One end of a light elastic string of natural length 0.6 m and modulus of elasticity 24 N is attached to a fixed point O. The other end of the string is attached to a particle P of mass 0.4 kg which hangs in equilibrium vertically below O.

(i) Calculate the extension of the string. [2]

P is projected vertically downwards from the equilibrium position with speed $5\,\text{m}\,\text{s}^{-1}$.

(ii) Calculate the distance P travels before it is first at instantaneous rest. [4]

When P is first at instantaneous rest a stationary particle of mass 0.4 kg becomes attached to P.

(iii) Find the greatest speed of the combined particle in the subsequent motion. [4]