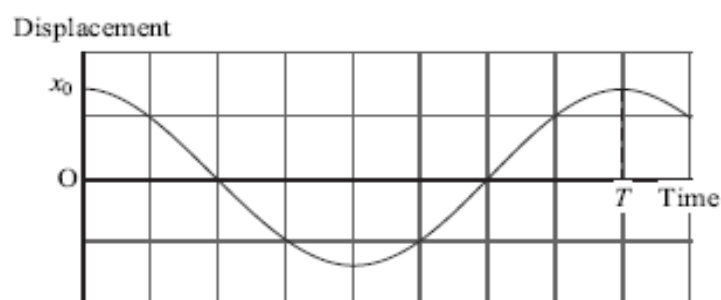3. The graph shows how the displacement of an object performing simple harmonic motion varies with time.

Displacement

(a) Add an X to the graph to label each point at which the kinetic energy is a maximum.

(1)

(b) The mass of the object is m. Show that its maximum kinetic energy E is given by

$$E = \frac{2\pi^2 m x_0^2}{T^2}$$

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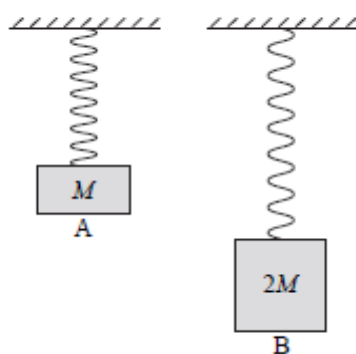
(2)

(c) Two objects A and B, of mass M and $2M$ respectively, are suspended from identical springs.

The objects are given identical vertical displacements from their equilibrium positions and then released. Air resistance may be neglected.

Determine the value of the ratio

$$\frac{\text{Maximum kinetic energy of B}}{\text{Maximum kinetic energy of A}}$$

Explain your answer.

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Ratio = ...

(3)