A particle P of mass 0.2 kg is released from rest at a point O above horizontal ground. At time t s after its release the velocity of P is v m s^{-1} downwards. A vertically downwards force of magnitude $0.6t$ N acts on P. A vertically upwards force of magnitude $k\mathrm{e}^{-t}$ N, where k is a constant, also acts on P.

(i) Show that $\dfrac{\mathrm{d}v}{\mathrm{d}t} = 10 - 5k\mathrm{e}^{-t} + 3t$. [2]

(ii) Find the greatest value of k for which P does not initially move upwards. [3]

(iii) Given that $k = 1$, and that P strikes the ground when $t = 2$, find the height of O above the ground. [5]