7 A particle X moves along a straight track, starting from a point O at time $t = 0$. The displacement of X from O at time t s is s m, where $s = 3t^{\frac{3}{2}} - 6t$.

(a) Find the time at which X is instantaneously at rest, and hence find the total distance travelled by X between $t = 0$ and $t = 16$. [6]

A second particle Y moves along another straight track, starting from a point P at time $t = 0$. The acceleration of Y at time t s is $a\,\mathrm{m\,s^{-2}}$, where $a = 0.8 - 0.6t$. The velocity of Y when it leaves P is $7.5\,\mathrm{m\,s^{-1}}$.

(b) When the velocity of Y is $-9.6\,\mathrm{m\,s^{-1}}$, show that the displacement of X from O is equal to the displacement of Y from P. [7]

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.