

9 In this question, the vectors \mathbf{i} and \mathbf{j} are directed east and north respectively.

The velocity $\mathbf{v} \text{ m s}^{-1}$ of a particle at time $t \text{ s}$ is given by $\mathbf{v} = kt^2\mathbf{i} + 6t\mathbf{j}$, where k is a positive constant. The magnitude of the acceleration when $t = 2$ is 10 m s^{-2} .

(a) Calculate the value of k . [4]

The particle is at the origin when $t = 0$.

(b) Determine an expression for the position vector of the particle at time t . [2]

(c) Determine the time when the particle is directly north-east of the origin. [2]