18 The photograph shows a musical instrument called a violin.

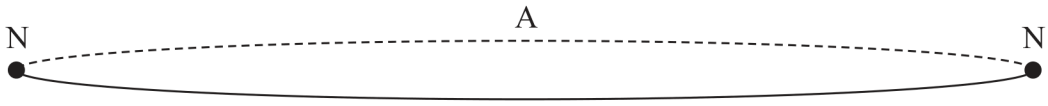
The violin has four strings. Each string is held in a fixed position by a peg and at the bridge.

When a string is plucked, a stationary wave forms on the string.

(a) Explain how a stationary wave forms on the string.

(3)

(b) The simplest stationary wave that can be formed on the string has a node (N) at each end and an antinode (A) at the centre, as shown.



The frequency of this wave is called the fundamental frequency.

The strings on a violin have different fundamental frequencies, as shown in the table.

String	Fundamental frequency / Hz
1	196
2	294
3	440
4	659

The tension in one of the strings is 71.5 N. The length of the string is 32 cm and the mass per unit length of the string is 2.03×10^{-3} kg m^{-1}.

Deduce whether this is string 1, 2, 3 or 4.

(4)

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(c) The stationary wave on the string causes sound waves to be transmitted through the air.

Describe the similarities and differences between the stationary wave on the string and the sound waves transmitted through the air.

(5)

(Total for Question 18 = 12 marks)