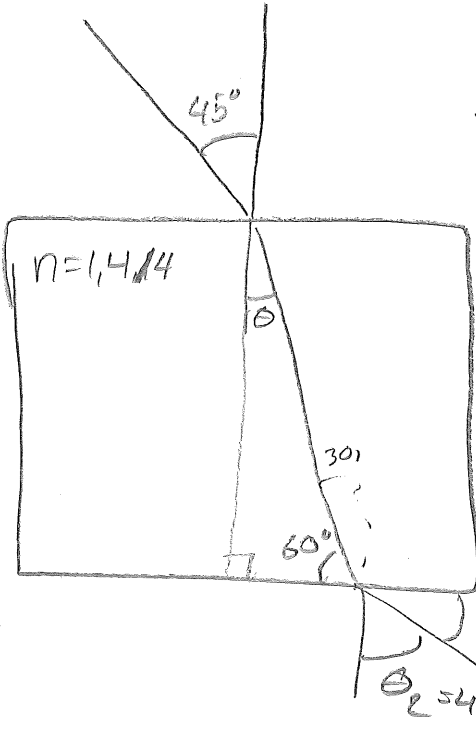
2.1

$$t = \frac{x_i \cdot n_i}{c}$$

$$s = t \cdot v$$

$$\sum \frac{x_i \cdot n_i}{c} = \frac{1}{c} \sum x_i \cdot n_i$$

2.5



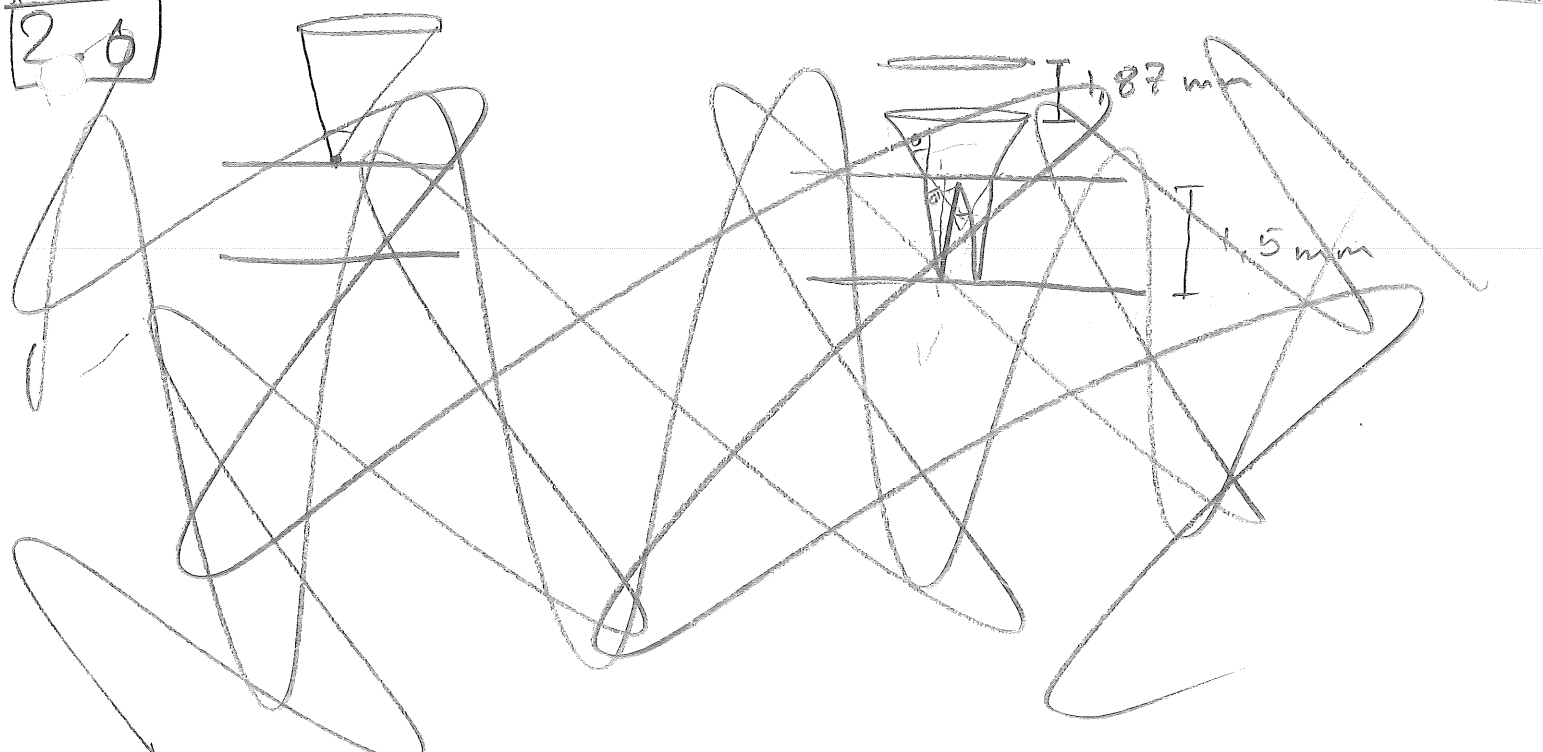
$$\frac{1}{\sqrt{2}} = 1,414 \cdot \sin \theta$$

