4 A student sets up the apparatus illustrated in Fig. 4.1 in order to investigate the oscillations of a 100 g metal cube suspended on a string.

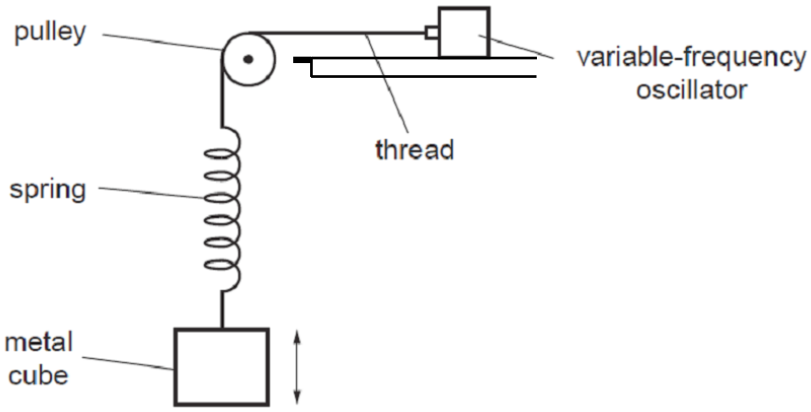

Fig. 4.1

Before switching on the variable-frequency oscillator, the metal cube was displaced by pulling it downwards and made to oscillate freely. A graph of its velocity against displacement is shown in Fig. 4.2.

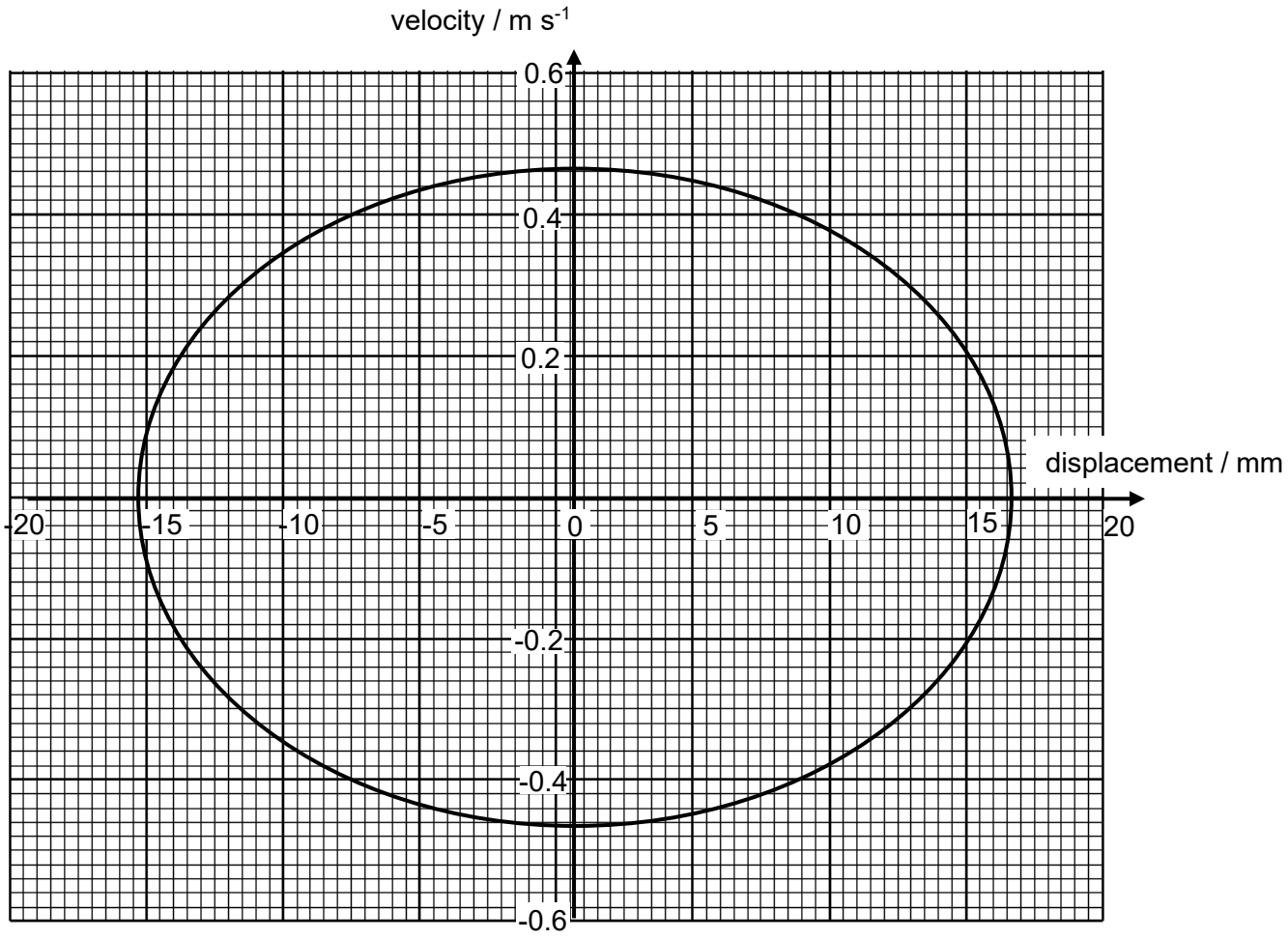

Fig. 4.2

(a) Using Fig. 4.2, show that the natural frequency of the metal cube is 4.6 Hz.

[2]

(b) Hence, or otherwise, determine the maximum resultant force acting on the metal cube.

maximum resultant force = ... N [2]

(c) The variable-frequency oscillator is now switched on so that the metal cube can undergo forced oscillation.

(i) State what is meant by *forced oscillation*.

.....

.....

[1]

(ii) On Fig. 4.3, sketch the variation with frequency of the amplitude of the oscillations of the metal cube between 2 Hz to 8 Hz.

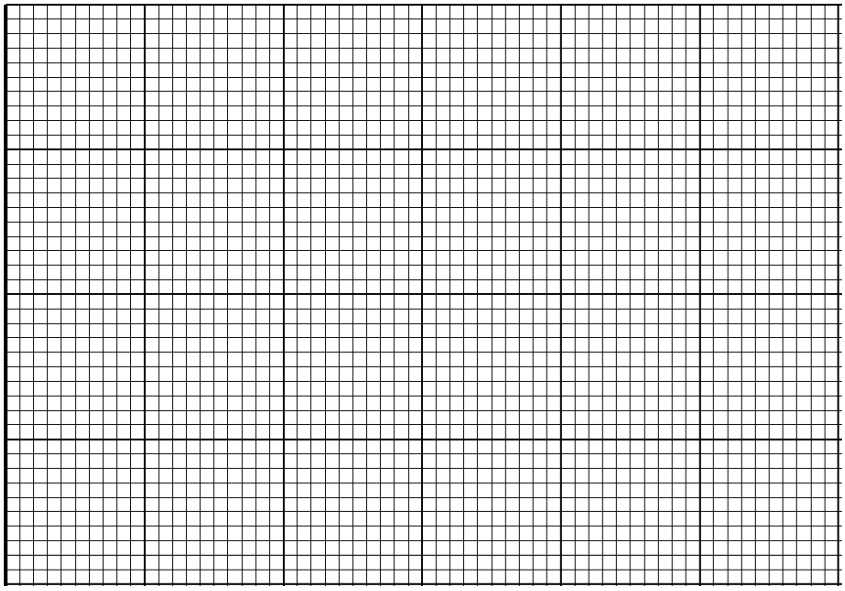

Fig. 4.3

[2]

[Total: 7]