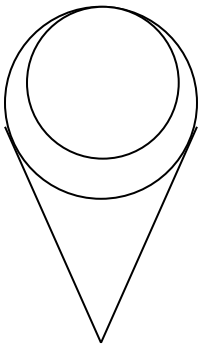
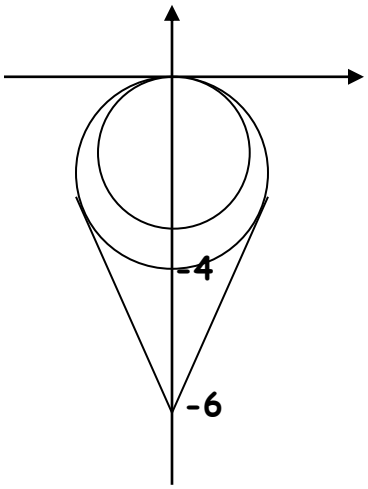
# Circle – Exam level questions and Past paper questions.

1. Find the possible values of 'k' for which the line $y = x - k$ is a tangent to the circle $x^2 + y^2 = 18$.

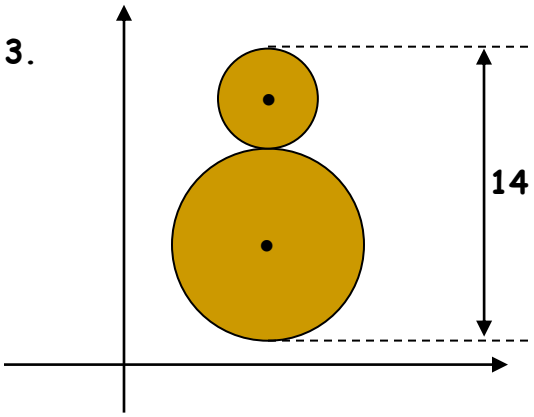
2. An ear ring is to be made from silver wire and is designed in the shape of two circles with tangents to the outer circle as shown in the diagram on the left.



The other diagram shows the ear ring related to the coordinate axis.
The circles touch at (0,0).
The equation of the inner circle is $x^2 + y^2 + 3y = 0$. The other circle intersects the y axis at (0,-4).
The tangents meet the y axis at (0,-6).
Find the total length of wire needed to make this ear ring.




3.




The diagram shows a 'gingerbread man' 14 cm high with a circular head and body. The equation of the body is

$x^2 + y^2 - 10x - 12y + 45 = 0$

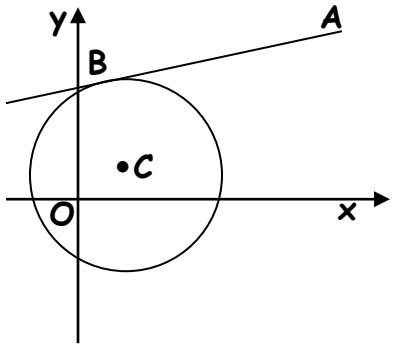
and the line of centres is parallel to the y axis.
Find the equation of the head.

**4. Show that the point (3,1) lies on the circle with equation $x^2 + y^2 - 4x + 6y - 4 = 0$. Find the equation of the tangent to the circle at this point.**

**5. AB is a tangent at B to the circle shown. The circle centre C has equation**

$$(x-2)^2 + (y-2)^2 = 25.$$

**The point A has coordinates (10,8). Find the area of triangle ABC**

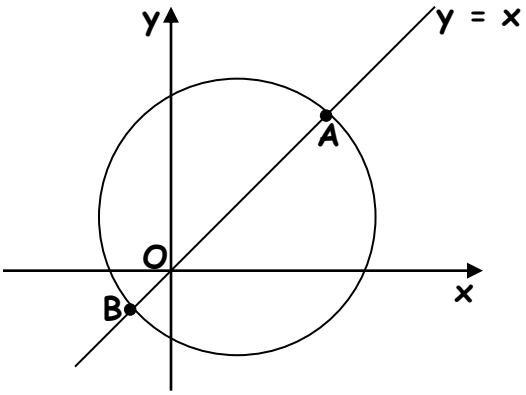



**6. Show that the equation $x^2 + y^2 + 2x + 3y + 5 = 0$ does not represent a circle.**

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

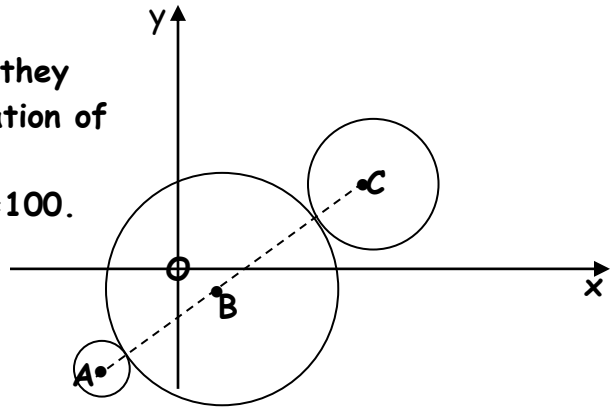
**a) Find the coordinates of A and B**

**b) Find the equation of the circle which has AB as diameter.**




**8. Find the equation of the circle which has P(-2,-1) and Q(4,5) as the end points of a diameter.**

**9. The diagram shows three circles.**
**The centres A, B and C are collinear i.e. they All lie on the same straight line. The equation of 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.**



