6 The points P, Q, R and S are the vertices of a quadrilateral $PQRS$ such that

$$\overrightarrow{PQ} = 2\mathbf{i} + 3\mathbf{j} \qquad \overrightarrow{PR} = -\mathbf{i} + 18\mathbf{j} \qquad \overrightarrow{PS} = -3\mathbf{i} + 15\mathbf{j}$$

(a) Show that $PQRS$ is a parallelogram.

(4)

(b) Find a unit vector parallel to $\overrightarrow{QS}$ as a simplified expression in terms of **i** and **j**

(4)

The point T lies on QS such that $QT : TS = 5 : 8$

(c) Find $\overrightarrow{PT}$ as a simplified expression in terms of **i** and **j**

(2)

Question 6 continued

Question 6 continued

Question 6 continued

(Total for Question 6 is 10 marks)