14 A regenerative braking system allows an electric car to use its kinetic energy to charge a battery as the car decelerates.

(a) A car travelling at $13.0\,m\,s^{-1}$ decelerated to rest.

The energy transferred to the car's battery during the deceleration was 73.9 kJ.

Calculate the efficiency of the regenerative braking system.

mass of car = 1560 kg

(3)

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Efficiency = ...

(b) (i) Drag forces act on the car as it moves through the air.

State how the drag forces vary with the velocity of the car.

(1)

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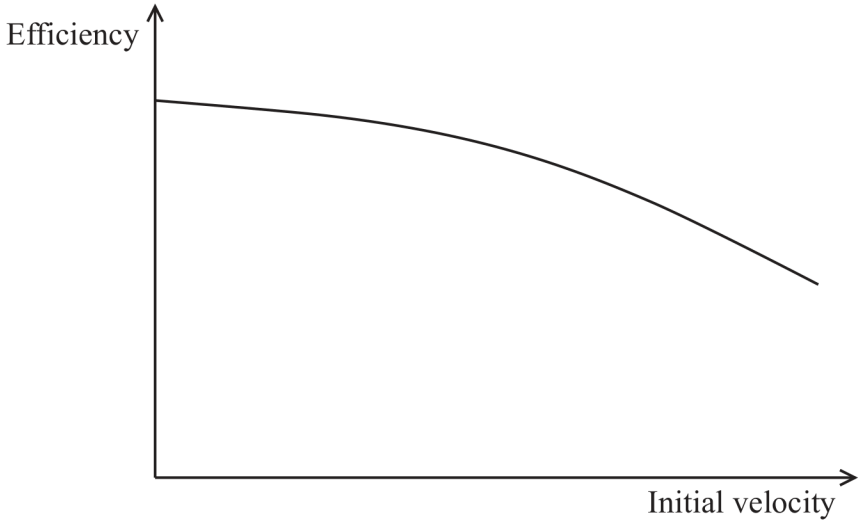
(ii) The graph shows how the efficiency of the regenerative braking system depends upon the initial velocity of the car for initial velocities in the range $20\,m\,s^{-1}$ to $40\,m\,s^{-1}$.



Explain why the efficiency of the regenerative braking system varies as shown in the graph.

(4)

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(Total for Question 14 = 8 marks)