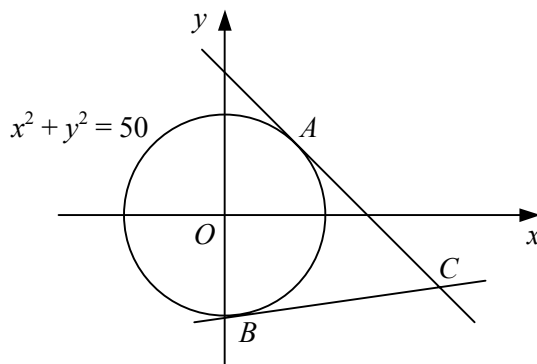


- 1 A circle has the equation $x^2 + y^2 - 8x + 7 = 0$.
- a Find the coordinates of the centre of the circle. (2)
- b Find the radius of the circle. (2)
- 2 A circle has the equation $x^2 + y^2 - 6x + 2y - 15 = 0$.
- a Find the coordinates of the centre of the circle. (2)
- b Find the radius of the circle. (1)
- c Show that the tangent to the circle at the point $(7, 2)$ has equation $4x + 3y - 34 = 0$. (4)

- 3 A circle has the equation $x^2 + y^2 + 6x - 8y + 21 = 0$.
- a Find the coordinates of the centre and the radius of the circle. (3)
- The point P lies on the circle.
- b Find the greatest distance of P from the origin. (2)

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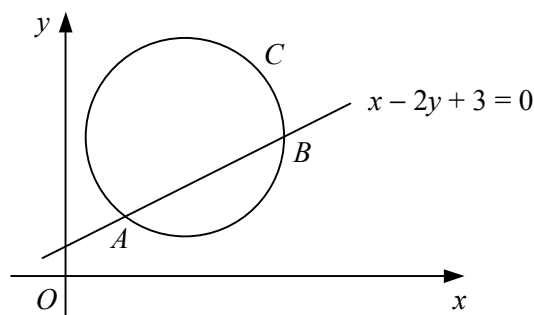


The diagram shows the circle with equation $x^2 + y^2 = 50$ and the tangents to the circle at the points $A(5, 5)$ and $B(1, -7)$.

- a Find an equation of the tangent to the circle at A . (3)
- b Show that the tangent to the circle at B has the equation $x - 7y - 50 = 0$. (3)
- c Find the coordinates of the point C where the tangents to the circle at A and B intersect. (2)
- 5 Circle C_1 has the equation $x^2 + y^2 - 2ay = 0$, where a is a positive constant.
- a Find the coordinates of the centre and the radius of C_1 . (4)
- Circle C_2 has the equation $x^2 + y^2 - 2bx = 0$, where b is a constant and $b > a$.
- b Sketch C_1 and C_2 on the same diagram. (4)
- 6 The circle C has the equation $x^2 + y^2 + 2x - 14y + 30 = 0$.
- a Find the coordinates of the centre of C . (2)
- b Find the radius of C , giving your answer in the form $k\sqrt{5}$. (2)
- c Show that the line $y = 2x - 1$ is a tangent to C and find the coordinates of the point of contact. (4)

- 7 The circle C has equation $x^2 + y^2 - 6x - 12y + 28 = 0$.
- a Find the coordinates of the centre of C . (2)
- The line $y = x - 2$ intersects C at the points A and B .
- b Find the length AB in the form $k\sqrt{2}$. (6)
- 8 The circle C has centre $(8, -1)$ and passes through the point $(4, 1)$.
- a Find an equation for C . (3)
- b Show that the line with equation $x + 2y + 4 = 0$ is a tangent to C . (3)
- 9 The points $P(-10, 2)$, $Q(8, 14)$ and $R(-2, -10)$ all lie on circle C .
- a Show that PR is perpendicular to PQ . (2)
- b Hence, show that C has the equation $x^2 + y^2 - 6x - 4y - 156 = 0$. (5)
- 10 A circle has the equation $x^2 + y^2 - 2x - 7y - 16 = 0$.
- a Find the coordinates of the centre of the circle. (2)
- b Show that the radius of the circle is $k\sqrt{13}$, where k is an exact fraction to be found. (2)
- c Find an equation of the tangent to the circle at the point $(4, 8)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (4)

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The line with equation $x - 2y + 3 = 0$ intersects the circle C at the points A and B as shown in the diagram above. Given that the centre of C has coordinates $(6, 7)$,

- a find the coordinates of the mid-point of the chord AB . (6)
- Given also that the x -coordinate of the point A is 3,
- b find the coordinates of the point B , (3)
- c find an equation for C . (2)
- 12 The circle C has equation $x^2 + y^2 - 8x - 16y + 72 = 0$.
- a Find the coordinates of the centre and the radius of C . (3)
- b Find the distance of the centre of C from the origin in the form $k\sqrt{5}$. (2)
- The point A lies on C and the tangent to C at A passes through the origin O .
- c Show that $OA = 6\sqrt{2}$. (3)
- 13 The circle C has equation $x^2 + y^2 - 4x - 6 = 0$ and the line l has equation $y = 3x - 6$.
- a Show that l passes through the centre of C . (3)
- b Find an equation for each tangent to C that is parallel to l . (6)