OCR
Oxford Cambridge and RSA

A level Physics B

H557/02 Scientific literacy in physics

Question Set 13

1 (a) This question is about momentum and force.

(i) A block of mass 0.20 kg has velocity +1.8 m s^{-1}. It collides with a stationary block of mass 0.30 kg. The two blocks stick together after the impact.

Calculate the velocity of the two blocks after impact. Ignore the effects of friction.

velocity =……..m s^{-1} **[2]**

(ii) Show that kinetic energy is **not** conserved in this collision. **[2]**

(iii) The collision took place over time, Δt. By calculating the change of momentum of both blocks, show that the force on one block is equal and opposite to the force on the other block, an example of Newton's third law of motion.

[3]

(b) In a crash test, a driverless car strikes a wall and stops. The graph in **Fig. 1.1** shows the variation of the force on the car over the time of the collision.

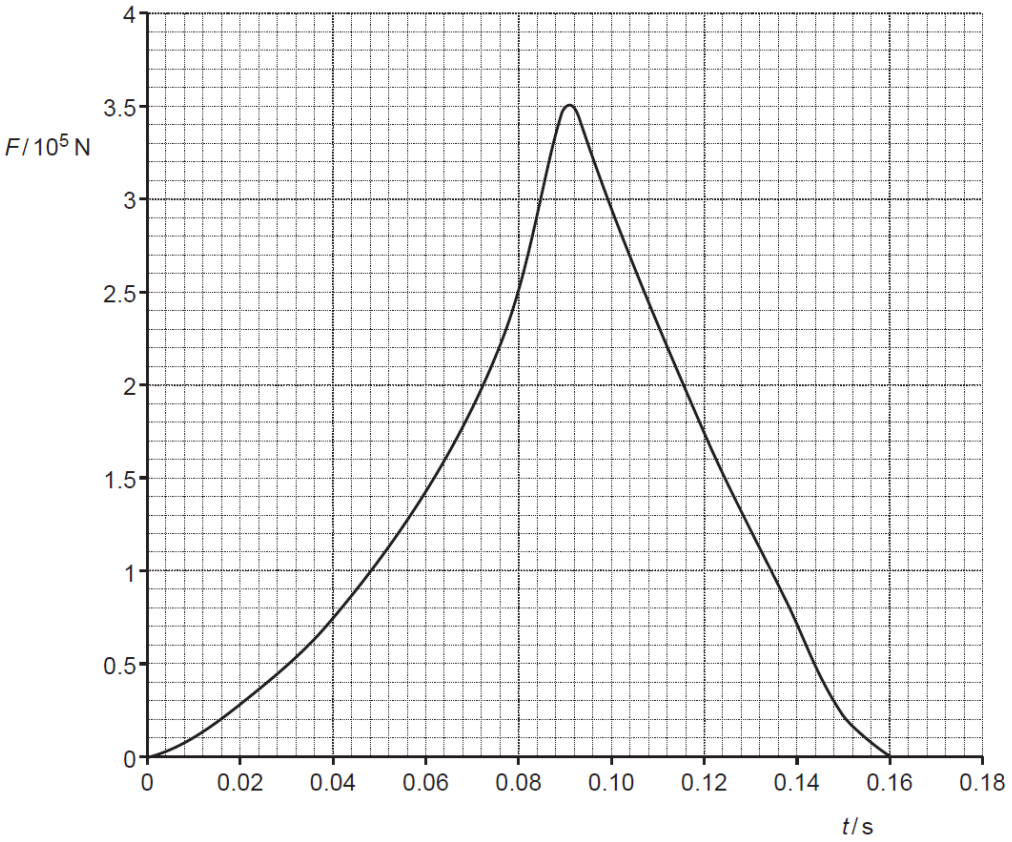

Fig.1.1

The impulse on the car is given by the area under the curve.

Use data from the graph to calculate the initial velocity of the car. Explain your method and reasoning.

mass of car = 1400 kg

initial velocity of car =……..m s^{-1}

[3]

Total Marks for Question Set 13: 10