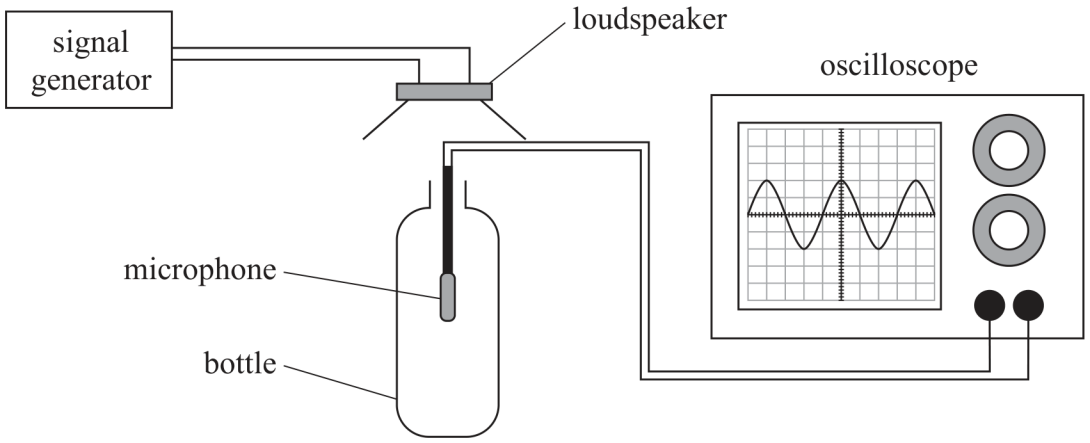
3 A student investigated standing waves using the apparatus shown.



The signal generator was adjusted until a loud sound was heard at a particular frequency, known as the resonant frequency.

(a) Describe how the student should use the oscilloscope to identify the resonant frequency and determine its value.

(4)

(b) The student reduced the volume V of air inside the bottle by adding known volumes of water. He recorded the following values of the resonant frequency f for each value of V.

V / cm^3	f / Hz		
576	221		
476	244		
376	275		
276	323		
176	408		
126	485		

(i) Plot a graph of $\log f$ against $\log V$ on the grid opposite. Use the additional columns in the table to record your processed data.

(6)

(ii) It is suggested that the relationship between f and V is given by

$$f = kV^{-\frac{1}{2}}$$

where k is a constant.

Discuss whether the graph supports this suggestion.

(5)

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