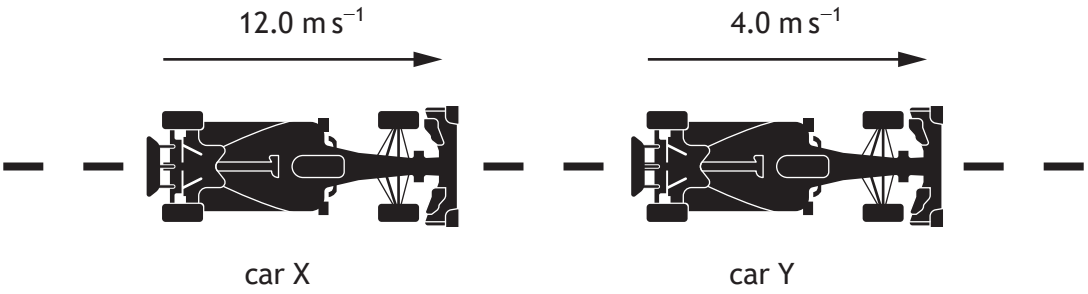
3. During a practice session for a Grand Prix, two Formula 1 cars collide in the pit lane.

Car X has a mass of 760 kg and is travelling at 12.0 m s^{-1}.

Car Y has a mass of 840 kg and is travelling at 4.0 m s^{-1}.



The cars collide and move off separately.

Car Y moves off with a velocity of 8.5 m s^{-1}.

(a) Calculate the velocity of car X immediately after the collision. **3**

Space for working and answer

3. (continued)

(b) Show by calculation that the collision is inelastic. **4**

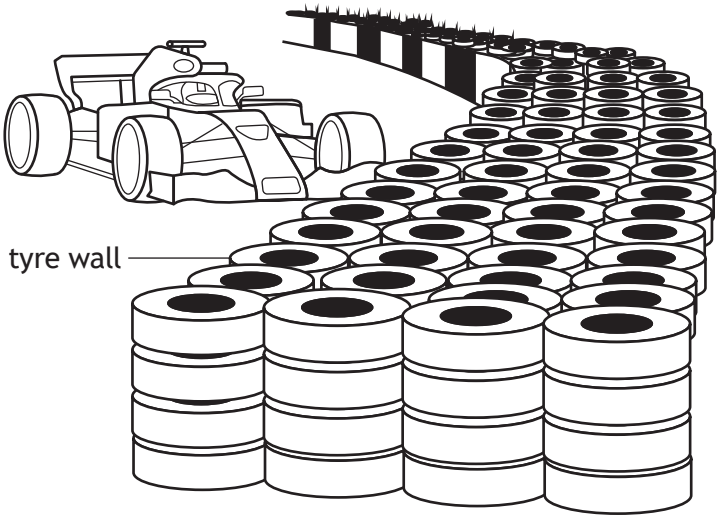
Space for working and answer

(c) During the collision, the cars are in contact for 0.82 s.
Calculate the magnitude of the average force car X exerts on car Y. **3**

Space for working and answer

3. (continued)

(d) One safety feature on Formula 1 racetracks is the use of tyre walls on bends. Tyre walls are designed to protect the driver in the event of their car leaving the track.



Explain how tyre walls protect the driver. **2**