6. The line L has equation

$$\mathbf{r} = \begin{pmatrix} 13 \\ -3 \\ -8 \end{pmatrix} + t \begin{pmatrix} -5 \\ 3 \\ 4 \end{pmatrix}$$

The point P has position vector $\begin{pmatrix} -7 \\ 2 \\ 7 \end{pmatrix}$.

The point P' is the reflection of P in L.

(a) Find the position vector of P'.

(6)

(b) Show that the point A with position vector $\begin{pmatrix} -7 \\ 9 \\ 8 \end{pmatrix}$ lies on L.

(1)

(c) Show that angle $PAP' = 120°$.

(3)

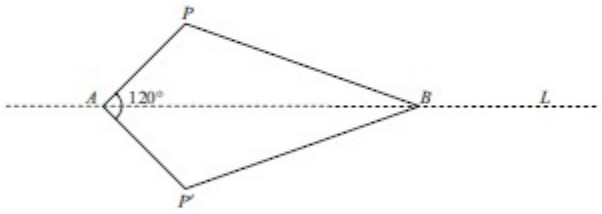

Figure 3

The point B lies on L and $APBP'$ forms a kite as shown in Figure 3.

The area of the kite is $50\sqrt{3}$

(d) Find the position vector of the point B.

(5)

(e) Show that angle $BPA = 90°$.

(2)

The circle C passes through the points A, P, P' and B.

(f) Find the position vector of the centre of C.

(2)