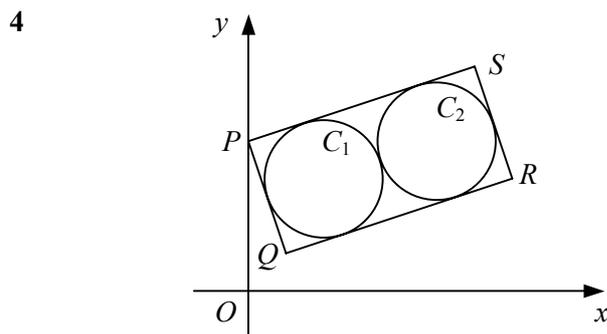


- 1 The circle C has centre $(3, -2)$ and radius 5.
 a Write down an equation of C in cartesian form.
 The line $y = 2x - 3$ intersects C at the points A and B .
 b Show that $AB = 4\sqrt{5}$.
- 2 The line AB is a diameter of circle C .
 Given that A has coordinates $(-5, 6)$ and B has coordinates $(3, 8)$, find
 a the coordinates of the centre of C ,
 b a cartesian equation for C ,
 c an equation of the tangent to C at A .
- 3 The circle C has equation $x^2 + y^2 + 8x - 16y + 62 = 0$.
 a Find the coordinates of the centre of C and the exact radius of C .
 The line l has equation $y = 2x + 1$.
 b Show that the minimum distance between l and C is $3(\sqrt{5} - \sqrt{2})$.

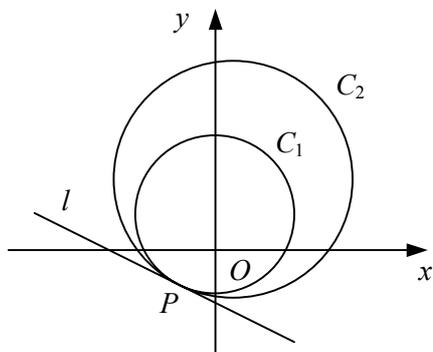


- The diagram shows rectangle $PQRS$ and circles C_1 and C_2 .
 Each circle touches the other circle and three sides of the rectangle. The coordinates of the corners of the rectangle are $P(0, 4)$, $Q(1, 1)$, $R(7, 3)$ and $S(6, 6)$.
- a Find the radius of C_1 .
 b Find the coordinates of the point where the two circles touch.
 c Show that C_1 has equation $2x^2 + 2y^2 - 8x - 12y + 21 = 0$.
- 5 The circle C touches the y -axis at the point $A(0, 3)$ and passes through the point $B(2, 7)$.
 a Find an equation of the perpendicular bisector of AB .
 b Find an equation for C .
 c Show that the tangent to C at B has equation

$$3x - 4y + 22 = 0.$$
- 6 The point $P(x, y)$ moves such that its distance from the point $A(-3, 4)$ is twice its distance from the point $B(0, -2)$.
 Show that the locus of P is a circle and find the coordinates of the centre and the exact radius of this circle.

- 7 The points $P(-4, 9)$ and $Q(-2, -5)$ are such that PQ is a diameter of circle C .
- Find the coordinates of the centre of C .
 - Find an equation for C .
 - Show that the point $R(2, 7)$ lies on C .
 - Hence, state the size of $\angle PRQ$, giving a reason for your answer.

8



The diagram shows circles C_1 and C_2 , which both pass through the point P , and the common tangent to the circles at P , the line l .

Circle C_1 has the equation $x^2 + y^2 - 4y - 16 = 0$.

- Find the coordinates of the centre of C_1 .

Circle C_2 has the equation $x^2 + y^2 - 2x - 8y - 60 = 0$.

- Find an equation of the straight line passing through the centre of C_1 and the centre of C_2 .
- Find an equation of line l .

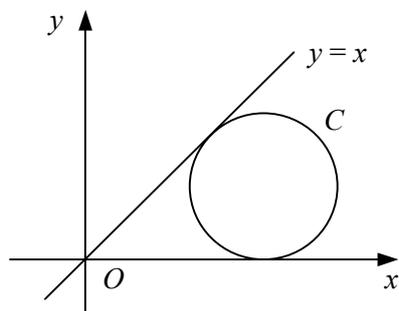
- 9 The circle C has equation $x^2 + y^2 - 8x + 4y + 12 = 0$.

- Find the coordinates of the centre of C and the radius of C .

The point P has coordinates $(3, 5)$ and the point Q lies on C .

- Find the largest and smallest values of the length PQ , giving your answers in the form $k\sqrt{2}$.
- Find the length of PQ correct to 3 significant figures when the line PQ is a tangent to C .

10



The diagram shows the circle C and the line $y = x$.

Given that circle C has centre (a, b) , where a and b are positive constants, and that C touches the x -axis,

- find a cartesian equation for C in terms of a and b .

Given also that the line $y = x$ is a tangent to C ,

- show that $a = (1 + \sqrt{2})b$.