$$\theta = 30^\circ$$

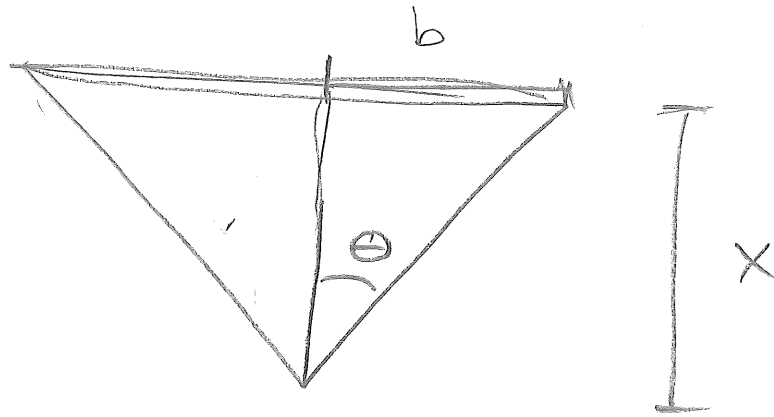
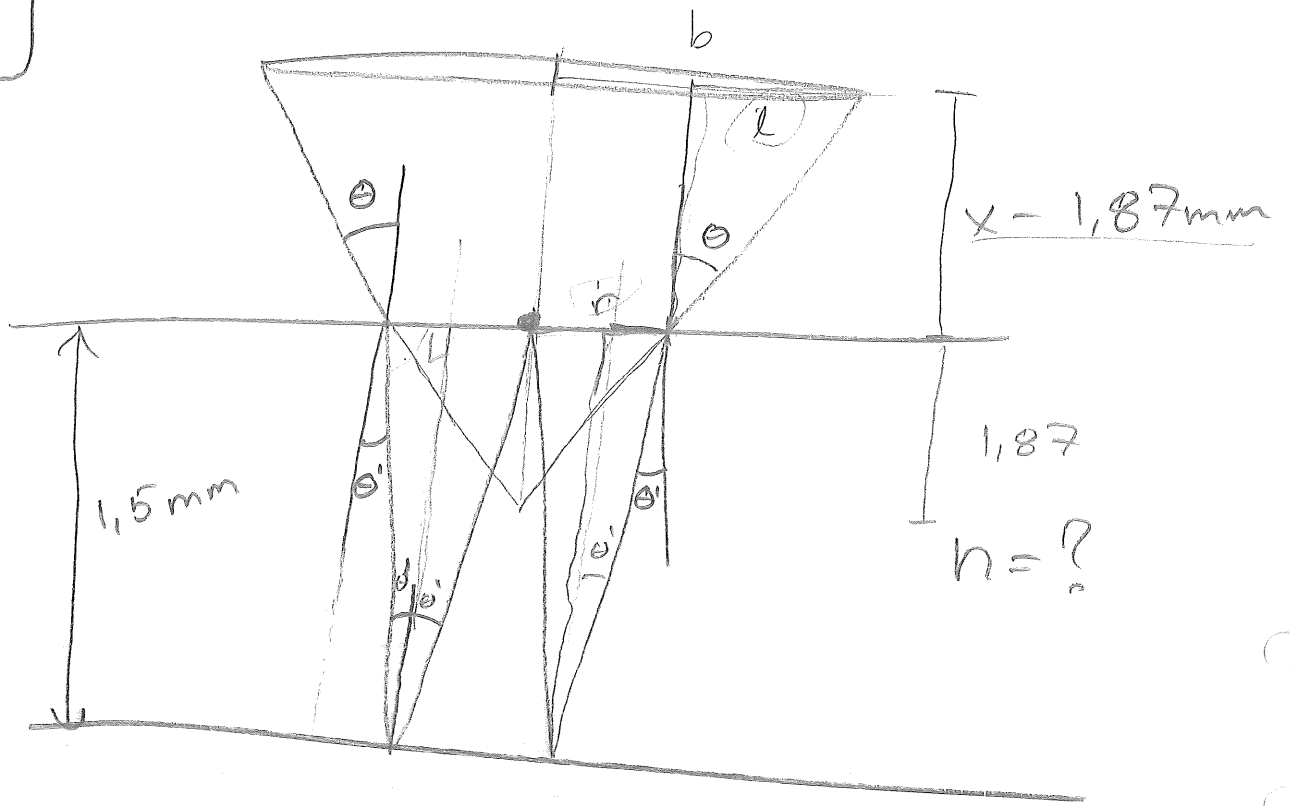
$$1,414 \sin 30^\circ = \sin \theta_2$$

