2 **(a)** **(i)** A partially submerged wooden block of mass m is displaced vertically and then released. For a displacement *x* that is measured from its equilibrium position, the acceleration *a* of the wooden block is given by the expression

$$a = -\frac{28}{m}x$$

Explain why the block is undergoing simple harmonic motion.

.....

.....

.....

.....

..... [2]

(ii) Fig. 2.1 shows the variation of kinetic energy of the block with time.

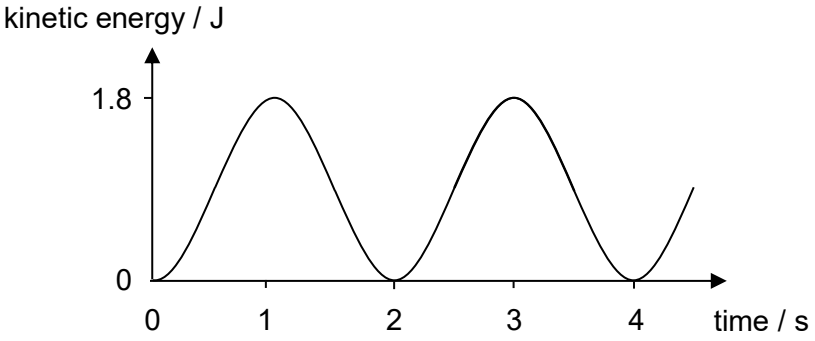

Fig. 2.1

Calculate

1. the frequency for the oscillations of the block,

frequency = ... Hz [2]

2. the mass of the block,

mass = ... kg [2]

3. the amplitude of the oscillations.

amplitude = ... m [2]

(b) On Fig. 2.2, sketch a labelled graph of the variation of the displacement with time of the wooden block from t = 0 s to t = 8 s. You may assume that there is negligible energy loss over this time.

[2]

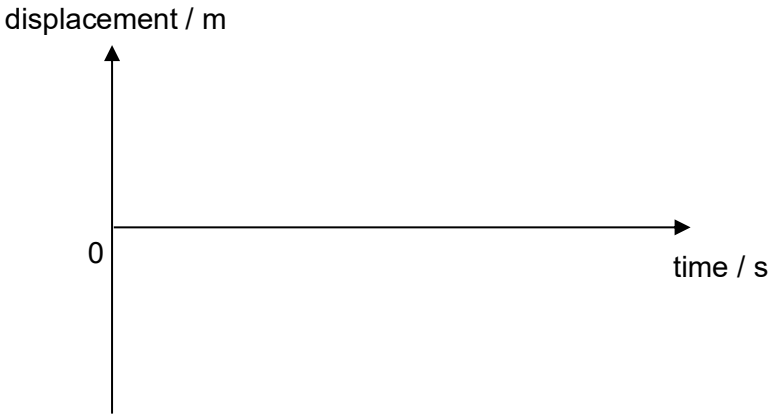

Fig. 2.2