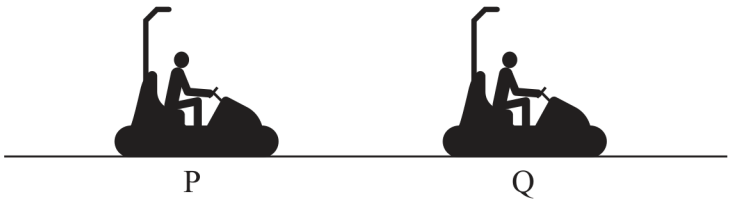
17 The diagram shows two bumper cars, P and Q, at an amusement park.



Q was stationary. P was moving at a speed of $2.10\,m\,s^{-1}$ towards Q.

P collided with Q. After the collision, P and Q moved off in the same direction. P moved with a speed of $1.15\,m\,s^{-1}$. Q moved with a speed of $1.57\,m\,s^{-1}$.

(a) (i) Show that the total mass of Q was about 150 kg.

total mass of P = 250 kg

(3)

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(ii) State one assumption you made in your calculation in (a)(i).

(1)

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(iii) The collision lasted a total time of 1.35 s.

Calculate the average horizontal force on Q during the collision.

(3)

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Average horizontal force = ...

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(b) Explain why P decelerates during the collision. Your answer should make reference to Newton's laws of motion.

(3)

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(Total for Question 17 = 10 marks)