$$\theta_2 = 45^\circ$$

2.6



2.6



$$\tan \theta = \frac{b}{x}$$

$$\sin \theta = n \cdot \sin \theta'$$

$$l + r = b$$

$$l = (x - 1,87) \cdot \tan \theta$$

$$r = 2 \cdot 1,5 \cdot \tan \theta'$$

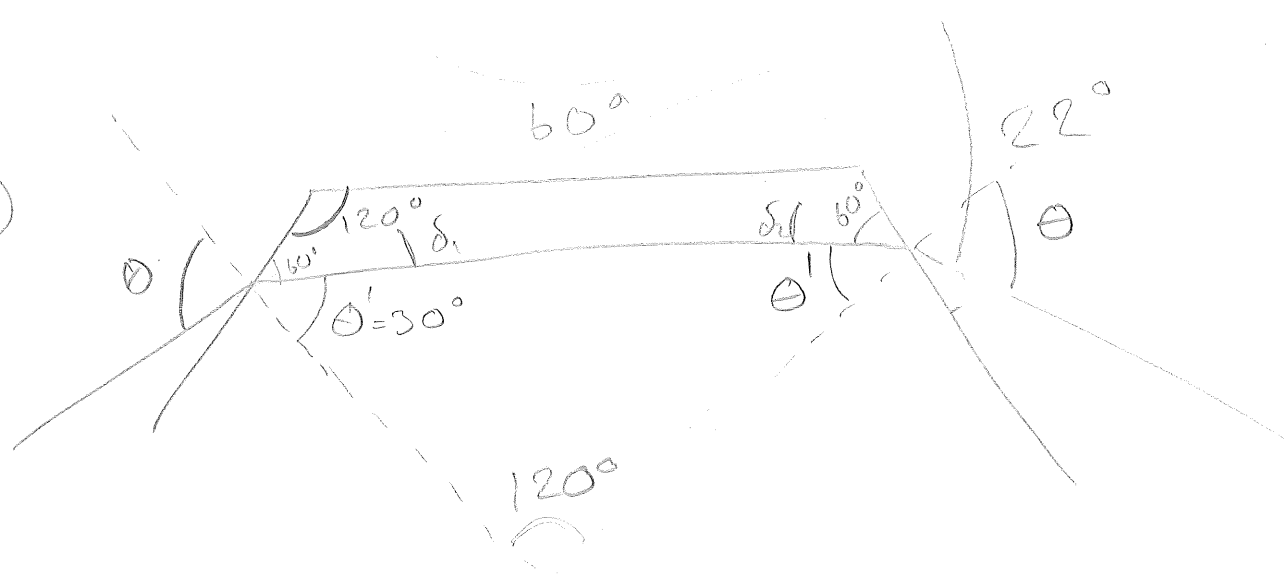
$$\tan \theta = \frac{r}{1,87}$$

FÖRSÖK 2



2.7

a)



