10D F=ma with Vectors

1. A force of $(3\boldsymbol{i} + 8\boldsymbol{j})$ N acts upon a particle of mass 0.5kg.

a) Find the acceleration of the particle in the form $(p\boldsymbol{i} + q\boldsymbol{j})\ ms^{-2}$.

b) Find the magnitude and bearing of the acceleration of the particle

2. The following forces:

   $\boldsymbol{F_1}$ = (2$\boldsymbol{i}$ + 4$\boldsymbol{j}$) N

   $\boldsymbol{F_2}$ = (-5$\boldsymbol{i}$ + 4$\boldsymbol{j}$) N

   $\boldsymbol{F_3}$ = (6$\boldsymbol{i}$ – 5$\boldsymbol{j}$) N

   all act on a particle of mass 3kg. Find the acceleration of the particle.

3. A boat is modelled as a particle of mass 60kg being acted on by 3 forces:

$$F_1 = \begin{pmatrix} 80 \\ 50 \end{pmatrix} N \qquad F_2 = \begin{pmatrix} 10p \\ 20q \end{pmatrix} N \qquad F_3 = \begin{pmatrix} -75 \\ 100 \end{pmatrix} N$$

Given that the boat is accelerating at a rate of $\begin{pmatrix} 0.8 \\ -1.5 \end{pmatrix} ms^{-2}$, find the values of p and q

4. Given that:

   a = 3**i** - **j**

   b = **i** + **j**

   Find μ if **a** + μ**b** is parallel to 3**i** + **j**