**8A Movement on a Plane**

1. A particle starts from the point with position vector $\left(3i+7j\right)m$ and moves with constant velocity $\left(2i-j\right) ms^{-1}$.
2. Find the position vector of the particle after 4 seconds
3. Find the time at which the particle is due east of the origin
4. A particle $P$ has velocity $\left(-3i+j\right) ms^{-1}$ at time $t=0$. The particle moves with constant acceleration $a=\left(2i+3j\right) ms^{-2}$. Find the speed of the particle and the bearing on which it is travelling at time 3 seconds.
5. An ice skater is skating on a large flat ice rink. At time $t=0 $the skater is at a fixed point $O$ and is skating with velocity $\left(2.4i-0.6j\right) ms^{-1}$.

At time $t=20$ the skater is travelling with velocity $\left(-5.6i+3.4j\right) ms^{-1}$.

Relative to $O$, the skater has position vector $s$ at time $t$ seconds.

Modelling the skater as having constant acceleration, find:

1. The acceleration of the ice skater
2. An expression for $s$ in terms of $t$
3. Find the time at which the skater is directly north-east of O
4. A second skater travels such that she has position vector $r=\left(1.1t-6\right)j m$ relative to the same point $O$ at time $t$.