2 During a crash test, a remotely driven bus and a car are both travelling towards each other with the same speed of 70 km h^{-1} as shown in Fig. 2.1. The mass of the bus is five times that of the mass of the car. The vehicles collide head-on and become entangled together. Assume frictional forces with the road are negligible.

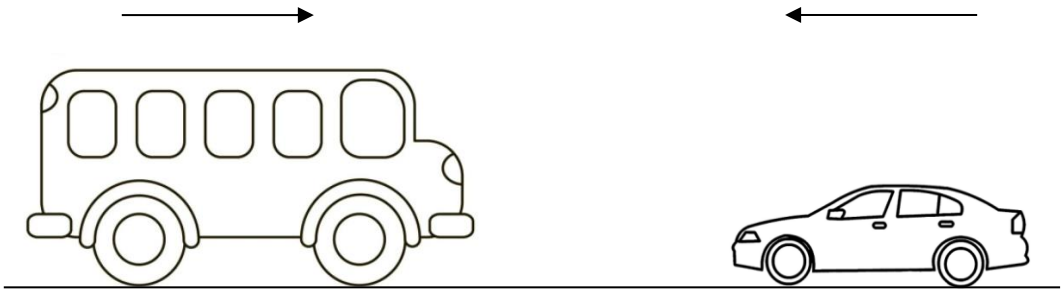

Fig. 2.1

(a) State and explain which vehicle experiences a larger impact force during the collision.

……...

…… [1]

(b) Explain why it is not possible for both vehicles to be at rest simultaneously during the collision.

……...

……...

……...

…… [2]

(c) Calculate the velocity of the entangled vehicles immediately after the collision.

speed = …… m s^{-1}

direction = ……..… [3]

(d) The dummies used in both the bus and car are of the same mass.
State and explain which dummy experiences a larger change in momentum.

……...

……...

……...

……. [2]

(e) The total kinetic energy of the system decreases as a result of the collision.
Calculate the fraction of the kinetic energy lost by the car.

fraction of kinetic energy lost = …… [2]