3 (a) Fig. 3.1 shows a string stretched between two fixed points P and Q.

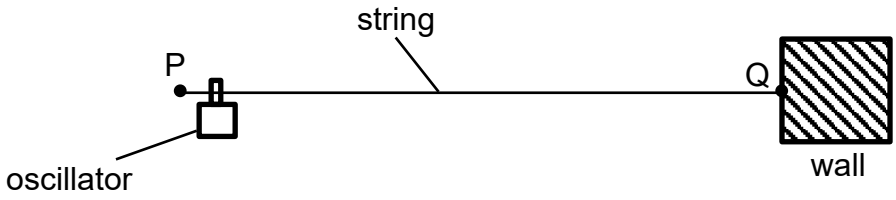

Fig. 3.1

An oscillator is attached near end P of the string. End Q is fixed to a wall. The oscillator has a frequency of 480.0 Hz.

The stationary wave produced on PQ at an instant time *t* is shown in Fig. 3.2. Each point on the string is at its maximum displacement.

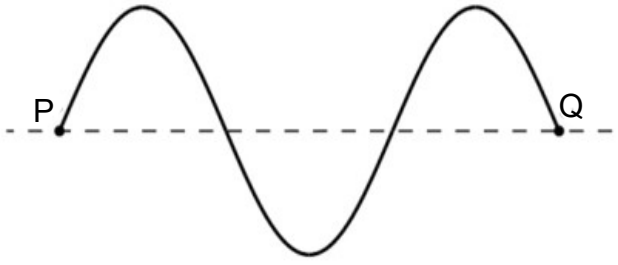

Fig. 3.2

(i) On Fig. 3.2, label all the nodes with the letter **N** and the antinodes with the letter **A** along the dotted line PQ.

[2]

(ii) Calculate the lowest possible frequency of the wave that can be formed between end P and Q of the string.

frequency = ……..…….....…… Hz [3]

(b) A loudspeaker is connected to a signal generator. It is then oriented to face a wall as shown in Fig. 3.3. Sound waves are produced between the speaker and the wall to form a stationary wave.

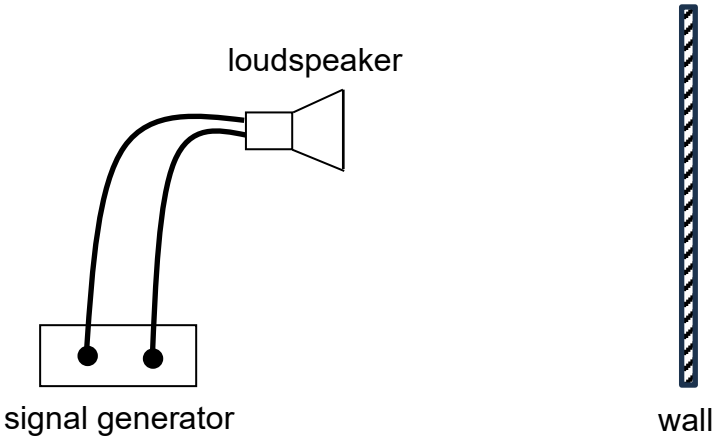

Fig. 3.3

(i) Explain why there are alternate regions of high and low intensity detected between the loudspeaker and the wall.

……

……

……

……

……

..... [3]

(ii) Outline how you would use this setup to obtain the speed of sound waves in air.

……

……

……

……

……

……

……

……

..... [4]

[Total: 12]