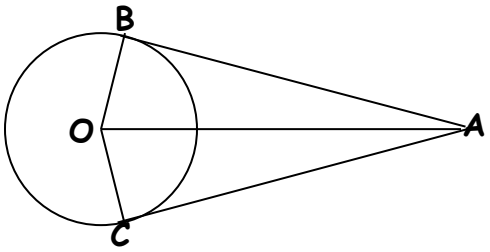

**10. Find the equation of the tangent to the circle $x^2 + y^2 + 2x - 4y - 15 = 0$ , at the point (3,4) on the circle.**

**11. The line $y = -1$ is a tangent to the circle which passes through the points (0,0) and (6,0). Find the equation of this circle.**

**12. Show that the line $x + 3y - 16 = 0$ as a tangent to the circle $x^2 + y^2 + 10x + 6y - 56 = 0$. Find the point of contact.**

**13. Find the coordinates of the points where the line $y = 2x - 1$ cuts the circle with equation $x^2 + y^2 = 2$.**

**14. In the diagram, AB and AC are the tangents from a point A(9,0) to the circle with equation $x^2 + y^2 = 16$ with centre O. Find the area of the kite AOBC.**



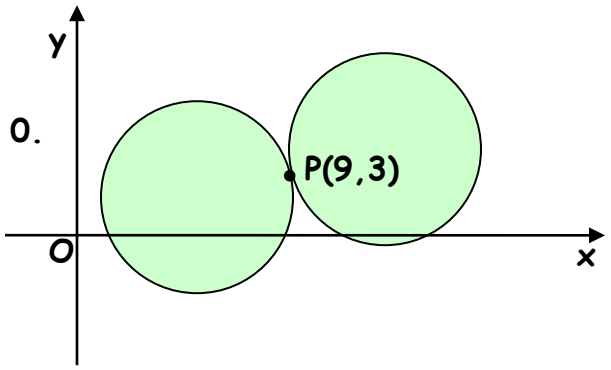

**15. Show that the line $x + y = 10$ is a tangent to the circle $x^2 + y^2 - 2x - 10y + 18 = 0$ and find the coordinates of the point of contact.**

**16. Find the centre and radius of the circle with equation $x^2 + y^2 - 6x - 8y = 0$. Find the equation of the tangent to this circle at the point (6,8) on the circle.**

**17. Show that the equation of the circle which passes through the points (0,0), (4,0) and (0,-2) is $x^2 + y^2 - 4x + 2y = 0$. Show that the line $y = 2x - 10$ is a tangent to this circle and find the point of contact.**

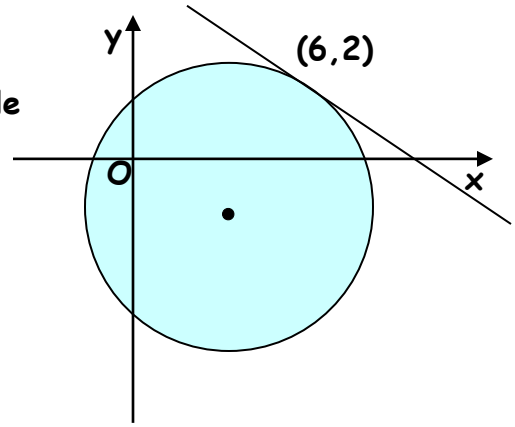
**18. Find the equation of the tangent to the circle $x^2 + y^2 - 3x + y - 16 = 0$ at the point (4,3).**

19. Two identical circles touch at the point P(9,3) as shown in the diagram. One of the circles has equation $x^2 + y^2 - 10x - 4y + 12 = 0$. Find the equation of the other circle.




20. Find the coordinates of the points of intersection of the circle with equation $x^2 + y^2 + 10x - 2y - 14 = 0$ and the line with equation $y = 2x + 1$.

21. The circle shown has equation
$(x-3)^2 + (y+2)^2 = 25$
Find the equation of the tangent to this circle at the point (6,2). Where does this tangent cut the y axis?




22. The line with equation $x - 3y = k$, is a tangent to the circle with equation $x^2 + y^2 - 6x + 8y + 15 = 0$. Find the possible values of 'k'.

**23. Show that the points (5,4) , (-3,-2) and (5,-2) form a right angled triangle and hence find the equation of the circle through these three points.**

**24. Show that the tangents to the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ at the points A(7,1) and B(-1,5) intersect at the point C(7,11).**

**25. Find the equation of the circle which has centre (2,3) and which passes through the point (5,6).**

**a) Prove that the line $x - y + 7 = 0$ is a tangent to this circle.**

**b) Show that where this line meets the circle $x^2 + y^2 = r^2$, x must satisfy the equation $2x^2 + 14x + (49 - r^2) = 0$.**

**c) Find the value of 'r' if the line $x - y + 7 = 0$ is to be a tangent to the circle $x^2 + y^2 = r^2$.**