12. Circle $C_1$ has equation $(x-13)^2 + (y+4)^2 = 100$.
Circle $C_2$ has equation $x^2 + y^2 + 14x - 22y + c = 0$.

(a) (i) Write down the coordinates of the centre of $C_1$.
(ii) The centre of $C_1$ lies on the circumference of $C_2$.
Show that $c = -455$.

The line joining the centres of the circles intersects $C_1$ at $P$.

(b) (i) Determine the ratio in which $P$ divides the line joining the centres of the circles.
(ii) Hence, or otherwise, determine the coordinates of $P$.

$P$ is the centre of a third circle, $C_3$.
$C_2$ touches $C_3$ internally.

(c) Determine the equation of $C_3$. 
Answers

(a) (i) (13, -4)

(ii) Substitute coordinates and process leading to $c = -455$

(b) (i) 3 : 2 or 2 : 3

(ii) $P (5, 2)$

(c) $(x - 5)^2 + (y - 2)^2 = 1600$

 or $x^2 + y^2 - 10x - 4y - 1571 = 0$