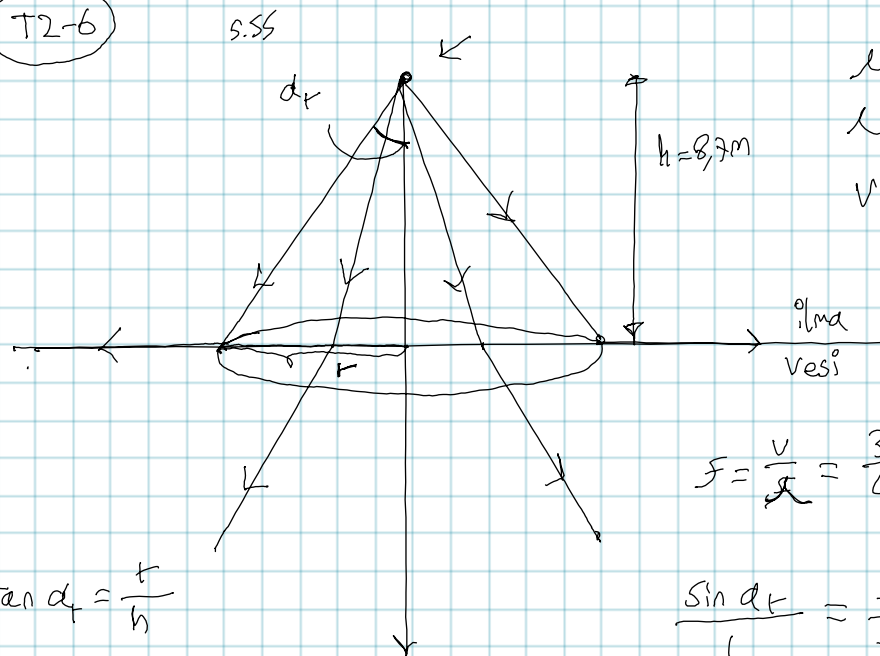


72-6



$$l_{\text{ilma}} = 0,78 \text{ m}$$

$$l_{\text{vesi}} = 3,4 \text{ m}$$

$$v_{\text{ilma}} = 343 \text{ m/s}$$

$$f = \frac{v}{\lambda} = \frac{343 \text{ m/s}}{0,78 \text{ m}} \approx 440 \text{ Hz}$$

$$\frac{\sin \alpha_r}{1} = \frac{l_1}{l_2} = \frac{0,78 \text{ m}}{3,4 \text{ m}}$$

$$\alpha_r \approx 13,26^\circ$$

$$\tan \alpha_r = \frac{r}{h}$$

$$r = h \cdot \tan \alpha_r$$

$$\begin{aligned} A &= \pi \cdot r^2 = \pi \cdot (h \cdot \tan \alpha_r)^2 \\ &= \pi \cdot (8,7 \text{ m} \cdot \tan 13,26^\circ)^2 \\ &\approx \underline{\underline{13 \text{ m}^2}} \end{aligned}$$

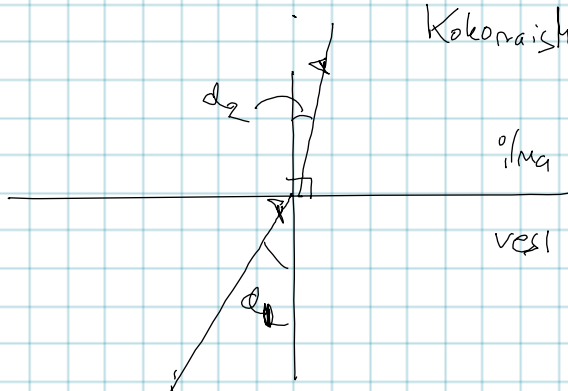
72-7

a)

$f = 45 \text{ Hz}$ Taajuus ei muutu!

$v = f \cdot \lambda$ λ pienenee!

b)



Kokonaishetjastminen ei ole mahdollinen!

$$\frac{\sin \alpha_1}{\sin \alpha_2} = \frac{v_{\text{vesi}}}{v_{\text{ilma}}}$$

$$\sin \alpha_1 = \frac{1480 \text{ m/s}}{340 \text{ m/s}} > 1$$

$$-1 \leq \sin \alpha_1 \leq 1$$

Vastaus: $0 \leq \alpha_1 < 90^\circ$