

**Question 3**

**(25 marks)**

- (a) The co-ordinates of two points are  $A(4, -1)$  and  $B(7, t)$ .

The line  $l_1 : 3x - 4y - 12 = 0$  is perpendicular to  $AB$ . Find the value of  $t$ .

- (b) Find, in terms of  $k$ , the distance between the point  $P(10, k)$  and  $l_1$ .

- (c)  $P(10, k)$  is on a bisector of the angles between the lines  $l_1$  and  $l_2 : 5x + 12y - 20 = 0$ .

- (i) Find the possible values of  $k$ .

- (ii) If  $k > 0$ , find the distance from  $P$  to  $l_1$ .

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