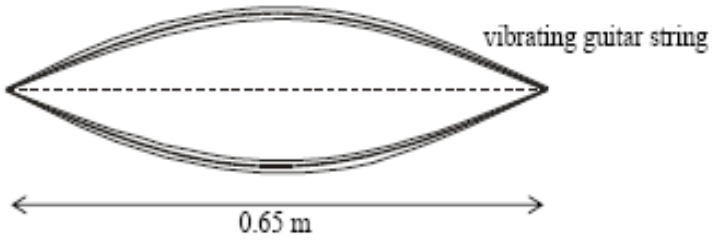
State Examination Commission – Physics Higher Level, 2005

Question 12(b)

The frequency of a stretched string depends on its length.
Give two other factors that affect the frequency of a stretched string. (6)



The diagram shows a guitar string stretched between supports 0.65 m apart. The string is vibrating at its first harmonic.
The speed of sound in the string is 500 m s^{-1}. What is the frequency of vibration of the string? (9)
Draw a diagram of the string when it vibrates at its second harmonic. (7)
What is the frequency of the second harmonic? (6)

The frequency of a stretched string depends on its length. Give two other factors that affect the frequency of a stretched string. (6)

The mass per unit length of string and the tension in the string.

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$\lambda = 2 \times 0.65 = 1.3$ m
$v = f\lambda$
$f = v/\lambda = 500 / 1.3 = 384.6$ Hz

Draw a diagram of the string when it vibrates at its second harmonic. (7)

What is the frequency of the second harmonic? (6)

The frequency of the second harmonic is twice the frequency of the fundamental, that is, 769.2 Hz