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Answer ALL questions. Write your answers in the spaces provided.

1. A particle P of mass 0.5 kg is moving along the positive x-axis under the action of a single force, directed towards the origin O. When $OP = x$ metres, the force has magnitude $\frac{k}{x^2}$ newtons, where k is a constant, and the speed of P is $v\,\text{m s}^{-1}$.

When P is 2 m from O, the speed of P is $5\,\text{m s}^{-1}$ and P is moving in the positive x direction.

When P is 5 m from O, the speed of P is $4\,\text{m s}^{-1}$ and P is moving in the positive x direction.

Find v^2 in terms of x.

(8)

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Question 1 continued

Q1

(Total 8 marks)