6 The points A, B, C have position vectors

$$\mathbf{i}-2\mathbf{k}, \quad \mathbf{i}+2\mathbf{j}+2\mathbf{k}, \quad 2\mathbf{i}-\mathbf{j}-\mathbf{k},$$

respectively.

(a) Find the equation of the plane ABC, giving your answer in the form $ax+by+cz=d$. [5]

A point D has position vector $\mathbf{i}+t\mathbf{k}$, where $t \neq -2$.

(b) Find the acute angle between the planes ABC and ABD. [4]

(c) Find the values of t such that the shortest distance between the lines AB and CD is $\sqrt{2}$. [7]