

Violin

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Solution: *The mass density is,*

$$\mu = \frac{m}{L} = 4 \text{ g/m} .$$

For a given string, the fundamental frequency only depends on its length. Hence, the frequencies 440 Hz and 528 Hz,

$$f_1 = \frac{1}{2L_1} \sqrt{\frac{T}{\mu}} \quad , \quad f_2 = \frac{1}{2L_2} \sqrt{\frac{T}{\mu}} ,$$

are related by,

$$L_2 = L_1 \frac{f_1}{f_2} = 20 \text{ cm} \frac{440}{528} .$$