

Assignment

1. Task A $A = 60 \times 24 = 1440 \text{ m}^2$
 $ht = 8\text{m} - 1 = 7\text{Lm} (H_m)$

$$RI = \frac{L \times W}{H_m(L+W)} = \frac{60 \times 24}{7(60+24)} = \underline{2.45}$$

2. $UF = 0.46$

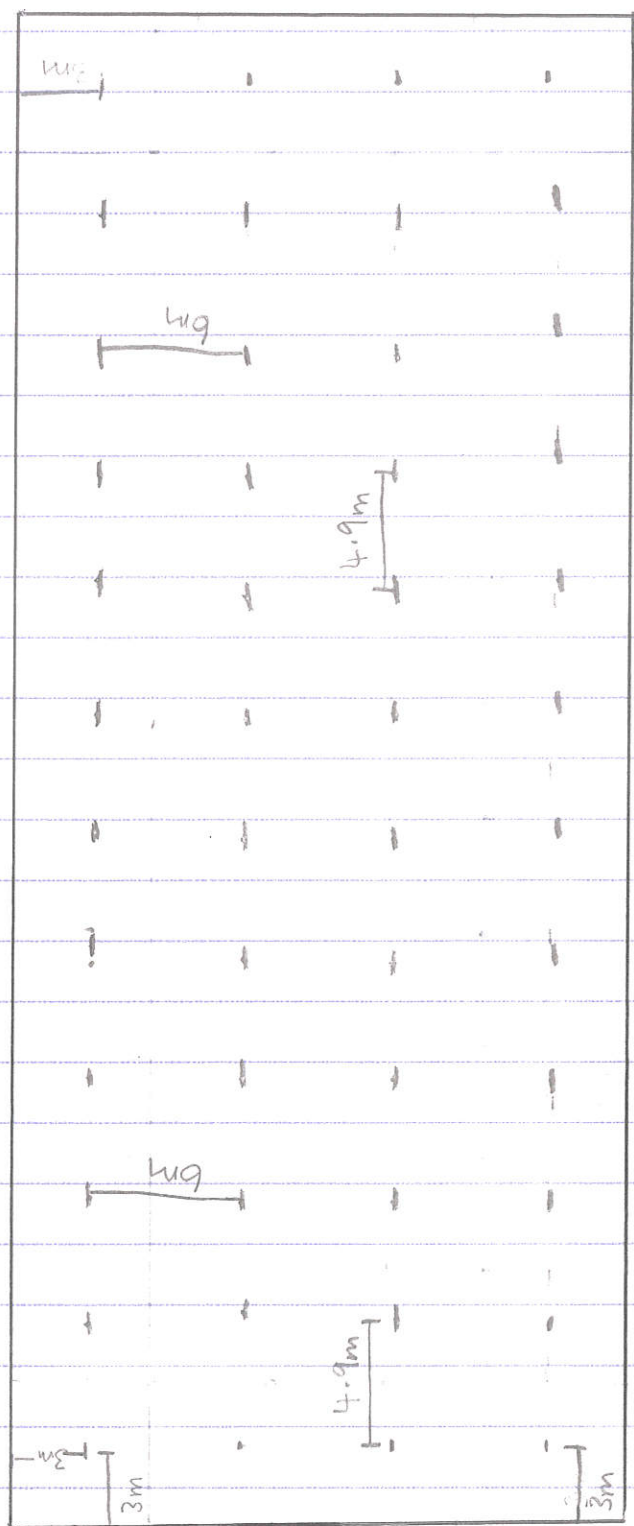
This number is derived from the utilisation factor table. The reflectance of the bulb is 50%. Therefore we look at that row. The reflectance of the ceiling is 0.5, and the reflectance of the walls is 0.5. By lining these columns up, it gives us a value of 0.46 for the utilisation factor.

3. $N = \frac{E \times A}{F \times UF \times LLF}$ $E = 200$ $A = 1440$
 $F = 18,000$ $UF = 0.46$ $LLF = 0.75$

$$N = \frac{200 \times 1440}{18,000 \times 0.46 \times 0.75} = 46.38 = \underline{48 \text{ lamps}}$$

$$S_{\max} = 1 \times H_m = 7\text{Lm}$$

$$1.5 \times H_m = 10.5\text{m}$$



Materials + Building Serv - A
Task B

②

Brick wall - 18m^2 - 50 dB

Window - 2m^2 - 10 dB

$$SRI = 10 \times \left(\log_{10} \left(\frac{1}{T} \right) \right)$$

Brick

$$SRI = 10 \times \left(\log_{10} \left(\frac{1}{10} \right) \right)$$

$$50 = 10 \times \left(\log_{10} \left(\frac{1}{10} \right) \right)$$

$$5 = \log_{10} \left(\frac{1}{T} \right)$$

$$\frac{1}{T} = 10^5$$

$$T = \frac{1}{10^5}$$

$$T = 1 \times 10^{-5}$$

Window

$$SRI = 10 \times \left(\log_{10} \left(\frac{1}{T} \right) \right)$$

$$10 = 10 \times \left(\log_{10} \left(\frac{1}{T} \right) \right)$$

$$1 = \log_{10} \left(\frac{1}{T} \right)$$

$$\frac{1}{T} = 10^1$$

$$T = \frac{1}{10^1}$$

$$T = 0.1$$

$$T_0 = \frac{(1 \times 10^{-5} \times 18) + (0.1 \times 2)}{18 + 2}$$

$$= \frac{1.8 \times 10^{-4} + 0.2}{20}$$

$$= \frac{0.20018}{20} = 0.010009$$

$$\begin{aligned} SRI &= 10 \times \left(\log_{10} \left(\frac{1}{T} \right) \right) \\ &= 10 \times \log_{10} \left(\frac{1}{0.010009} \right) \\ &= 20 \text{ dB} \end{aligned}$$

2.

1) Different materials and structures act in different ways when sound pressure is imposed on them. This includes reflection, transmission, and absorption. 'In general, the object must be thicker than one wavelength in order to significantly disturb the sound field'. (lecture notes)
Fabrics also have a part to play in these 3 actions as well. Harder fabrics such as concrete or terracotta reflect sounds very well. ~~and have higher attenuation~~
~~Materials such as mats and carpets~~ Damp surfaces such as vegetation absorb more sound, while soft surfaces or porous surfaces offer a lot of absorption.

2. Partition walls consist of a variety of materials. These include ~~just~~ a plastered surface, plasterboard, timber, insulation, plasterboard and then plastered finish on the other side. This distance should be around 130mm, and from this we are able to identify what frequencies ~~it~~ it will have an effect on. ^{Short} wavelengths and high frequencies ~~with~~ are in direct correlation and will be impacted by the partition.

3. Insulation is used for its insulating properties and also its sound deadening properties. This is highlighted in Approved document E of ~~the~~ insulating the flat floors above ground floor. Insulation is a solid but also has a lot of air gaps, these offer sound absorption and help in deadening the sounds.