# The Circle – Revision

1. Find the equation of the circle, centre (-2,7), with the x-axis as a tangent.

2. A circle, centre the origin, passes through the point (-6,-8).
   Find the equation of the is circle.

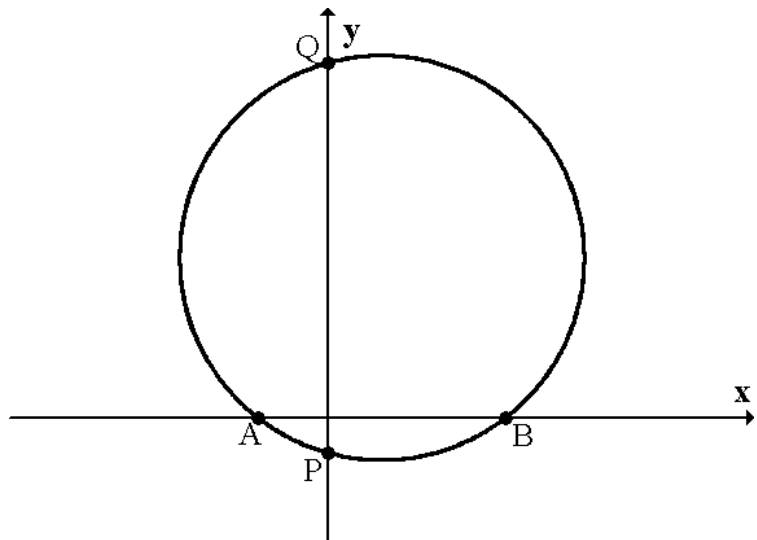3. Find the centre and radius of each circle below.

   (a) $(x + 4)^2 + (y - 6)^2 = 45$                (b) $x^2 + y^2 - 10x + 4y - 20 = 0$

4. A circle has equation
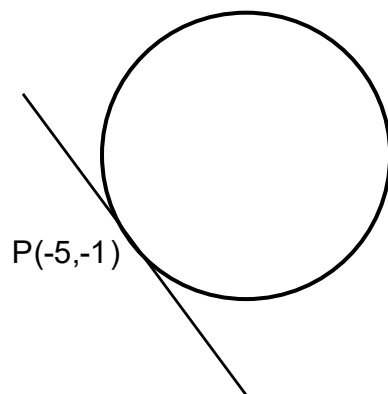   $x^2 + y^2 - 6x - 18y - 40 = 0$.

   (a) The circle cuts the x-axis at A and B.
       Find the coordinates of A and B.

   (b) The circle cuts the y-axis at P and Q.
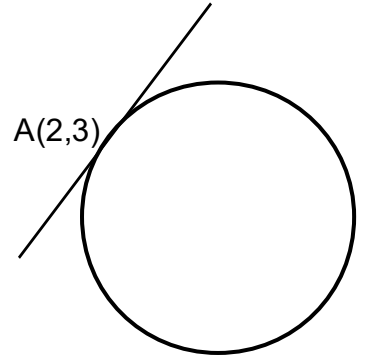       Find the coordinates of P and Q.



5. A circle has equation $(x + 4)^2 + (y - 1)^2 = 16$. Write down the equation of the
   tangent to this circle at the point A(-4,-3).

6. A circle has equation $x^2 + y^2 + 6x + 4 = 0$. Find the equation of the
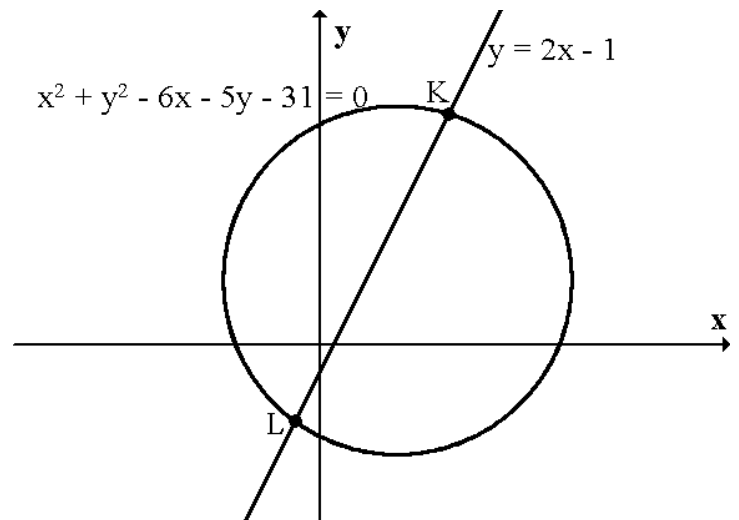   tangent to this circle at the point P(-5,-1).



P(-5,-1)

7. Find the equation of the tangent to the circle $x^2 + y^2 - 8x + 2y - 3 = 0$
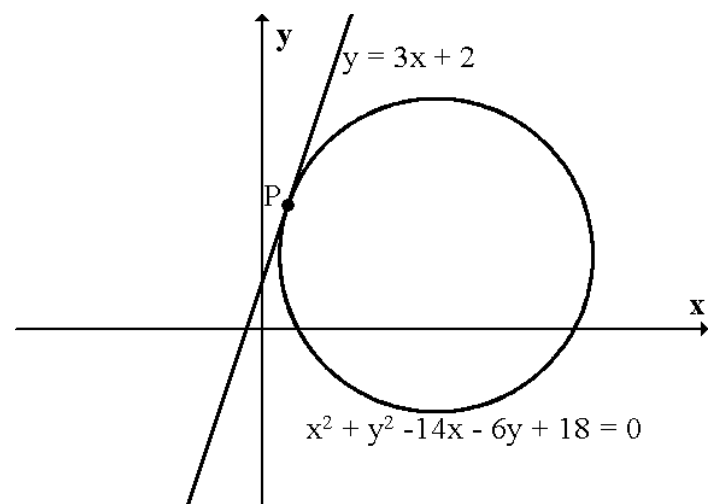at the point A(2,3).

