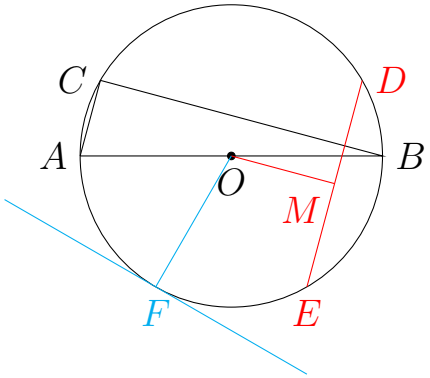
Circles and Tangents

1 Key Properties

1. Write down the equation of the circle with centre $(-1, 4)$ and radius 7.
2. Give the centre and radius of the circle with equation $(x-2)^2+(y+9)^2-25 = 0$.
3. Consider the circle below, in which O is the center.



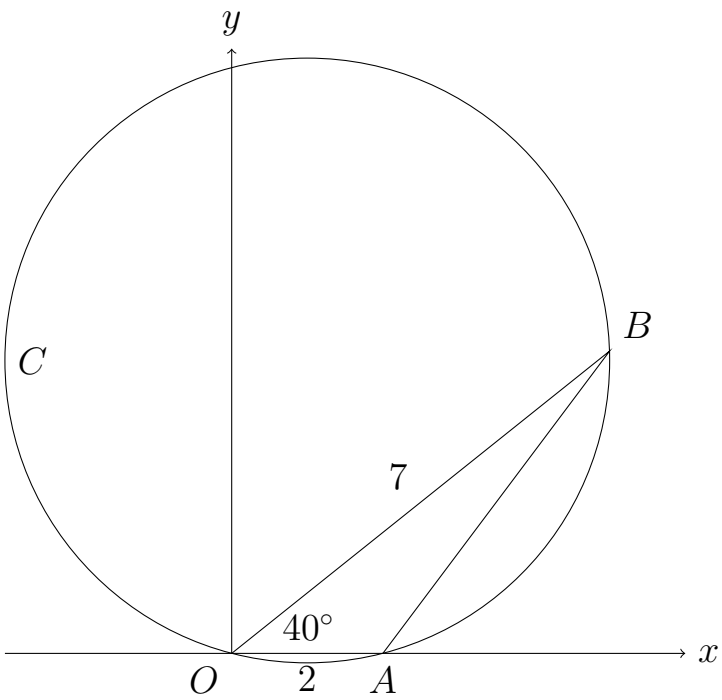
   (a) What is the angle ACB?

   (b) The line OM is perpendicular to the line DE. In what ratio does OM divide DE?

   (c) The cyan line is tangent to the circle at F. What angle does it make with the radius OF?

2 Practice Questions

1. Find the radius and centre of the circle with equation $x^2+7x-8y+y^2-30=0$.
2. In the diagram below, O is the origin, A has coordinates $(2,0)$, angle AOB is $40°$, and line OB has length 7. The circle C passes through O, A, and B.



   (a) Find the coordinates of B.
   (b) Find the equations of the perpendicular bisectors of OA and OB.
   (c) Hence find the coordinates of the center of the circle C.
   (d) Hence find the equation of C.

3. Let C be the circle with centre $(-3,4)$ and radius 5.
   (a) Show that $(0,0)$ lies on C.
   (b) Find the equation of the tangent to C at $(0,0)$.
4. The circle C has centre A with coordinates $(7,5)$. The line with equation $y=2x+1$ is tangent to C at P.
   (a) Show that the line PA has equation $2y+x=17$.
   (b) Hence find the coordinates of P.
   (c) Hence find an equation of C.
   (d) The line $y=2x+k$ is also tangent to C, where $k\neq 1$ is a constant. Find the value of k.