

CIRCLE (Q 1, PAPER 2)

2003

1 (a) For all values of $t \in \mathbf{R}$, the point $\left(\frac{3-3t^2}{1+t^2}, \frac{6t}{1+t^2} \right)$ lies on the circle $x^2 + y^2 = r^2$.

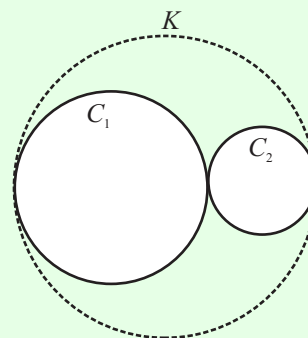
Find r , the radius of the circle.

1 (b) $C_1: x^2 + y^2 + 2x - 2y - 23 = 0$ and

$C_2: x^2 + y^2 - 14x - 2y + 41 = 0$ are two circles.

(i) Prove that C_1 and C_2 touch externally.

(ii) K is a third circle. Both C_1 and C_2 touch K internally. Find the equation of K .



1 (c) The line $ax + by = 0$ is a tangent to the circle $x^2 + y^2 - 12x + 6y + 9 = 0$ where $a, b \in \mathbf{R}$ and $b \neq 0$.

(i) Show that $\frac{a}{b} = -\frac{3}{4}$.

(ii) Hence, or otherwise, find the co-ordinates of the point of contact.

ANSWERS

1 (a) $r = 3$

1 (b) (ii) $K: (x-2)^2 + (y-1)^2 = 64$

1 (c) (ii) $\left(\frac{12}{5}, \frac{9}{5}\right)$