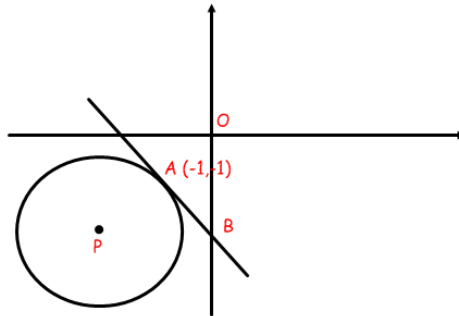


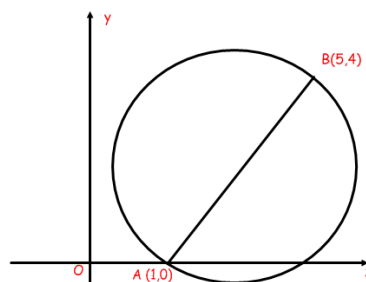
## Higher Homework - The circle

1. a) This diagram shows a circle, centre P, with equation  $x^2 + y^2 + 6x + 4y + 8 = 0$ .  
Find the equation of the tangent at the point A(-1,-1) on the circle. 4
- b) The tangent crosses the y-axis at B.  
Find the equation of the circle with AB as diameter. 3

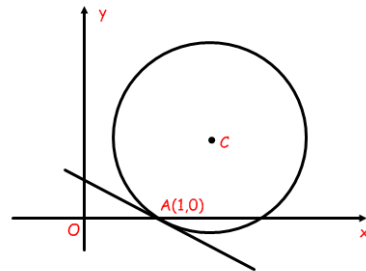


2. For what range of values does the equation  $x^2 + y^2 + 4kx - 2ky - k + 4 = 0$  represent a circle. 5
3. Circle P has equation  $x^2 + y^2 - 8x - 10y + 9 = 0$ . Circle Q has centre (-2,-1) and radius  $2\sqrt{2}$ .  
a) (i) Show that the radius of the circle P is  $4\sqrt{2}$ .  
(ii) Hence show that the circles P and Q touch. 4
- b) Find the equation of the tangent to circle Q at the point (-4, 1) 3
4. The Line  $y + 2x = k$ ,  $k$  is greater than 0, is a tangent to the circle  $x^2 + y^2 - 2x - 4 = 0$ .  
a) Find the value of  $k$ . 7
- b) Deduce the coordinates of the point of contact. 2

- 5.a) A chord joins the points A(1,0) and B(5,4) on the circle as shown in the diagram.  
Show that the equation of the perpendicular bisector of chord AB is  $x + y = 5$



b) The point  $C$  is the centre of this circle. The tangent at the point  $A$  on the circle has equation  $x + 3y = 1$ .  
Find the equation of the radius  $CA$ . 4



c) (i) Determine the coordinates of the point  $C$ .  
(ii) Find the equation of the circle. 4

6. Two congruent circles, with centres  $A$  and  $B$  touch at  $P$ .  
Relative to suitable axes, their equations are

$$x^2 + y^2 + 6x + 4y - 12 = 0 \text{ and}$$

$$x^2 + y^2 - 6x - 12y + 20 = 0.$$

a) Find the coordinates of  $P$ . 3  
b) Find the length of  $AB$ . 1

