2: **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

[*In this question,* **i** *and* **j** *are horizontal unit vectors.*]

A particle P of mass 3 kg is moving on a smooth horizontal plane.

At time t seconds, where $1 \leqslant t \leqslant 4$, the position vector, **r** metres, of P relative to a fixed origin is given by $\mathbf{r} = 4t^{\frac{1}{2}}\,\mathbf{i} - 3t\,\mathbf{j}$.

At the instant when $t = 4$, P receives an impulse $(6\mathbf{i} - 3\mathbf{j})$ N s.

Find the speed of P immediately after the impulse is received.

(7)

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Question 2 continued

(Total for Question 2 is 7 marks)