4 **(a)** A small metal sphere of mass m is moving vertically downwards through a viscous liquid.

When it reaches a constant downward velocity v, the kinetic energy achieved is given by $\frac{1}{2} mv^2$.

Explain why the kinetic energy reached a constant value.

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……

…… [2]

(b) Consider a constant horizontal applied force F acting on an object of mass m travelling with initial velocity u, achieving a final velocity of v, over a displacement of s as shown in Fig. 4.1.

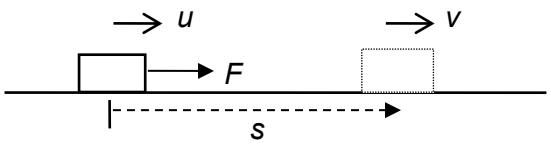

Fig. 4.1

By considering Newton's Laws and equations of motion, derive an expression for the kinetic energy $\frac{1}{2} mv^2$.

State an assumption necessary for the derivation.

……

…… [4]