

1 Equation of a circle

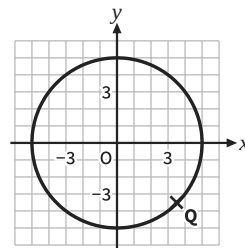
- a) Write the equation of the circle with centre (0, 0) and radius 7.
b) Find the radius of the circle $x^2 + y^2 = 45$.
Give your answer as a surd in its simplest form.

$$\begin{aligned} \text{a) } x^2 + y^2 &= 49 \\ \text{b) } \sqrt{45} &= \sqrt{9 \times 5} \\ \text{radius} &= 3\sqrt{5} \end{aligned}$$

2 Equation of a circle

The circle has centre (0, 0).

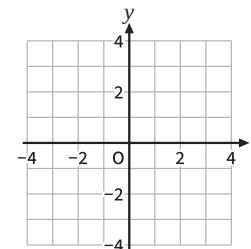
- a) Write down the equation of the circle.
b) Is the point Q(3.5, -3.5) inside, on or outside the circle?
Show how you know.



$$\begin{aligned} \text{a) } x^2 + y^2 &= 25 \\ \text{b) } 3.5^2 + 3.5^2 &= 24.5 < 25, \text{ inside} \end{aligned}$$

3 Equation of a circle

- a) On the grid, draw the circle $x^2 + y^2 = 9$.
b) Draw the line $y = 2 - x$ on the grid.
Estimate the coordinates of the points where it meets the circle.



$$\begin{aligned} \text{a) centre } (0, 0), \text{ radius } 3 \\ \text{b) } (2.9, -0.9) \text{ and } (-0.9, 2.9) \end{aligned}$$

4 Equation of a circle

The circle $x^2 + y^2 = 61$ meets the positive y axis at A.

- a) Write down the exact coordinates of A.
b) The point (k, -6) is on the circle. Find the two possible values of k.

$$\begin{aligned} \text{a) } (0, \sqrt{61}) \\ \text{b) } k^2 + 36 &= 61, k^2 = 25 \\ k &= 5 \text{ or } k = -5 \end{aligned}$$

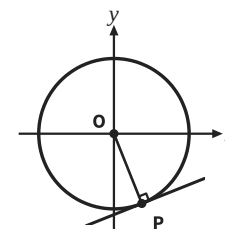
Equations of circles revision mat answers

Higher A

5 Equation of a tangent

P(2, -5) is on the circle $x^2 + y^2 = 29$.

- a) Find the gradient of the radius OP.
b) Find the gradient of the tangent to the circle at P.



$$\begin{aligned} \text{the tangent is perpendicular to } OP \\ \text{a) } -\frac{5}{2} \quad \text{b) } \frac{2}{5} \end{aligned}$$

6 Equation of a tangent

The point (-3, 1) is on the circle $x^2 + y^2 = 10$.

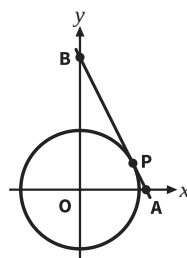
- a) Find the equation of the tangent to the circle at (-3, 1).
b) Show that the tangent passes through the point (-4, -2).

$$\begin{aligned} \text{a) radius gradient } -\frac{1}{3}, \text{ tangent gradient } 3 \\ 1 &= -9 + c, y = 3x + 10 \\ \text{b) } 3 \times (-4) + 10 &= -2 \end{aligned}$$

7 Equation of a tangent

The tangent to $x^2 + y^2 = 20$ at P(4, 2) meets the axes at A and B.

- a) Find the equation of the tangent.
b) Find the area of triangle OAB.



$$\begin{aligned} \text{a) tangent gradient } -2, y &= -2x + 10 \\ \text{b) } A(5, 0), B(0, 10), 5 \times 10 \div 2 &= 25 \end{aligned}$$

8 Equation of a tangent

A tangent to the circle $x^2 + y^2 = 45$ has gradient 2. It touches the circle at P, above the x axis.

- a) Find the gradient of OP.
b) Find the coordinates of P.

$$\begin{aligned} \text{a) } -\frac{1}{2}, \text{ so } P \text{ is on } y &= -\frac{1}{2}x \\ \text{b) } x^2 + \frac{x^2}{4} &= 45, x^2 = 36 \\ x &= -6, \text{ so } P \text{ is } (-6, 3) \end{aligned}$$