A particle P of mass 0.4 kg is released from rest at a point O on a smooth plane inclined at 30° to the horizontal. P moves down the line of greatest slope through O. The velocity of P is $v\,\mathrm{m\,s^{-1}}$ when its displacement from O is x m. A retarding force of magnitude $0.2v^2$ N acts on P in the direction PO.

(i) Show that $v\dfrac{\mathrm{d}v}{\mathrm{d}x} = 5 - 0.5v^2$. [2]

(ii) Express v in terms of x. [4]