**8.** [*In this question* **i** *and* **j** *are horizontal unit vectors due east and due north respectively and position vectors are given relative to the fixed point O.*]

A particle *P* moves with constant acceleration.

At time t = 0, the particle is at *O* and is moving with velocity  $(2\mathbf{i} - 3\mathbf{j}) \operatorname{ms}^{-1}$ At time t = 2 seconds, *P* is at the point *A* with position vector  $(7\mathbf{i} - 10\mathbf{j}) \operatorname{ms}$ .

(a) Show that the magnitude of the acceleration of *P* is  $2.5 \,\mathrm{m \, s^{-2}}$ 

At the instant when *P* leaves the point *A*, the acceleration of *P* changes so that *P* now moves with constant acceleration  $(4\mathbf{i} + 8.8\mathbf{j}) \,\mathrm{m \, s^{-2}}$ 

At the instant when P reaches the point B, the direction of motion of P is north east.

(b) Find the time it takes for *P* to travel from *A* to *B*.

(4)