

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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LCH: 2015 Paper 2, Q4

Question 4

(25 marks)

Two circles  $s$  and  $c$  touch internally at  $B$ , as shown.

- (a) The equation of the circle  $s$  is

$$(x-1)^2 + (y+6)^2 = 360.$$

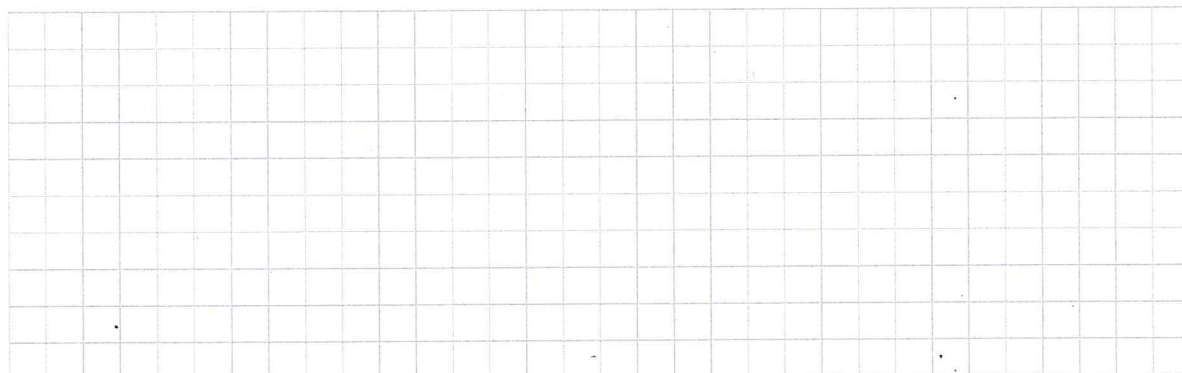
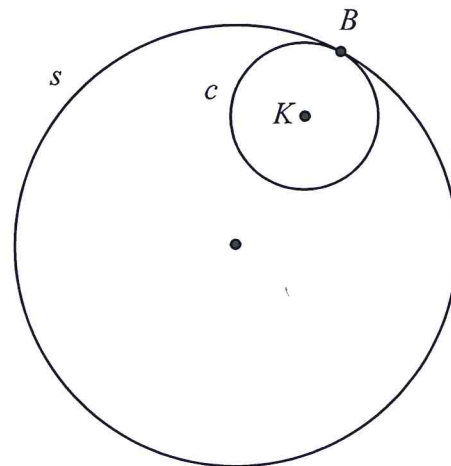
Write down the co-ordinates of the centre of  $s$ .

Centre: \_\_\_\_\_

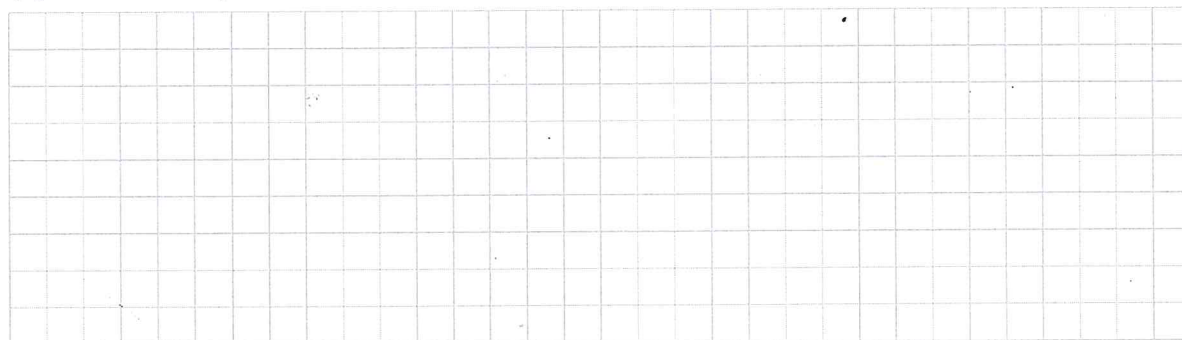
Write down the radius of  $s$  in the form  $a\sqrt{10}$ , where  $a \in \mathbb{N}$ .

Radius: \_\_\_\_\_

- (b) (i) The point  $K$  is the centre of circle  $c$ .  
The radius of  $c$  is one-third the radius of  $s$ .  
The co-ordinates of  $B$  are  $(7, 12)$ .  
Find the co-ordinates of  $K$ .



- (ii) Find the equation of  $c$ .



- (c) Find the equation of the common tangent at  $B$ .  
Give your answer in the form  $ax+by+c=0$ , where  $a, b, c \in \mathbb{Z}$ .

