Coordinate geometry: circles

P2 | Study notes, worked example and practice

What to understand

A circle equation in completed-square form shows its centre and radius directly.

At the point where a tangent touches a circle, the tangent is perpendicular to the radius.

Key formulae

$$(x-a)^2+(y-b)^2=r^2$$

$$\text{centre}=(a,b), \qquad \text{radius}=r$$

Worked example

$$x^2+y^2-4x+6y-12=0 \implies (x-2)^2+(y+3)^2=25$$

The centre is $(2, -3)$ and the radius is 5.

Practice questions

Show your working. Try these without looking at the answers.

1. State the centre and radius of $(x - 2)^2 + (y + 1)^2 = 25$.

2. Find the centre and radius of $x^2 + y^2 - 4x + 6y - 12 = 0$.

3. Find the tangent to $x^2 + y^2 = 25$ at $(3, 4)$.

Answers

Use these to check the method as well as the final answer.

1. Centre $(2, -1)$, radius 5.

2. Centre $(2, -3)$, radius 5.

3. $3x + 4y = 25$.