4 The variation with time t of the displacement x of the cone of a loudspeaker is shown in Fig. 4.1.

For Examiner's Use

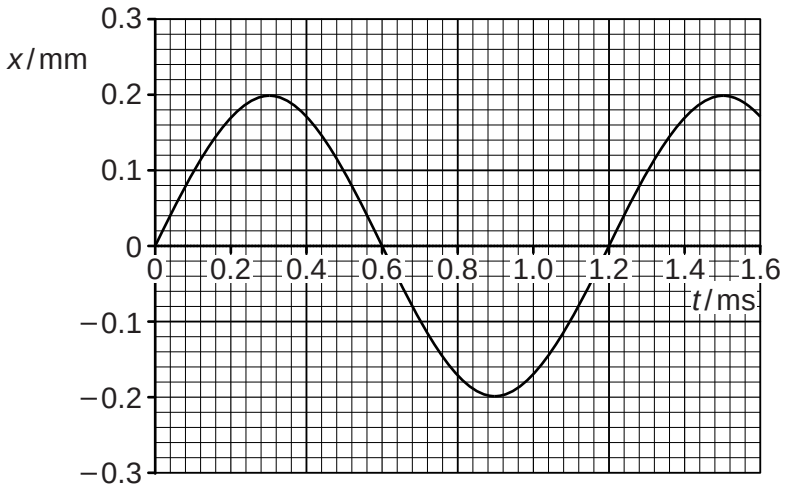

Fig. 4.1

(a) Use Fig. 4.1 to determine, for these oscillations,

(i) the amplitude,

amplitude = ... mm [1]

(ii) the frequency.

frequency = ... Hz [2]

(b) State two times at which

(i) the speed of the cone is maximum,

time ..... ms and time ..... ms [1]

(ii) the acceleration of the cone is maximum.

time ..... ms and time ..... ms [1]

(c) The effective mass of the cone is 2.5 g.

Use your answers in **(a)** to determine the maximum kinetic energy of the cone.

For Examiner's Use

kinetic energy = ... J [3]

(d) The loudspeaker must be designed so that resonance of the cone is avoided.

(i) State what is meant by *resonance*.

.....

.....

..... [2]

(ii) State and briefly explain one other situation in which resonance should be avoided.

.....

.....

.....

..... [2]