

One loud speaker gives a sound level $\beta_1 = 100\text{db}$.

How many identical speakers will generate $\beta_2 = 124\text{db}$?

A) 10-50.

B) 50-200.

C) more than 200.

$$\beta_1 - \beta_2 = 124 - 100 = 24 = 100 \log_{10} \left(\frac{I_2}{I_1} \right) .$$

$$\frac{I_2}{I_1} = 10^{2.4} = 251 .$$

Need 251 speakers.

An alternative method.

Use $\log_{10} 2 \sim 0.30$.

$$24 = 10 \log_{10} 2^x \sim (10 x) (0.3) = 3 x .$$

$$x \sim 8 , \text{ or } \frac{I_2}{I_1} = 2^8 = 256 .$$

This is an example of “back-of-the-envelope” type calculations, where one does not need to use a calculator.

Answer **C**

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