



The diagram shows triangle OAB , in which the position vectors of A and B with respect to O are given by

$$\overrightarrow{OA} = 2\mathbf{i} + \mathbf{j} - 3\mathbf{k} \quad \text{and} \quad \overrightarrow{OB} = -3\mathbf{i} + 2\mathbf{j} - 4\mathbf{k}.$$

C is a point on OA such that $\overrightarrow{OC} = p\overrightarrow{OA}$, where p is a constant.

- (i) Find angle AOB . [4]
- (ii) Find \overrightarrow{BC} in terms of p and vectors \mathbf{i} , \mathbf{j} and \mathbf{k} . [1]
- (iii) Find the value of p given that BC is perpendicular to OA . [4]