1 **(a)** Length, mass and temperature are all SI base quantities.

State two other SI base quantities.

1.
……

2.
…… [2]

(b) A small frictionless trolley of mass *m* is attached to a fixed point A by means of a spring, as shown in Fig. 1.1.

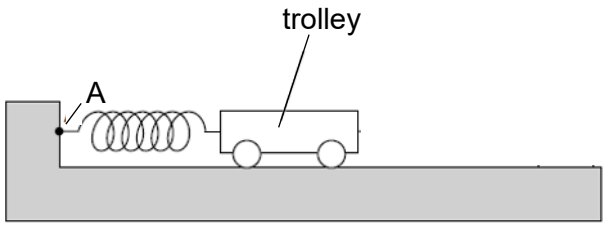

Fig. 1.1

The trolley is then displaced horizontally 5.0 cm and released.

The period *T* of the oscillations of the trolley is given by

$$T = 2\pi\sqrt{\frac{m}{k}}$$

where k is the spring constant of the spring.

Data for the oscillation is shown in Fig. 1.2.

quantity	magnitude	uncertainty
k / N m^{-1}	25	± 8 %
m / kg	200×10^{-3}	± 2 %

Fig. 1.2

(i) Determine the period T of the oscillations, with its uncertainty. Give your answer to an appropriate number of significant figures.

T = ...

± ..... s [4]

(ii) **1.** Derive an expression for total energy of the trolley in terms of T.

[2]

2. Calculate the total energy of the trolley using the period calculated in **b(i)**.

total energy = ……J [1]