Section A

Answer **all** the questions in the spaces provided.

1   An object of mass 0.92 g is projected vertically upwards with an initial speed of 160 m s⁻¹. The object reaches a height of 1100 m before returning to the ground.

   (a) **(i)**   Show that air resistance on the object is **not** negligible.

[3]

   (ii)   Calculate the energy lost by the object due to air resistance.

energy lost = ... J [2]

   (b)   At the initial speed of 160 m s⁻¹, the force due to air resistance acting on the object is 3.4 × 10⁻³ N.

   Calculate the initial deceleration of the object.

deceleration = ... m s⁻² [2]

(c) The variation with speed v of the air resistance force F_A acting on the object is shown in Fig. 1.1.
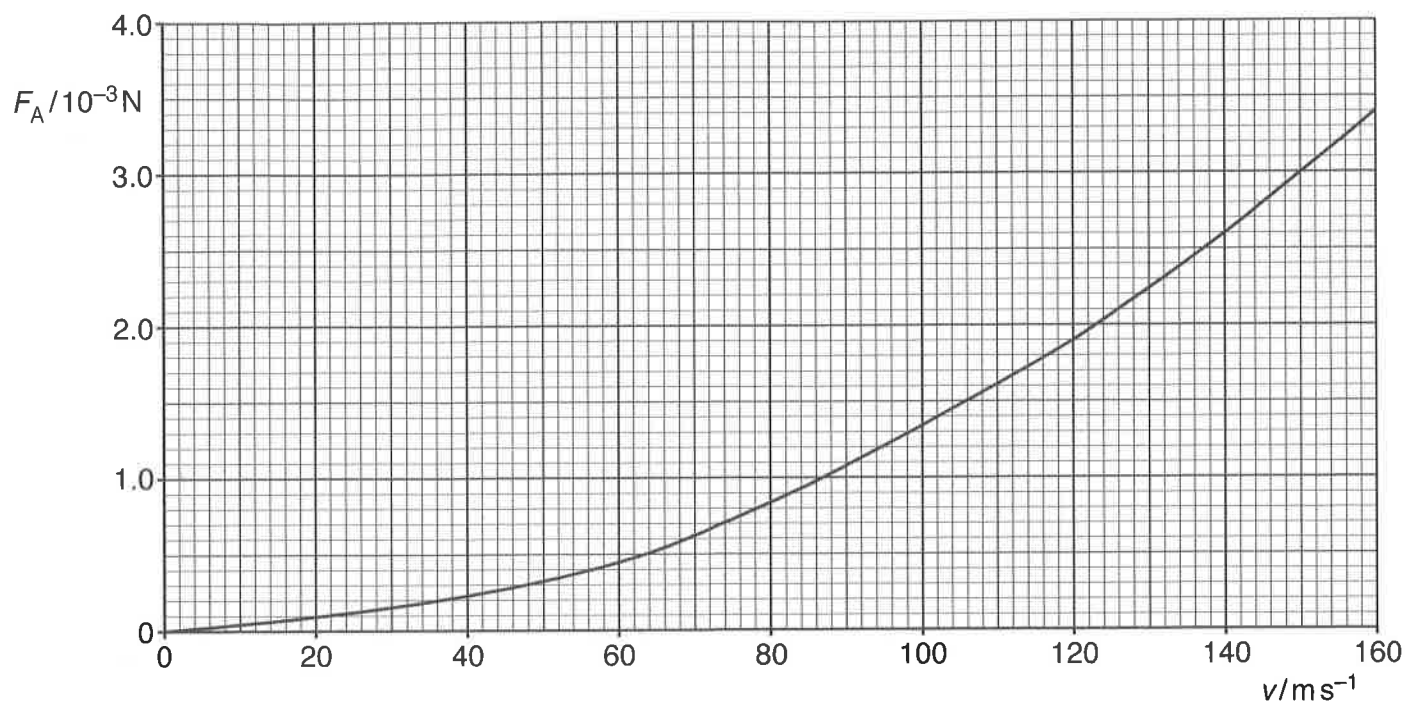

Fig. 1.1

Show that, for speeds greater than $80\,\text{m s}^{-1}$, the force F_A due to air resistance is proportional to the square of the speed v.

....

....

....

[3]

[Total: 10]