A particle $P$ of mass $m$ kg is projected vertically upwards from a point $O$, with speed $20\,\mathrm{m\,s^{-1}}$, and moves under gravity. There is a resistive force of magnitude $2mv$ N, where $v\,\mathrm{m\,s^{-1}}$ is the speed of $P$ at time $t$ s after projection.

**(a)** Find an expression for $v$ in terms of $t$, while $P$ is moving upwards. [6]

The displacement of $P$ from $O$ is $x$ m at time $t$ s.

**(b)** Find an expression for $x$ in terms of $t$, while $P$ is moving upwards. [2]

**(c)** Find, correct to 3 significant figures, the greatest height above $O$ reached by $P$. [2]