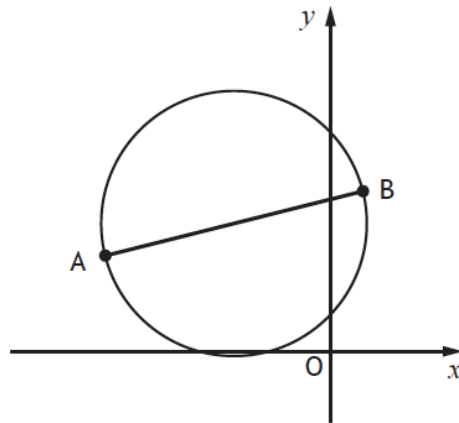


## Higher Maths: The Circle

Please attempt the following questions in preparation for the online session on 22<sup>nd</sup> March 2018.

Q1

A and B are the points  $(-7,3)$  and  $(1,5)$  and AB is a diameter of the circle.



Find the equation of this circle.

Q2

Show that the line with equation  $y = 3x - 5$  is a tangent to the circle with equation  $x^2 + y^2 + 2x - 4y - 5 = 0$  and find the coordinates of the point of contact.

Q3

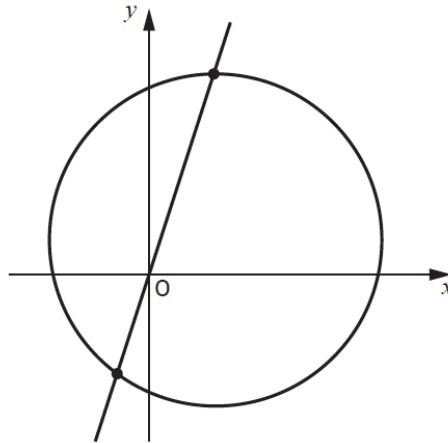
$T(-2,-5)$  lies on the circumference of the circle with equation  $(x + 8)^2 + (y + 2)^2 = 45$ .

Find the equation of the tangent to the circle passing through T.

## Higher Maths: The Circle

Q4

The line  $y = 3x$  intersects the circle with equation  $(x - 2)^2 + (y - 1)^2 = 25$ .



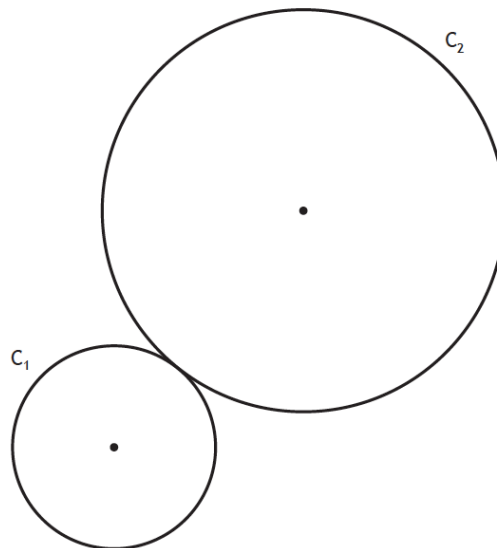
Find the coordinates of the points of intersection.

Q5

Circle  $C_1$  has equation  $x^2 + y^2 + 6x + 10y + 9 = 0$ .

The centre of circle  $C_2$  is  $(9, 11)$ .

Circles  $C_1$  and  $C_2$  touch externally.



(a) Determine the radius of  $C_2$ .

A third circle  $C_3$  is drawn such that both  $C_1$  and  $C_2$  touch  $C_3$  internally and the centres of  $C_1$ ,  $C_2$  and  $C_3$  are collinear.

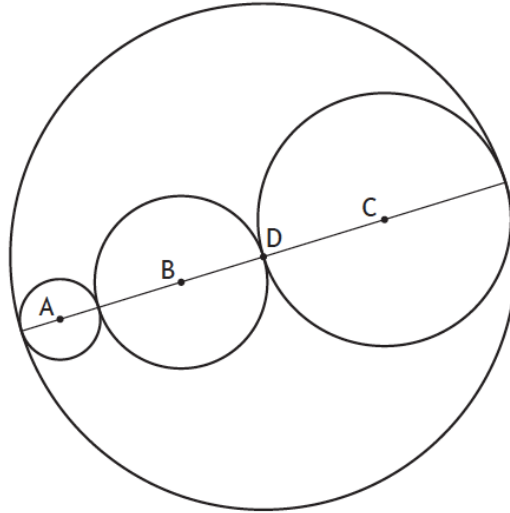
(b) Determine the equation of  $C_3$ .

Higher Maths: The Circle

Q6

(a) Show that the points  $A(-7,-2)$ ,  $B(2,1)$  and  $C(17,6)$  are collinear.

Three circles with centres  $A$ ,  $B$  and  $C$  are drawn inside the circle with centre  $D$ .



Circles with centres  $A$ ,  $B$  and  $C$  have radii  $r_A = \sqrt{10}$ ,  $r_B = 2r_A$  and  $r_C = r_A + r_B$ .

(b) Determine the equation of the circle with centre  $D$ .