**8D Differentiating Vectors**

1. A particle $P$ of mass 0.8kg is acted on by a single force $F N$. Relative to a fixed origin $O$, the position vector of $P$ at time $t$ seconds is $r$ metres, where:

$r=2t^{3}i+50t^{-\frac{1}{2}}j$, $t\geq 0$

Find:

1. The speed of $P$ when $t=4$
2. The acceleration of $P$ as a vector when $t=2$
3. The value of $F$ when $t=2$