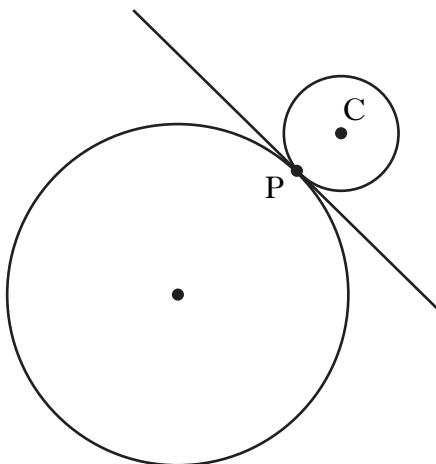


Easter geometry

- [SQA] 1. Circle P has equation $x^2 + y^2 - 8x - 10y + 9 = 0$. Circle Q has centre $(-2, -1)$ and radius $2\sqrt{2}$.
- (a) (i) Show that the radius of circle P is $4\sqrt{2}$.
 (ii) Hence show that circles P and Q touch. 4
- (b) Find the equation of the tangent to the circle Q at the point $(-4, 1)$. 3
- (c) The tangent in (b) intersects circle P in two points. Find the x -coordinates of the points of intersection, expressing your answers in the form $a \pm b\sqrt{3}$. 3
2. (a) (i) Show that the line with equation $y = 3 - x$ is a tangent to the circle with equation $x^2 + y^2 + 14x + 4y - 19 = 0$.
 (ii) Find the coordinates of the points of contact, P. 5
- (b) Relative to a suitable set of coordinate axes, the diagram below shows the circle from (a) and a second smaller circle with centre C.



- The line $y = 3 - x$ is a common tangent at the point P.
 The radius of the larger circle is three times the radius of the smaller circle.
 Find the equation of the smaller circle. 6

3. Circle C_1 has equation $(x + 1)^2 + (y - 1)^2 = 121$.

A circle C_2 with equation $x^2 + y^2 - 4x + 6y + p = 0$ is drawn inside C_1 .

The circles have no points of contact.

What is the range of values of p ?

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[END OF QUESTIONS]