(21). I_0 = seuil d'audibilité $= 1.10^{-12}$ W/m²

I : intensité du son recherchée

$$\beta = 10\log_{10}\left(\frac{I}{1.10^{-12}}\right) = 138 \Rightarrow \log_{10}\left(\frac{I}{1.10^{-12}}\right) = 13,8 \Rightarrow \frac{I}{1.10^{-12}} = 10^{13,8}$$

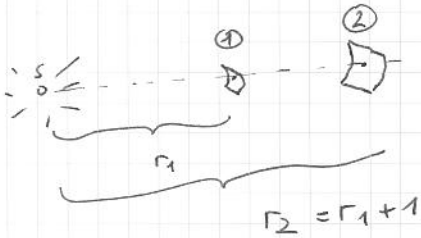
$$\Rightarrow I = 1.10^{-12}.\ 10^{13,8} \simeq \underline{63\ W/m^2}$$

(23). Soit I_{120} et I_{67} les intensités données (W/m²)

de $\beta = 10\log_{10}\left(\frac{I}{I_0}\right) \Rightarrow I = I_0 \cdot 10^{\beta/10}$

$$\Rightarrow \frac{I_{120}}{I_{67}} = \frac{I_0.10^{12}}{I_0.10^{6,7}} = 10^{12-6,7} = 10^{5,3} \simeq \underline{2.10^5}$$

(27).



• Soit I_s, l'intensité de la source en W.

• $I_1 = \frac{I_s}{4\pi r_1^2}$; $\beta_1 = 10\log_{10}\left(\frac{I_1}{I_0}\right)$

• $I_2 = \frac{I_s}{4\pi r_2^2}$; $\beta_2 = 10\log_{10}\left(\frac{I_2}{I_0}\right)$

$\beta_1 > \beta_2$

$\beta_1 = \beta_2 + 2$

$$\Rightarrow 10\log_{10}\left(\frac{I_1}{I_0}\right) = 10\log_{10}\left(\frac{I_2}{I_0}\right) + 2 \Rightarrow 10\left(\log_{10}\left(\frac{I_1}{I_0}\right) - \log_{10}\left(\frac{I_2}{I_0}\right)\right) = 2$$

$$\Rightarrow 10\log_{10}\left(\frac{I_1}{I_0}\cdot\frac{I_0}{I_2}\right) = 2 \Rightarrow \log_{10}\left(\frac{I_1}{I_2}\right) = 0,2$$

$$\Rightarrow \log_{10}\left(\frac{I_s}{4\pi r_1^2}\cdot\frac{4\pi r_2^2}{I_s}\right) = 0,2 \Rightarrow \log_{10}\left(\frac{r_2^2}{r_1^2}\right) = 0,2 \Rightarrow \frac{r_2^2}{r_1^2} = 10^{0,2}$$

$$\Rightarrow \frac{(r_1+1)^2}{r_1^2} = 10^{0,2} \Rightarrow \frac{r_1+1}{r_1} = \left(10^{0,2}\right)^{1/2} = 10^{0,1}$$

$$\Rightarrow r_1 + 1 = r_1.10^{0,1} \Rightarrow r_1\left(1-10^{0,1}\right) = -1 \Rightarrow r_1 = \frac{-1}{1-10^{0,1}} \simeq \underline{3,86\ m}$$

$$\Rightarrow r_2 = \underline{4,86\ m}$$

(28).

$$\beta_1 = 10\log_{10}\left(\frac{I}{I_0}\right) = 65 \Rightarrow \log_{10}\left(\frac{I}{I_0}\right) = 6,5 \Rightarrow I = I_0.10^{6,5}$$

$$\beta_n = 10\log_{10}\left(\frac{nI}{I_0}\right) = 78$$

$$\Rightarrow \beta_n = 10\log_{10}\left(\frac{n I_0.10^{6,5}}{I_0}\right) = 78 \Rightarrow \log_{10}\left(n.10^{6,5}\right) = 7,8$$

$$\Rightarrow n.10^{6,5} = 10^{7,8} \Rightarrow n = \frac{10^{7,8}}{10^{6,5}} = 10^{1,3} \simeq \underline{20 \text{ personnes}}$$