A(2,3)

8. AB is a diameter of a circle. A has coordinates (-2,5) and B is (6,-1).
Find the equation of this circle.

9. A circle has equation
$x^2 + y^2 - 6x - 5y - 31 = 0$.
The line $y = 2x - 1$ intersects the
circle at the points K and L.

Find the coordinates of K and L.
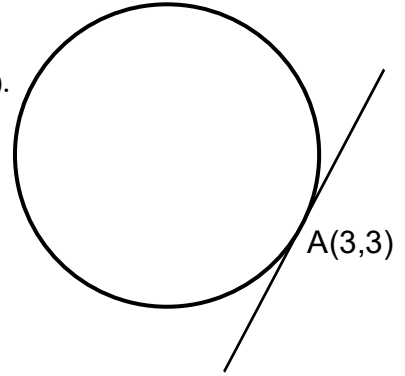
y

$y = 2x - 1$

$x^2 + y^2 - 6x - 5y - 31 = 0$    K

x

L

10. Show that the line $y = 3x + 2$ is a tangent
to the circle $x^2 + y^2 - 14x - 6y + 18 = 0$
and find the point of contact.

y

$y = 3x + 2$

P

x

$x^2 + y^2 - 14x - 6y + 18 = 0$

11. (a) A circle has equation $(x + 3)^2 + (y - 6)^2 = 61$.
Find the equation of the tangent to this circle at the point A(3,3).

(b) Show that this tangent is also a tangent to the circle with
equation $x^2 + y^2 + 6x - 7y - 10 = 0$ and find the point
of contact.

A(3,3)

12. Show that the line $y = 4x + 1$ does not intersect the circle with equation
$x^2 + y^2 - 6x - 2y + 4 = 0$ .

13. For what range of values of p does the equation $x^2 + y^2 + 2px + 2py + 6p + 8 = 0$
represent a circle.

14. For what range of values of k does the equation $x^2 + y^2 - 2kx + 4ky + 4 - k = 0$
represent a circle.

15. Two circles have equations

$(x + 10)^2 + (y + 8)^2 = 25$ and $x^2 + y^2 - 12x - 8x - 173 = 0$.

(a) Show that the circles touch at a single point.
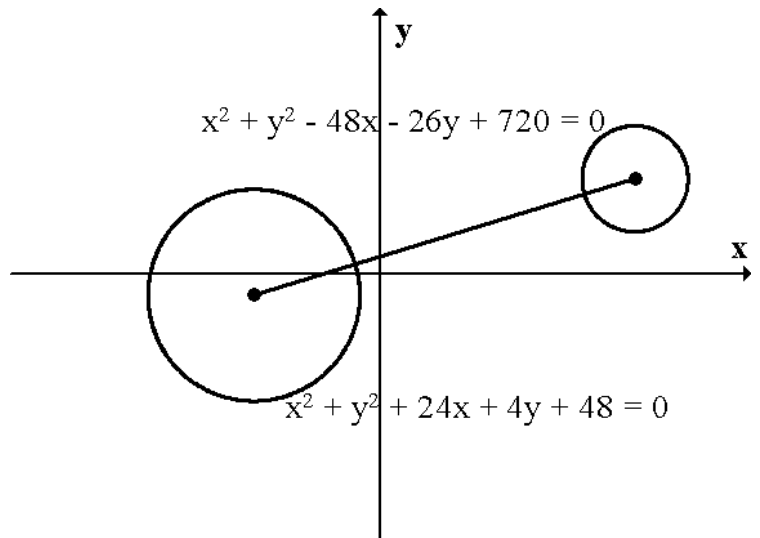(b) Find the point of contact of the two circles.

16. The diagram shows two circles
    with equations

    $x^2 + y^2 - 48x - 26y + 720 = 0$

    and

    $x^2 + y^2 + 24x + 4y + 48 = 0.$

    Calculate the smallest gap between
    the circles.

$x^2 + y^2 - 48x - 26y + 720 = 0$

$x^2 + y^2 + 24x + 4y + 48 = 0$

17. (a) Write down the centre and calculate the radius of the circle $x^2 + y^2 + 8x + 4y - 38 = 0$.

    (b) A second circle has equation $(x - 4)^2 + (y - 6)^2 = 26$.
        Show that these circles intersect.

    (c) The line $y = 4 - x$ is a common chord to both circles passing through the points of
        intersection of the circles. Find these points of intersection.

18. (a) Find the equation of AB, the perpendicular
        bisector of the line joining the points P(-3,1)
        and Q(1,9).

    (b) C is the centre of a circle passing through
        P and Q. Given that QC is parallel to the
        y-axis, determine the equation of the circle.

    (c) The tangents at P and Q intersect at T.

        Write down
        (i) the equation of the tangent at Q
        (ii) the coordinates of T.

Q(1,9)

A

C

P(-3,1)

B