Examrace

Environmental Science: Numerical Questions – Noise Addition of Noise

1. A person is exposed to two sound levels of 80 dB and 100 dB simultaneously. What is the average noise level the person experiences?

1. ~97 dB
2. ~87 dB
3. ~90 dB
4. ~93 dB

Explanation:

$$L_{eq} = 10 \log \left(10^{\left(L_1 / 10 \right)} + 10^{\left(L_2 / 10 \right)} \right)$$

$$L_{eq} = 10 \log \left(10^{\left(80 / 10 \right)} + 10^{\left(100 / 10 \right)} \right)$$

$$L_{eq} = 10 \log \left(10^8 + 10^{10} \right)$$

$$L_{eq} = 10 \log \left[108 \left(1 + 10^2 \right) \right]$$

$$L_{eq} = 10 \left[\log 108 + \log 1 + \log 102 \right]$$

$$L_{eq} = 10 \left[''8 + 0 + 2'' \right]$$

$$L_{eq} = 100 \text{ dB}$$

Difference (L_2-L_1)	Added to Higher Sound Value
0	3
1	2.5
2	2.1
3	1.5
4	1.5
5	1
6	1

7	0.8
8	0.6
9	0.5
10	0.4

Difference and Added to Higher Sound Value

Difference (L_2-L_1)	**Added to Higher Sound Value**
0 or 1	3
2 or 3	2
4 to 8	1
9 or more	0

Difference and Added to Higher Sound Value

2. On take - off, an aeroplane generates noise level of 120 db. If 5 such aeroplanes take – off simultaneously what will be the noise level?

1. ~126.98 dB
2. ~124.98 dB
3. ~123.86 dB
4. ~122.98 dB

Answer: (A) ~126.98 dB

Explanation: L_eq = L_i + 10 Log (n)

L_eq = 120 + 10 Log (5)

L_eq = 120 + 10 ∗ 0.69

L_eq = 120 + 6.9

L_eq = 126.9

3. The resultant of two noise levels of 50 dB and 55 dB is:

1. 58 dB
2. 55.41 dB
3. 52.5 dB
4. 56.19 dB

Answer: Option (D) 56.19 dB

Explanation:

$$L_{eq} = 10 \log \left(10^{\left(L_1/10 \right)} + 10^{\left(L_2/10 \right)} \right)$$

$$L_{eq} = 10 \log \left(10^{\left(50/10 \right)} + 10^{\left(55/10 \right)} \right)$$

$$L_{eq} = 10 \log \left(10^5 + 10^{5.5} \right)$$

$$L_{eq} = 10 \log \left[10^5 \left(1 + 10^{0.5} \right) \right]$$

$$L_{eq} = 10 \left(\log 105 + \log \left(1 + \sqrt{10} \right) \right)$$

$$L_{eq} = 10 \left(\log 105 + \log \left(1 + 3.16 \right) \right)$$

$$L_{eq} = 10 \left(5 + 0.619 \right)$$

$$L_{eq} = 10 \times 5.619 = 56.19$$

✍ Mayank

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