For Examiner Use

7 When a wire is stretched between two points A and B and is made to vibrate, stationary waves can be set up on the wire. A possible shape (mode of vibration) for the stationary waves is shown in Fig. 7.1.

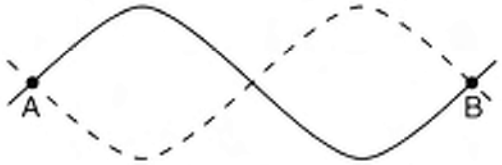

Fig. 7.1

The frequency of vibration of the wire in this mode of vibration is thought to depend on the tension in the wire, the length of the wire and the mass per unit length of the wire.

With all other variables kept constant, the relation between the frequency f of this mode of vibration of the wire and the mass per unit length μ of the wire is

$$f = k\mu^n$$

where k and n are constants.

You are provided with an oscillator that can vibrate the wire over a large range of unknown frequencies. You may also use any of the other equipment usually found in a Physics laboratory.

Design an experiment using different wires to determine the value of n.

You should draw a labelled diagram to show the arrangement of your apparatus. In your account you should pay particular attention to

(a) the equipment you would use,
(b) the procedure to be followed,
(c) the control of variables,
(d) how the frequency of vibration of the wire would be measured,
(e) any precautions that would be taken to improve the accuracy of the experiment.

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Diagram