

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.

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

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

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**