The Circle

1. Write down the equation of each circle below

   (a) Centre the Origin, radius 4   (b) Centre the Origin, radius $\sqrt{6}$

   (c) Centre (-1,4) , radius 5   (d) Centre (-2,-5), radius $\sqrt{10}$

2. Write down the centre and radius of each circle below

   (a) $x^2 + y^2 = 25$ (b) $x^2 + y^2 = 12$

   (c) $(x - 3)^2 + (y - 2)^2 = 36$ (d) $(x + 1)^2 + (y - 4)^2 = 10$
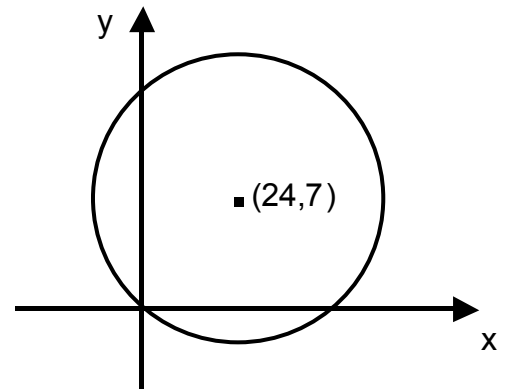
   (e) $x^2 + y^2 - 10x - 6y - 2 = 0$ (f) $x^2 + y^2 + 6x + 4y + 4 = 0$

3. (a) The point (a,5) lies on the circle with equation $x^2 + y^2 = 74$. Find two values for a.

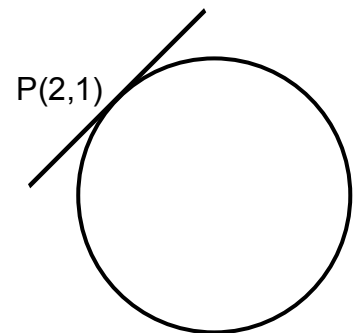   (b) The point (3,c) lies on the circle $x^2 + y^2 - 4x + 6y + 12 = 0$. Find c.

4. The lines x = -2, x = 10, y = -5 and y = 7 are tangents to a circle. Find the equation of this circle.

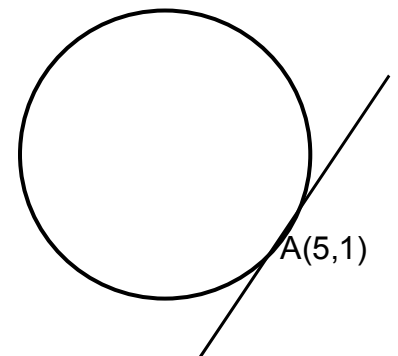5. The circle shown has centre (24,7) and passes through the origin. Find its equation.

6. The diagram shows the circle with equation $(x - 4)^2 + (y + 5)^2 = 40$.

   Find the equation of the tangent to this circle at the point P(2,1).

7. The diagram shows the circle $x^2 + y^2 - 6x - 4y + 8 = 0$. Find the equation of the tangent to this circle at the point A(5,1).
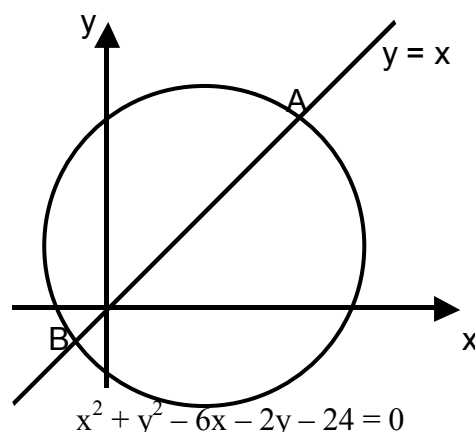
8. Find the equation of the tangent to the circle $x^2 + y^2 - 10y - 43 = 0$ at the point (2,-3).

9. Find the points of intersection of the line $y = 2x + 8$ and the circle with equation $x^2 + y^2 + 4x + 2y - 20 = 0$.

10. Find the points of intersection of the circle $x^2 + y^2 - 2x - 4y + 1 = 0$ and the line $x + y = 1$.

11. The straight line $y = x$ cuts the circle $x^2 + y^2 - 6x - 2y - 24 = 0$ at A and B.

   (a) Find the coordinates of A and B.
   (b) Find the equation of the circle which has AB as diameter.
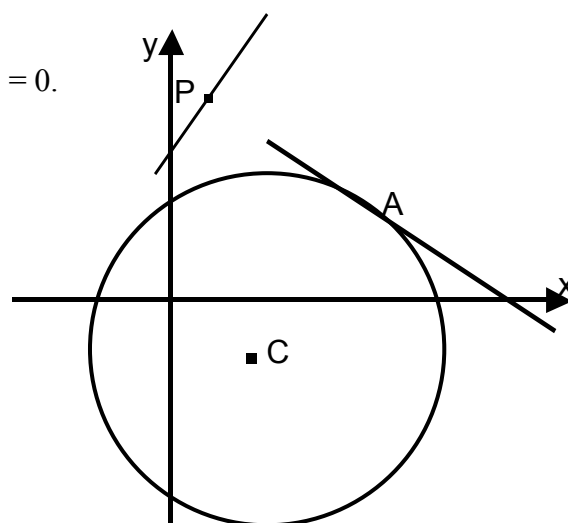

$x^2 + y^2 - 6x - 2y - 24 = 0$

12. Show that the line $y = -3x - 10$ is a tangent to the circle $x^2 + y^2 - 8x + 4y - 20 = 0$, and find the point of contact.

13. The circle, centre C, has equation $x^2 + y^2 - 4x + 6y - 12 = 0$.

   (a) Find the equation of the tangent at the point A(5,1) on this circle.

   The line through P(1,4) at right angles to this tangent has equation $4x - 3y + 8 = 0$.

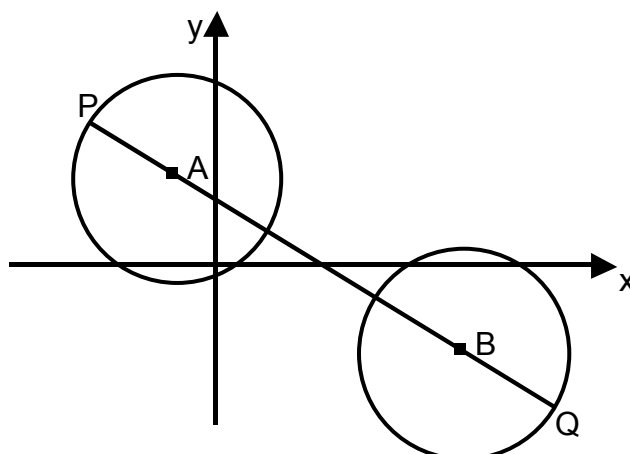   (b) Show that this line is also a tangent to the circle.

14. In the diagram,

   The circle, centre A, has equation $x^2 + y^2 + 2x - 8y - 8 = 0$.
   The circle, centre B, has equation $x^2 + y^2 - 22x + 10y + 121 = 0$.

   The line PQ passes through A and B.
   Calculate the length of the line PQ.

15. In the diagram opposite, the centres A, B and C
    are collinear.
    The equations of the outer circles are
    $(x + 12)^2 + (y + 15)^2 = 25$ and $(x - 24)^2 + (y - 12)^2 = 100$.

    Find the equation of the central circle.