$$\sin \theta = n \sin 30^\circ$$

$$\delta_1 + \delta_2 = 22^\circ = 2\delta_1 \Rightarrow \delta_1 = 11^\circ$$

$$\theta = \delta_1 + \theta' = 11^\circ + 30^\circ = 41^\circ$$

$$n = \frac{\sin 41^\circ}{\sin 30^\circ} = 1,31$$

$$\delta = \delta_1 + \delta_2$$

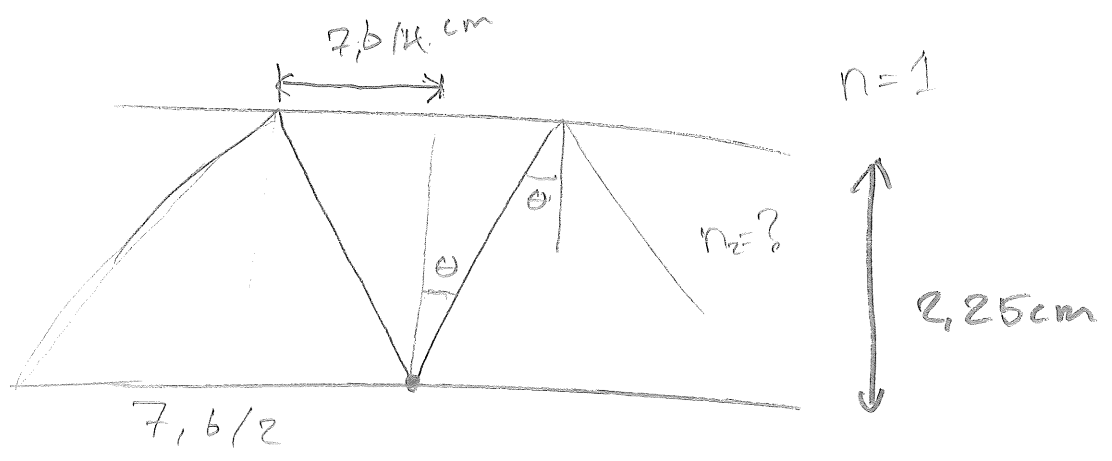
$$\theta_1' + \theta_2' = \nu$$

b)



Härledning ger  $46^\circ$

2.7

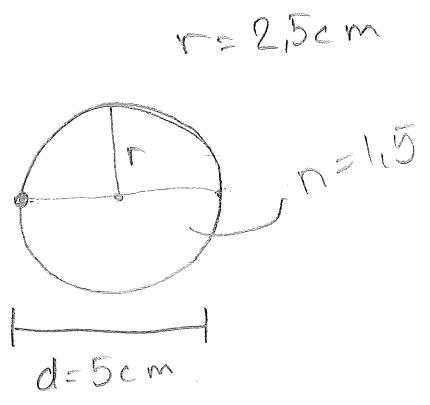


$$n_2 \sin \theta = 1 \cdot \sin 90^\circ \Rightarrow \boxed{n_2 \cdot \sin \theta = 1}$$

$$\tan \theta = \frac{7.6/2}{2.25} = 2 \Rightarrow \theta = 63.4^\circ$$

$$n_2 = \frac{1}{\sin \theta} = \boxed{1.54}$$

2.12



$$\frac{n_1}{s} + \frac{n_2}{s'} = \frac{n_2 - n_1}{R}$$

- $s = 5 \text{ cm}$
- $n_1 = 1.5$
- $n_2 = 1.0$
- $R = 2.5 \text{ cm}$

$$\boxed{s' = -10 \text{ cm}}$$

Virtuellt bild  
10 cm bakom  
ytan.

$$m = \frac{n_1 s'}{n_2 s} = \boxed{3 \text{ magnification}}$$

