

8 (a)  $A$  has coordinates  $(-2, 7)$ ,  $B$  has coordinates  $(1, -5)$  and  $C$  has coordinates  $(5, 4)$ .

(i) Find the coordinates of the midpoint of the line  $AB$ .

(..... , ..... ) [2]

(ii) Find  $\overrightarrow{AC}$ .

$\overrightarrow{AC} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [2]

(iii) Find  $|\overrightarrow{AC}|$ .

..... [2]

(iv) Find the equation of the line  $AB$ .  
Give your answer in the form  $y = mx + c$ .

$y =$  ..... [3]

- (v) Find the equation of the line perpendicular to  $AB$  that passes through  $C$ .  
Give your answer in the form  $y = mx + c$ .

$y = \dots\dots\dots$  [3]

- (b) The graphs of  $y + 5x = 8$  and  $y = 2x^2 + 6x - 13$  intersect at the points  $P$  and  $Q$ .

Find the coordinates of  $P$  and the coordinates of  $Q$ .  
Show all your working.

$P ( \dots\dots\dots , \dots\dots\dots )$

$Q ( \dots\dots\dots , \dots\dots\dots )$  [6]