

Now we can compute the frequency of the waves travelling through the rod

$$f\lambda = v$$

$$\rightarrow f = \frac{v}{\lambda} = \frac{3809 \text{ m/s}}{L}$$

Whoops! We don't know length L . But we do know the frequency:

middle C has $f = 261.6 \text{ Hz}$

one octave above " " $f = 2 \cdot 261.6 \text{ Hz}$

two " " $f = 4 \cdot 261.6 \text{ Hz}$

five octaves above $f = 32 \cdot 261.6 \text{ Hz} = 8371 \text{ Hz}$

So

$$L = \frac{v}{f} = \frac{3809 \text{ m/s}}{8371 \text{ Hz}} = \underline{\underline{0.455 \text{ m}}}$$