A particle P of mass 0.2 kg is released from rest at a point O on a rough plane inclined at 60° to the horizontal, and travels down a line of greatest slope. The coefficient of friction between P and the plane is 0.3. A force of magnitude $0.6x$ N acts on P in the direction PO, where x m is the displacement of P from O.

(i) Show that $v\dfrac{\mathrm{d}v}{\mathrm{d}x} = 5\sqrt{3} - 1.5 - 3x$, where $v\,\mathrm{m\,s^{-1}}$ is the velocity of P at a displacement x m from O. [3]

(ii) Find the value of x for which P reaches its maximum velocity, and calculate this maximum velocity. [4]

(iii) Calculate the magnitude of the acceleration of P immediately after it has first come to instantaneous rest. [4]