3. A hammer is used to hit a tent peg into soft ground.

The hammer has mass 1.8 kg and the tent peg has mass 0.2 kg.

The hammer and tent peg are both modelled as particles and the impact is modelled as a direct collision.

Immediately before the impact, the tent peg is stationary and the hammer is moving vertically downwards with speed $10\,\text{m}\,\text{s}^{-1}$

Immediately after the impact, the hammer and tent peg move together, vertically downwards, with the **same** speed $v\,\text{m}\,\text{s}^{-1}$

(a) Find the value of v

(2)

(b) Find the magnitude of the impulse exerted on the tent peg by the hammer, stating the units of your answer.

(3)

The ground exerts a constant vertical resistive force of magnitude R newtons, bringing the hammer and tent peg to rest after they travel a distance of 12 cm.

(c) Find the value of R.

(5)

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Question 3 continued

(Total for Question 3 is 10 marks)