



The diagram shows the roof of a house. The base of the roof, $OABC$, is rectangular and horizontal with $OA = CB = 14$ m and $OC = AB = 8$ m. The top of the roof DE is 5 m above the base and $DE = 6$ m. The sloping edges OD , CD , AE and BE are all equal in length.

Unit vectors \mathbf{i} and \mathbf{j} are parallel to OA and OC respectively and the unit vector \mathbf{k} is vertically upwards.

- (i) Express the vector \overrightarrow{OD} in terms of \mathbf{i} , \mathbf{j} and \mathbf{k} , and find its magnitude. [4]
- (ii) Use a scalar product to find angle DOB . [4]