8 Relative to an origin O, the position vectors of points A and B are given by

$$\overrightarrow{OA} = \begin{pmatrix} 3p \\ 4 \\ p^2 \end{pmatrix} \quad \text{and} \quad \overrightarrow{OB} = \begin{pmatrix} -p \\ -1 \\ p^2 \end{pmatrix}.$$

  (i) Find the values of p for which angle AOB is $90°$. [3]

  (ii) For the case where $p = 3$, find the unit vector in the direction of $\overrightarrow{BA}$. [3]